



LCDA630P series

Servo Drive Design & Maintenance Manual

Shenzhen Xin Lichuan Electric Co.LTD

Safety precautions (please read carefully before use)

When receiving inspection, installation, wiring, operation, maintenance and inspection, you should pay attention to the following safety precautions at all times:

Regarding ignoring the contents of the manual and using this product incorrectly, the degree of harm and damage that may be caused is distinguished and explained as shown in the following table.

| | |
|---|---|
|  Danger | This mark indicates the content of "accidents that may cause injury or property damage" |
|  Notes | This mark indicates the content of "accidents that may cause injury or property damage" |

Use the following graphic signs to explain the matters that should be observed:

| | |
|---|--|
|  | This graphic shows the contents of the prohibited items. |
|  | This graphic shows the "mandatory" content that must be implemented. |

|  Danger | | |
|---|---|---|
| About installation and wiring | | |
|  | Never connect the motor directly to a commercial power source. | Otherwise, it may cause fire and malfunction. |
| | Do not place flammable materials around the motor and driver. | Otherwise, it may cause a fire accident. |
|  | The drive must be protected by an outer box. When installing the protective outer box, the outer box wall, other Keep the distance specified in the instruction manual between the machine and the drive. It should be installed in a place with less dust and no contact with water, oil, etc. | Otherwise, it may cause electric shock, fire, and malfunction |
| | The motor and driver are installed on non-combustible materials such as metal. | Otherwise, it may cause electric shock. |
| | Be sure to have a professional electrician perform the wiring work. | Otherwise, it may cause electric shock. |
| | The FG terminal of the motor and driver must be grounded. | Otherwise, it may cause electric shock, injury, malfunction, or damage. |
| | The upper circuit breaker must be cut off in advance and the correct wiring must be performed. | Otherwise, it may cause a fire accident |
| | The cable should be properly connected and the energized parts must be insulated with insulators. | Otherwise, it may cause electric shock, fire, and malfunction. |
| About operation and operation | | |
|  | Do not touch the inside of the drive. | Otherwise, it may cause fire and malfunction. |
| | Do not let the cable be damaged, subjected to excessive external force, heavy pressure, or pinched. | Otherwise, it may cause a fire accident. |
| | Do not touch the rotating part of the motor during operation. | Otherwise, it may cause electric shock, fire, and malfunction |
| | Do not use it in a place with water, in an environment with corrosive, flammable gas, or near combustible materials. | Otherwise, it may cause a fire accident |
| | Do not use it in places subject to intense vibration or shock. | Otherwise, it may cause electric shock. |
| | Do not immerse the cable in oil and water for use. | Otherwise, it may cause electric shock. |
| | Do not connect and operate with wet hands. | Otherwise, it may cause electric shock, injury, malfunction, or damage. |

| | | |
|--|--|--|
| | When using a motor with a keyway on the shaft end, do not touch the keyway with your bare hands. | Otherwise, it may cause a fire accident |
| | The temperature of the motor, driver, and radiator will rise, please do not touch them. | Otherwise, it may cause electric shock, fire, and malfunction. |
| | Do not use external power to drive the motor. | Otherwise, it may cause fire and malfunction. |

Notes on other use

| | | |
|--|---|--|
| | Be sure to confirm relevant safety after the earthquake. | Otherwise, it may cause a fire accident |
| | In order to prevent fires and personal accidents in the event of an earthquake, the installation and installation should be carried out properly. | Otherwise, it may cause electric shock, fire, and malfunction. |
| | An emergency stop circuit must be installed externally to ensure that the operation can be stopped and the power supply can be cut off in time in an emergency. | Otherwise, it may cause fire and malfunction. |

About maintenance and inspection

| | | |
|--|--|---|
| | The drive has dangerous high voltage parts. When wiring and inspection work, you must cut off the power supply and leave it to discharge (more than 5 minutes). And, it is absolutely not allowed to decompose it. | Otherwise, it may cause fire and malfunction. |
|--|--|---|

⚠ Notes

About installation and wiring

| | | |
|--|---|---|
| | The motor and driver must be combined as specified. | Otherwise, it may cause electric shock. |
| | Do not touch the connector terminals directly. | Otherwise, it may cause electric shock, injury, malfunction, or damage. |
| | Note that the vents must not be blocked or foreign objects enter. | Otherwise, it may cause a fire accident |
| | The test run must be carried out with the motor fixed and separated from other mechanical systems. | Otherwise, it may cause electric shock, fire, and malfunction. |
| | After confirming the action, install it on the mechanical system. | Otherwise, it may cause fire and malfunction. |
| | Observe the specified installation method and installation direction. Install properly according to the weight of the equipment and the rated output of the product. | Otherwise, it may cause electric shock. |

About operation and operation

| | | |
|--|---|---|
| | Do not stand on the product or place heavy objects on the product. | Otherwise, it may cause fire and malfunction. |
| | Prohibition of extreme gain adjustments and changes will cause unstable operation. | Otherwise, it may cause a fire accident. |
| | Do not use it in places exposed to direct sunlight. | Otherwise, it may cause electric shock, fire, and malfunction |
| | Do not subject the motor and motor shaft to strong impact. | Otherwise, it may cause a fire accident |
| | The function of the built-in brake of the motor is to keep the brake, and it is prohibited to use it for normal braking. | Otherwise, it may cause electric shock. |
| | When the power supply is restored after a power failure, it may start suddenly, so please do not approach the machine. Make sure to set up the machine to ensure personal safety even after restarting. | Otherwise, it may cause electric shock. |
| | Do not use faulty or damaged motors and drives. | Otherwise, it may cause electric shock, injury, malfunction, or damage. |
| | Please confirm whether the power supply specifications are normal. | Otherwise, it may cause a fire accident |
| | The holding brake is not a stopping device to ensure mechanical safety. Install a stop device to ensure safety on the machine side. | Otherwise, it may cause electric shock, fire, and malfunction. |
| | When alarming, remove the cause of the fault and ensure safety, then clear the alarm and restart. | Otherwise, it may cause fire and malfunction. |
| | The brake relay and the emergency stop circuit breaker relay must be connected in series. | Otherwise, it may cause a fire accident. |

About maintenance and inspection

| | | |
|--|--|--|
| | Do not store in places where rain or water splashes, or where there are toxic gases and liquids. | Otherwise, it may cause electric shock. |
| | When carrying, do not hold the cable or the motor shaft. | Otherwise, it may cause a fire accident |
| | Avoid falling or tipping when carrying or installing. | Otherwise, it may cause electric shock, fire, and malfunction. |
| | If long-term storage is required, please consult the contact method described in this manual. | Otherwise, it may cause fire and malfunction. |
| | Please keep it in a storage place that complies with the storage environment specified in this manual. | Otherwise, it may cause a fire accident. |

Notes on other use

| | | |
|--|--|--|
| | When disposing of batteries, please insulate them with tape, etc., and dispose of them in accordance with the regulations of the relevant authorities. | |
| | Please dispose of it as industrial waste. | |

About maintenance and inspection

| | | |
|--|--|---|
| | Do not carry out disassembly and repair work except our company. | Otherwise, it may cause fire and malfunction. |
| | Do not open and close the main circuit power switch frequently. | Otherwise, it may cause a fire accident. |
| | During power-on or within a certain period of time after the power is cut off, the motor, the radiator of the driver, and the regenerative resistor may be in a high temperature state. Do not touch it. | Otherwise, it may cause electric shock. |
| | When the drive fails, please cut off the control power supply and the main circuit power supply. | Otherwise, it may cause a fire accident |
| | Be sure to cut off the main power supply when not in use for a long time. | Otherwise, it may cause electric shock. |

About maintenance and inspection

| | |
|----------------------|---|
| <Warranty Period> | |
| ◆ | The warranty period of the product is 18 months from the month of manufacture of the company. However, for motors with brakes, the number of acceleration and deceleration of the shaft does not exceed the life span. |
| <Guaranteed Content> | |
| ◆ | According to the normal use of this manual, within the warranty period, it will be repaired free of charge in case of failure. However, even if the following failure occurs during the warranty period, it is a paid repair. |
| ① | Wrong use, and inappropriate repair and modification. |
| ② | When it is dropped after purchase, and the cause of damage during transportation. |
| ③ | The reason for using the product beyond the product specifications. |
| ④ | Fire, earthquake, thunderstorm, wind and flood, salt damage, abnormal voltage and other natural disasters. |
| ⑤ | When water, oil, metal pieces, or other foreign matter invades. |
| ◆ | The scope of guarantee is the main body of the deliverable. If the damage is caused by the failure of the deliverable, it is judged to be outside the scope of compensation. |

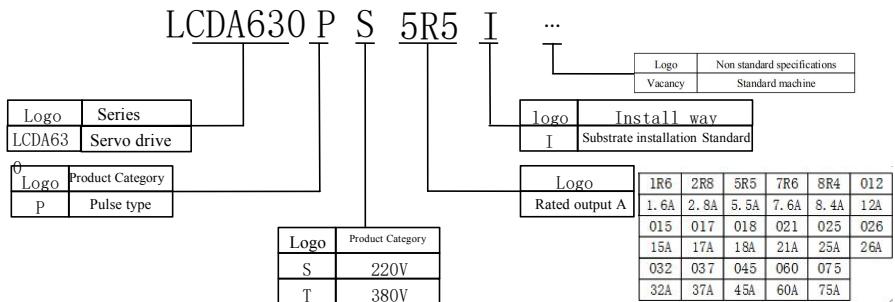
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Chapter 1 Product description and system selection

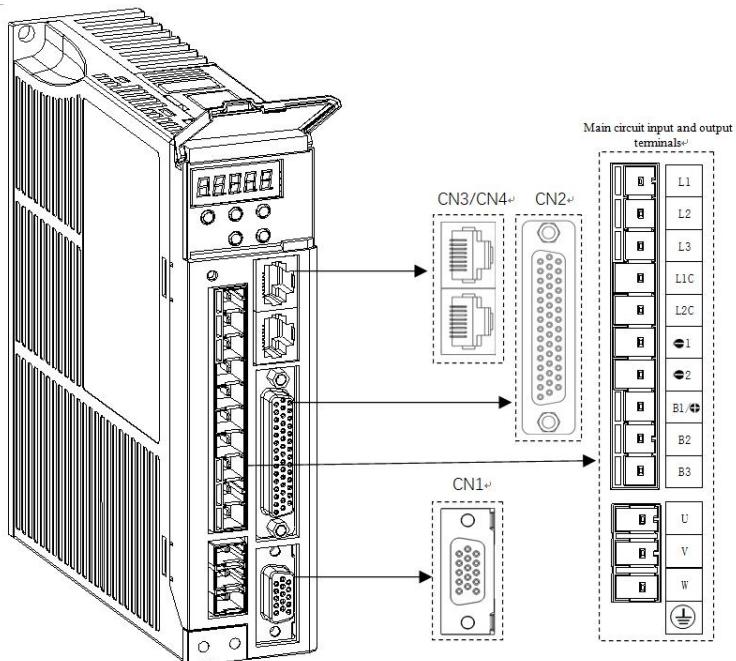
1.1 Model Type



1.2 The name of each part of the drive

| Model | Specification |
|---|---|
| Digital tube display | The 5-digit 7-segment LED digital tube is used to display the running status and parameter setting of the servo. |
| Key operator | <p>◀ : Set key. Press this key to display the setting and setting value of each parameter, and enter the parameter setting state (long press the parameter to confirm);</p> <p>◀ : DATA key. Press this key to move the selected digit (the decimal point of the digit flashes) to the left;</p> <p>▲ : UP key. The set value can be increased as a forward start key when the auxiliary function mode JOG is running;</p> <p>M : MODE key. Switch basic mode: status display, auxiliary function, parameter setting, monitoring;</p> <p>▼ : DOWN key. It can reduce the set value and act as the reverse start key during the auxiliary function mode JOG operation.</p> |
| CHARGE Bus voltage indicator | Used to indicate that the bus capacitor is in a charged state. When the indicator light is on, even if the main circuit power supply is OFF, the internal capacitor of the servo unit may still be charged. Therefore, do not touch the power terminals when the light is on to avoid electric shock. |
| L1、L2、L3 | Three phase AC200V-240V, -15%~10%, 50/60Hz; Or three phase AC380V-440V, -15%~10%, 50/60Hz. |
| L1C、 L2C Control power terminal | Single phase AC200V-240V, -15%~10%, 50/60Hz. (380VWithout this terminal) |
| 01、02 (Empty feet) | ∅1: BusbarN; ∅2: Empty feet |
| B1/∅、B2、B3 Braking resistor terminal | When using an external braking resistor, connect a braking resistor between B1/∅ and B2; when using an internal braking resistor, short-circuit B2 and B3 (B2 and B3 have been short-circuited before leaving the factory). |
| U、V、W、 Motor power terminal and ground terminal | It must correspond to the UVW terminals of the motor one by one. |

| | |
|--------------------------------------|--|
| CN1 Motor encoder terminal | Note the terminal definition |
| CN2 Input and output terminals | Note the terminal definition. |
| CN3、CN4 Communication terminal | Internal parallel connection, connected with RS-232, RS-485, Canopen communication command device. |



1.3 Braking resistor related specifications

Note: ■S1R6 and S2R8 models have no built-in braking resistor. If you need to use it, please configure the external braking resistor by yourself. Please consult our technical support for the power selection of the external braking resistor.

| Model Type | Built-in braking resistor specifications | | Minimum allowable resistance value(Ω) | The capacitor can absorb the maximum braking energy (J) |
|----------------------------|---|--------------|--|---|
| | Resistor (Ω) | Capacity (W) | | |
| Single phase 220V | IR6 | - | - | 50 |
| | 2R8 | - | - | 45 |
| single/three phase 220V | 5R5 | 50 | 50 | 40 |
| Three phase 220V | 7R6 | 30 | 60 | 20 |
| | 012、015、018 | | | 20 |
| | 025 | 40 | 200 | 12 |
| | 032 | | | 12 |
| | 045 | - | - | 8 |
| | 060 | - | - | 6 |
| | 075 | - | - | 6 |
| | | | | 500 |
| | | | | 250 |
| | | | | 900 |
| | | | | 1200 |

| | | | | | |
|------------------|---------|-----|-----|----|-----|
| Three phase 380V | 3R5 | 100 | 80 | 80 | 28 |
| | 5R4 | | | 60 | 34 |
| | 8R4 | 60 | 100 | 45 | 60 |
| | 012 | 60 | 100 | 45 | 90 |
| | 017 | 60 | 100 | 35 | 90 |
| | 021 | 40 | 200 | 35 | 122 |
| | 026、032 | 40 | 200 | 25 | 200 |
| | 037 | - | - | 20 | 250 |
| | 045 | - | - | 16 | 300 |
| | 060 | - | - | 12 | 450 |
| | 075 | - | - | 12 | 600 |

Chapter 2 Product specifications

2.1 Servo drive specifications

| Item | | Specifications | | | | | | | | | | | | | | | |
|--------------------------|---|--|------------------------------|--|-----|-----|-----|-----|----------------------|-----|-----|--|--|--|--|--|--|
| Model Type LCDA630PS□□□I | | 1R6 | 2R8 | 5R5 | 7R6 | 012 | 015 | 018 | B Type 018 025 | 025 | 032 | | | | | | |
| Outlook | W(mm) | 148 | | 148 | 65 | | | 201 | | 215 | | | | | | | |
| | H(mm) | 160 | | 160 | 160 | | | 222 | | 368 | | | | | | | |
| | D(mm) | 42 | | 56 | 186 | | | 110 | | 206 | | | | | | | |
| | Weight(kg) | 0.8 | | 1.0 | 1.5 | | | 4.0 | | 8.3 | | | | | | | |
| | Input Power | Single phase AC200V-240V, -15%~10%, 50/60Hz or three phase AC200V-240V,-15%~10%, 50/60Hz | | Three phase AC200V-240V,-15% ~ 10% , 50/60Hz | | | | | | | | | | | | | |
| Modpe LCDA630PTel Ty□□I | | 8R4 | 012 | 017 | 021 | 026 | 032 | 037 | 045 | 060 | 075 | | | | | | |
| Outlook | W(mm) | 201 | | | | 215 | | | | 215 | | | | | | | |
| | H(mm) | 222 | | | | 368 | | | | 463 | | | | | | | |
| | D(mm) | 110 | | | | 206 | | | | 224 | | | | | | | |
| | Weight(kg) | 4.0 | | | | 8.3 | | | | 12 | | | | | | | |
| | Input Power | Three phase AC380V-440V, -15%~10%, 50/60Hz | | | | | | | | | | | | | | | |
| Basic information | E n v i r o n m m e n | ℃ | Use environment humidity | 0~55℃ | | | | | | | | | | | | | |
| | | | Storage environment humidity | -20~65℃ | | | | | | | | | | | | | |
| | H u u m id it y | | Use environment humidity | 20~85% RH below (No condensation) | | | | | | | | | | | | | |
| | | | Storage environment humidity | 20~85% RH below (No condensation) | | | | | | | | | | | | | |

| Item | | | Specifications |
|------------------------|--|--|--|
| t | vibration | Use to preserve ambient air | indoor (no sunshine)、No corrosive gas, flammable gas, oil mist, dust |
| | | altitude | Below 1000m |
| | | vibration | 5.8m/s ² (0.6G) below 10~60Hz (Can not be used continuously at resonance frequency) |
| | Insulation withstand voltage | | Basic—FG between AC1500V 1min |
| | Control way | | Three-phase PWM converter sine wave drive |
| | Encoder feedback | | 1: Provincial line 2500 line 2: 17bit (after adding a battery, it can be used as a multi-turn absolute encoder) |
| | Control signal | Input | 9 inputs (DC24V optocoupler isolation) switch according to the control mode function |
| | | Output | 5 output (DC24V optocoupler isolation, open collector output) switch according to the control mode function |
| | Pulse signal | Input | 2 inputs (optocoupler isolation, RS-422 differential, open collector output) |
| | | Output | 4 outputs (A/B/Z phase RS-422 differential; Z phase open collector output) |
| Communication function | RS232 | | For PC communication (for "Servostudio" connection) |
| | RS-485 | | For upper remote control communication (1:n) |
| | CAN | | CANOPEN bus communication |
| | Regeneration function | | Optional regenerative resistor, external regenerative resistor. Pay attention to modify internal parameters |
| | Dynamic brake | | YES |
| Function | Control model | | 6 control modes: speed control, position control, torque control, torque/speed control, speed/position control, torque/position, torque/speed/position hybrid control |
| | Control input | | Alarm reset, proportional action switching, zero fixed function enable, forward drive prohibited, reverse drive prohibited, external torque limit for forward rotation, external torque limit for reverse rotation, forward jog, reverse jog, forward Reset switch, reverse reset switch, origin switch, emergency stop, servo enable, gain switch |
| Control output | | Servo ready, motor rotating, zero speed signal, speed reached, position reached, positioning approach signal, torque limit, speed limit, brake output, warning, servo failure, alarm code (3-digit output) | |
| Position control | Pulse width | Maximum command pulse frequency | Differential input: high-speed maximum 4Mpps, pulse width cannot be less than 0.125μs The maximum low speed is 500Kpps, and the pulse width cannot be less than 1μs Open collector: maximum 200Kpps, pulse width cannot be less than 2.5μs |
| | | Input pulse signal form | Differential input; open collector |
| | | Input pulse signal method | Pulse + direction, right angle phase difference (A phase + B phase), CW + CCW pulse |
| | Command pulse division/multiplication (Electronic gear ratio setting) | Command pulse division/multiplication (Electronic gear ratio setting) | 0.1048576 < B/A < 419430.4 |
| | | Command filter | Smoothing filter, FIR filter |
| | | Output pulse form | Phase A, Phase B: Differential output Z phase: differential output or open collector output |
| | Frequency division ratio | Frequency division ratio | Arbitrary frequency division |

| Item | | | Specifications |
|---|-------------------------------------|--|--|
| | o u t p u t | Output pulse function | Encoder position pulse and position pulse command (can be set) |
| S p e e d c o n t r o l | Control input | | Servo ON, alarm reset, speed command reverse, zero speed clamp, internal command selection input 1, internal command selection input 2, internal command selection input 3, internal command selection input 4, forward rotation external torque limit input, reverse rotation External torque limit input, emergency stop |
| | Control output | | Alarm status, servo preparation, brake release, torque limit output, speed limit output speed reached, speed consistent, motor rotation output, zero-speed signal output |
| T o r q u e C o n t r o l | Control input | Servo ON, alarm reset, torque command reverse, zero speed clamp | |
| | Control output | Alarm status, servo preparation, brake release, torque limit, speed limit output, emergency stop | |
| T o r q u e C o n t r o l | Torque command input | (Factory default setting, the range can be set by function code) | |
| | Speed limit function | Positive and negative internal speed limit P03.27, P03.28 | |
| C o m m o n | Speed observer function | YES | |
| | Damping control function | YES | |
| | Adaptive notch filter | YES | |
| | Automatic adjustment function | YES | |
| | Encoder output frequency division | YES | |
| | Internal location planning function | YES | |
| | Adjustment/ function setting | Use the host computer setting software "Servostudio" to adjust | |
| | Protection | Over voltage, abnormal power supply, overcurrent, overload, abnormal encoder, overspeed, excessive position deviation, abnormal parameters, etc. | |

Chapter 3 Servo Motor and Drive Installation and Dimensions

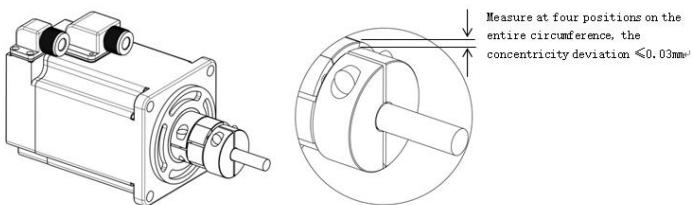
3.1 Install environment

Regarding environmental conditions, please be sure to comply with the specifications set by our company. If you need to use it outside the specified environmental conditions, please consult our company in advance.

- ① Install in a place that will not be directly exposed to sunlight.
- ② The driver must be installed in the control box
- ③ Install it in a place where it will not be immersed by water or oil (cutting oil, oil mist) and without moisture.
- ④ Keep away from corrosive atmospheres such as explosive and flammable gas, sulfide gas, chlorinated gas, ammonia, etc., acid/alkali and salt.
- ⑤ A place that will not be disturbed by dust, iron powder, cutting powder, etc.
- ⑥ Keep away from high temperature places, places with continuous vibration and excessive shock.

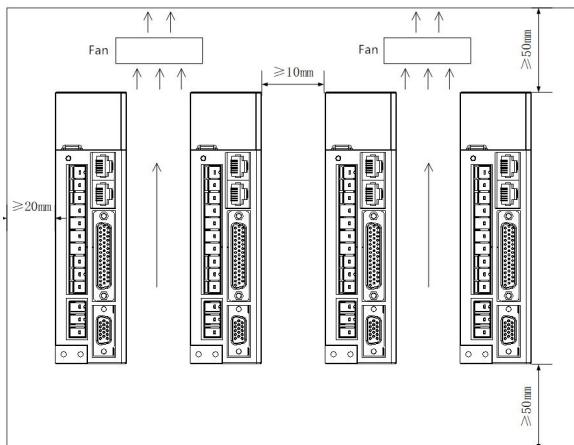
3.2 Installation concentricity

When connecting with machinery, use flexible couplings as much as possible, and keep the axis of the servo motor and the axis of the mechanical load in a straight line. When installing the servo motor, it should meet the concentricity tolerance requirements in the figure below.



Measured at quarters of a circle, the difference between the largest and smallest is less than 0.03mm.
(Rotate with the coupling)

3.3 Driver installation direction and interval



When setting up the drive, in order to ensure the heat dissipation and heat convection in the protection box or the control box, sufficient space should be left around.

For the driver, install it in the vertical direction. When installing the driver, please use two M4 screws to fix it.

When installed in a sealed box such as a control box, in order to ensure that the surrounding temperature of the internal boards does not exceed 55°C, it is necessary to install a fan or cooler for cooling.

The surface of the heat sink will be 30°C higher than the surrounding temperature.

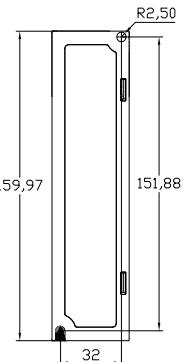
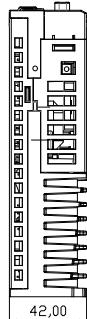
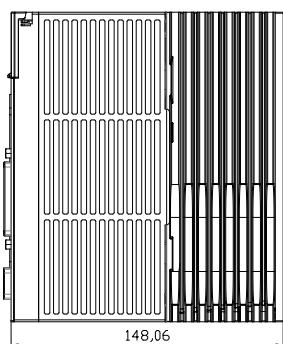
Use heat-resistant materials for wiring materials, and isolate them from devices and wiring that are easily affected by temperature.

The service life of the servo drive depends on the temperature around the internal electrolytic capacitor. When the electrolytic capacitor reaches the end of its service life, the electrostatic capacitance decreases and the internal resistance increases. Due to the above reasons, please be aware that it will cause overvoltage alarms, malfunctions caused by noise, and damage to various components. The life of an electrolytic capacitor is about 5 to 6 years under the conditions of "an average of 30°C per year, a load rate of 80%, and an average of 20 hours a day."

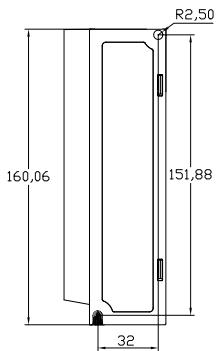
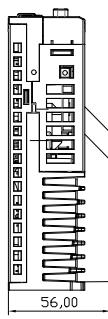
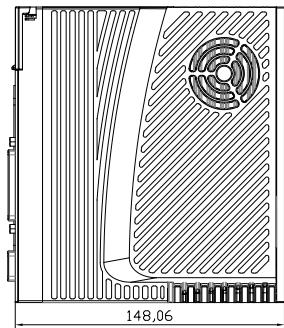
3.4 Servo drive installation size

LCDA630PS (220V) (Unit:mm)

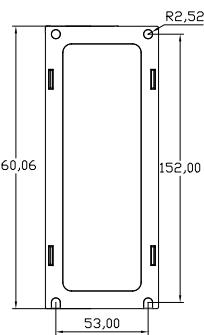
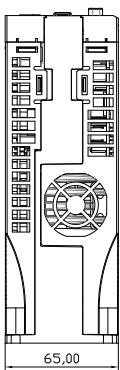
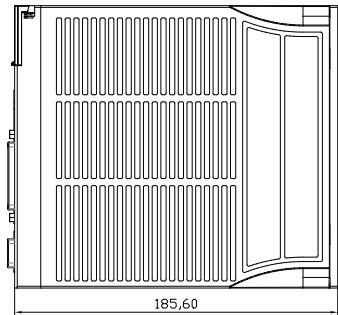
1. LCDA630PS1R6I、LCDA630PS2R8I



2. LCDA630PS5R5I

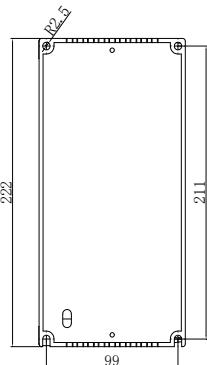
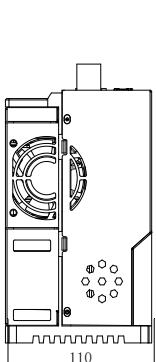
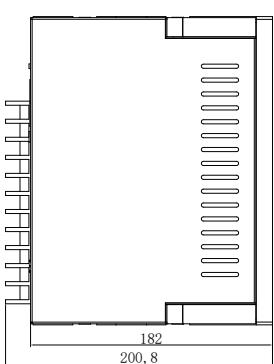


3. LCDA630PS7R6I、LCDA630PS012I、LCDA630PS018I



LCDA630PT (380V) (Unit:mm)

1. LCDA630PT8R4I、LCDA630PT012I、LCDA630PT017I、LCDA630PT021I、LCDA630PT026I



Chapter 4 Servo motor and driver wiring instructions

4.1 System wiring diagram example

Circuit breaker for wiring

Used to protect the power line and cut off the circuit in case of overcurrent

Noise filter

Install a noise filter to prevent external noise from the power cord

Electromagnetic contactor

Turn the servo power on/off. Please install surge suppressor when using

Braking resistance

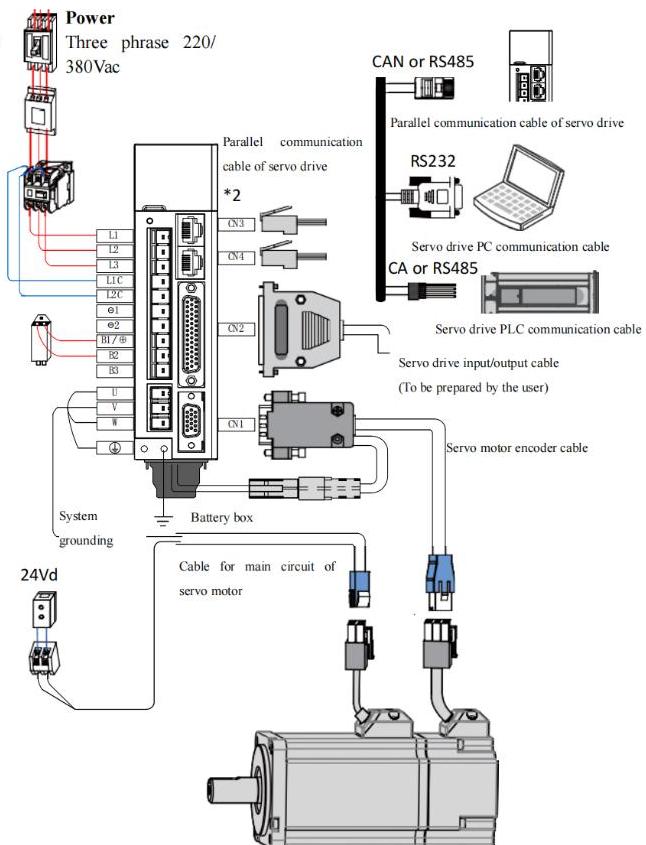
When using the external braking resistor, take down the B2 and B3 short connectors and connect the braking resistor between B1/① and B2; When using internal braking resistor, short circuit B2 and B3. (B2 and B3 have been short-circuited when leaving the factory)

Band brake power supply

24Vdc voltage source, used when servo motor is equipped with band

brake actuator

Brake control signal, turn on/off brake power. Please install surge suppressor when using



Please pay attention to the power capacity when connecting external control power supply or 24Vdc power supply, especially when supplying power to several drives or multiple brakes at the same time. Insufficient power capacity will result in insufficient power supply current and failure of the drive or brake. The brake power supply is a 24V DC voltage source, and the power needs to refer to the motor model and meet the brake power requirements.

Precautions for system wiring:

1. When connecting an external braking resistor, disconnect the short wiring between terminals B2 and B3 of the servo drive before connecting. Pay attention to modify internal parameters.
2. CN3 and CN4 are two pin definitions exactly the same communication interface, you can choose between them.
3. In single-phase 220V wiring, the main circuit terminals are L1 and L2. Do not connect the reserved

terminals.

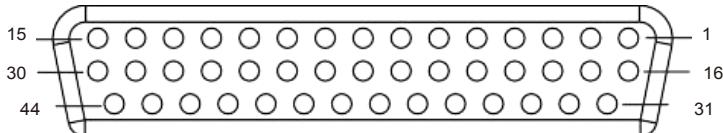
4.2 Detailed description of user I/O connector terminal arrangement

4.2.1 CN2 Illustration of terminal arrangement

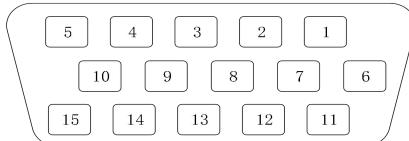
| | | | | | | | | | | | | | | |
|--------------|--------------|--------------|--------------|--------------|-------------|---------------|-------------|---------------|--------------|------------|------------|------------|------------|------------|
| 15 +5V | 14 COM- | 13 PZ0+ | 12 DI9 | 11 COM+ | 10 DI2 | 9 DI1 | 8 DI4 | 7 D01+ | 6 D01- | 5 D02+ | 4 D02- | 3 D03+ | 2 D03- | 1 D04+ |
| 30 DI8 | 29 GND | 28 D05+ | 27 D05- | 26 D04- | 25 PBO+ | 24 PZO- | 23 PBO- | 22 PAO- | 21 PAO+ | 20 AI1 | 19 GND1 | 18 AI2 | 17 +24V | 16 GND2 |
| 44 PZ-OUT | 43 PULSE- | 42 HSIGN+ | 41 PULSE+ | 40 HSIGN- | 39 SIGN- | 38 HPULSE+ | 37 SIGN+ | 36 HPULSE- | 35 PULLHI | 34 DI13 | 33 DI15 | 32 DI16 | 31 DI7 | |

Note: ■ When the power supply voltage is 380VAC, the terminal arrangement is shown in the figure above; when the power supply voltage is 220VAC, pins 14/17 are defined as empty pins.

Connector pattern diagram



4.2.2 CN1 Illustration of terminal arrangement



| Termin al No. | 2500 lines/absolute value signal lead name | | Terminal No. | 2500 lines/absolute value signal lead name | |
|---------------|--|-------------------|--------------|--|--------------------------------|
| | Name | Function | | Name | Function |
| 2 | A+ | PG input A+ phase | 15 | Z- | PG input Z-phase |
| 3 | A- | PG input A- phase | 6 | PG5V | PG power +5V |
| 4 | B+ | PG input B+ phase | 12 | PS+ | Bus type communication signal+ |
| 5 | B- | PG input B- phase | 7 | PS- | Bus type communication signal- |
| 10 | Z+ | PG input Z+ phase | 1 | GND | Signal ground |

4.2.3 CN3、CN4 Illustration of terminal arrangement

| Pin number | Definition | Description | Terminal pin distribution | | | | | | |
|------------|------------|------------------------|---|---|---|---|---|---|---|
| 1 | CANH | CAN communication port | <table border="1"> <tr><td>8</td></tr> <tr><td>7</td></tr> <tr><td>6</td></tr> <tr><td>5</td></tr> <tr><td>4</td></tr> <tr><td>3</td></tr> </table> | 8 | 7 | 6 | 5 | 4 | 3 |
| 8 | | | | | | | | | |
| 7 | | | | | | | | | |
| 6 | | | | | | | | | |
| 5 | | | | | | | | | |
| 4 | | | | | | | | | |
| 3 | | | | | | | | | |
| 2 | CANL | | | | | | | | |
| 3 | GND | | | | | | | | |
| 4 | RS485+ | | | | | | | | |
| 5 | RS485- | | | | | | | | |

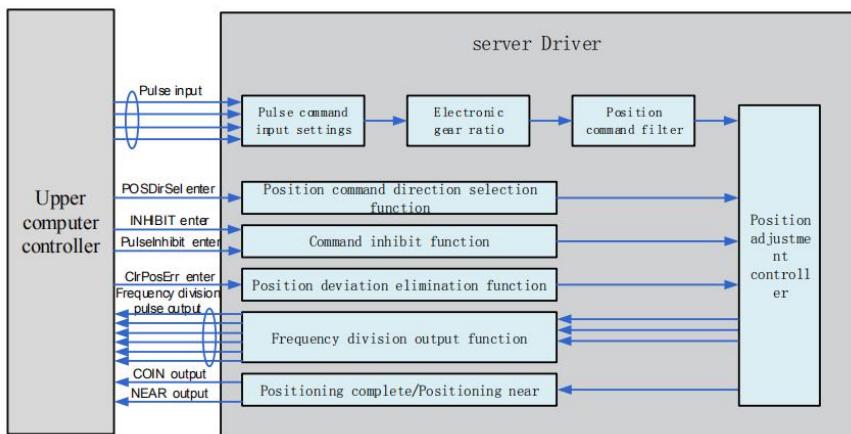
| | | |
|-------|-----------|--|
| 6 | RS232-TXD | RS232 sending end, connected with the receiving end of the host computer |
| 7 | RS232-RXD | RS232 receiving end, connected with the sending end of the host computer |
| 8 | GND | Ground |
| Shell | PE | shield |

Chapter 5 Control Mode

5.1 Position mode instructions

Set the value of parameter P02-00 to 1 through the servo drive panel or drive debugging platform, and the servo drive will operate in the position control mode.

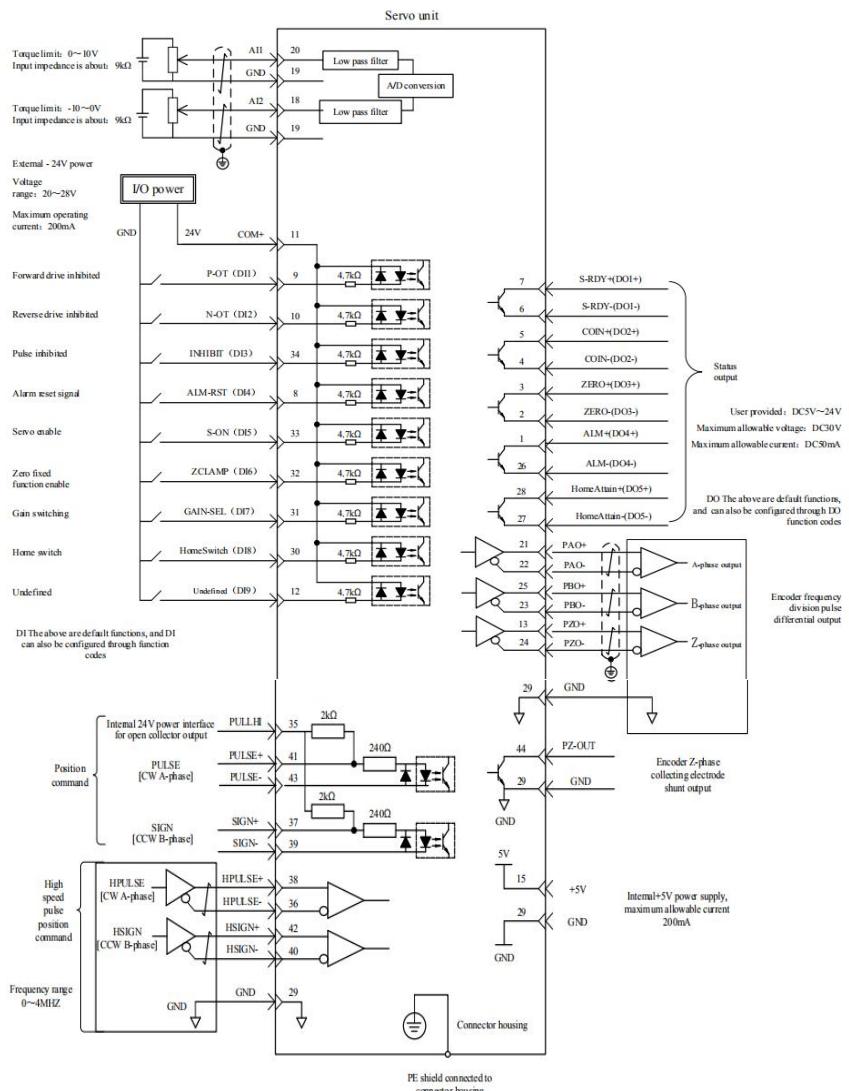
Please set the servo drive parameters according to the mechanical structure and indicators. The following describes the basic parameter settings when using the position control mode.



Position mode is the common working mode of servo drive, and its main use steps are as follows:

1. Correctly connect the power supply of the servo main circuit and control circuit, as well as the motor power line and the encoder line. After power-on, the display of "rdy" on the servo panel means that the servo power connection is correct and the motor encoder connection is correct.
2. Perform servo JOG trial run by pressing buttons to confirm whether the motor can run normally.
3. Connect the pulse direction input and pulse command input in the CN2 terminal, as well as necessary DI/DO signals, such as servo enable and positioning completion signals.
4. Set the location mode. Set the required DI/DO based on the actual situation. For the function code, see P03/P04. In addition, it is sometimes necessary to set the origin return, frequency division output and other functions, as detailed in the product comprehensive manual.
5. Enable servo, and control the rotation of servo motor by issuing position command through the upper computer. First, rotate the motor at a low speed, and confirm whether the rotation direction and the electronic gear ratio are normal, and then adjust the Gain

5.1.1 Position mode wiring



Represents twisted pair

Note:

- Signal cable and power cable must be separated, at least 30cm apart;
- When the signal cable is extended because the length is not enough, the shielding layer must be reliably connected to ensure that the shielding and grounding are reliable;
- +5V is based on GND, +24V is based on COM-. Do not exceed the maximum allowable current, otherwise the drive will not work properly.

5.1.2 Setting function codes related to position control mode

1) Position instruction input setting

a) Position instruction source

Set the function code P05-00=0, the position instruction comes from the pulse instruction, can also be set to other values according to the actual situation.

| Function code | Name | Setting range | Unit | Setting method | Effective time | Factory setting |
|---------------|-------------------------|---|------|----------------|-----------------------|-----------------|
| P05-00 | Location command source | 0: Pulse command 1: Step amount 2:Multi segmentposition command | - | stop setting | Effective immediately | 0 |

b) Source of pulse instruction

Set function code P05-01 to specify whether the pulse command originates from the low-speed pulse port or the high-speed pulse port..

| Function code | Name | Setting range | Unit | Setting method | Effective time | Factory setting |
|---------------|--|------------------------------|------|----------------|----------------|-----------------|
| P05-01 | Pulse instruction input terminal selection | 0-low speed 1- High speed | - | Stop setting | Display | 0 |

c) Position instruction direction switch

By setting the DI function FunIN.27, you can use DI to control the direction switch of the position command to meet the need to change the direction.

| Function code | Name | Function name | Setting range | remark |
|---------------|-----------|--|---|---|
| FunIN.27 | POSDirSel | Position instruction direction setting | 0- invalid (positivedirection); 1-Valid(reversedirection) . . | Logical selection of the corresponding terminal, the proposal is set to: Level valid. |

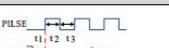
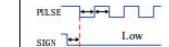
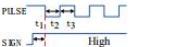
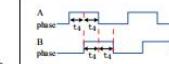
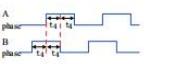
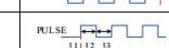
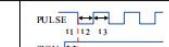
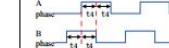
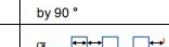
d) Pulse command form selection

Set the function code P05-15, select the form of external pulse instruction, including "direction + pulse (positive and negative logic)", "orthogonal pulse", "CW+CCW" three forms.

| Function code | Name | Setting range | Function | Setting method | Effective time | Factory setting |
|---------------|--------------------|---|---------------------------|------------------|----------------|-----------------|
| P05-15 | Pulse command form | 0: Direction+pulse (positive logic) 1: Direction+pulse (negative logic) 2: A-phase+B-phase quadrature pulse 4 frequency multiplication 3: CW+CCW | Select pulse command form | Shutdown setting | Re-energize | 0 |

The principle of the three pulse instruction forms is shown in the following table.

Table 6-8 Pulse Shape Description

| P02-02 Rotation direction selection | P05-15 Command form settings | Pulse shape | Signal | Schematic diagram of forward rotation pulse | Schematic diagram of reverse pulse |
|-------------------------------------|------------------------------|---|--------------------------------|--|--|
| 0 | 0 | Pulse+direction Positive logic | PULSE SIGN |  |  |
| | 1 | Pulse+direction Negative logic | PULSE SIGN |  |  |
| | 2 | Phase A+Phase B Quadrature pulse 4 octave | PULSE (phase A) Sign (phase B) |  |  |
| | 3 | CW+CCW | PULSE(CW) SIGN(CCW) |   | |
| 1 | 0 | Pulse+direction Positive logic | PULSE SIGN |  |  |
| | 1 | Pulse+direction Negative logic | PULSE SIGN |  |  |
| | 2 | Phase A+Phase B Quadrature pulse 4 octave | PULSE (phase A) Sign (phase B) |  |  |
| | 3 | CW+CCW | PULSE(CW) SIGN(CCW) |   | |

★Associated function NO.:

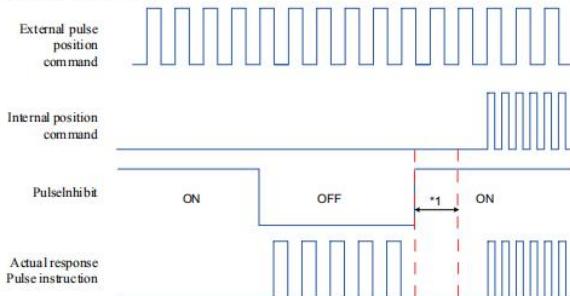
| Code | Name | Function | Function |
|----------|---------|-----------------------------|--|
| FunIN.13 | Inhibit | Position command inhibition | Invalid: in position control mode, the servo drive can respond to position commands; Valid. in position control mode, the servo drive does not respond to any internal or external position commands. |

b) Pulse command inhibition function

Pulse command inhibition function: forcibly setting the pulse command to zero, and the servo drive does not respond to the pulse command input from the pulse input terminal. In the Position control mode, the drive can respond to other forms of position commands. At this time, the drive can also switch to other control modes to continue running.

When the pulse command inhibition function is effective, in the Position control mode, if other forms of position commands are not switched to use, and the pulse input terminal continues to input pulse signals, the input position command counter (P0B-13) continues to count the pulse commands. However, the drive does not respond to the pulse commands counted at this time after the pulse command inhibition function is canceled; In the Position control mode, if you switch to using other forms of position commands, P0B-13 continues to count other forms of position commands and performs the position command.

When using the pulse command inhibit function, configure one DI terminal of the servo drive as function 37 (FunIN.37: Pulse Inhibit), and determine the valid logic for the DI terminal. It is recommended to use a fast DI (DI8 or DI9) terminal.



When P05-02 is not 0, the electronic gear ratio $\frac{B}{A} = \frac{\text{encoder resolution}}{\text{P05-02}}$. At this time, electronic gear ratio 1 and electronic gear ratio 2 have no effect.

3) Related function codes

a) Electronic gear ratio value setting

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------|------|---|------------------|-----------------------|-----------------|
| P05-02 | Number of position commands per 1 rotation of the motor | 0~1048576 | P/r | Set the number of position commands for 1 rotation of the motor | Re-energize | Effective immediately | 0 |
| P05-07 | Electronic gear ratio 1 (molecular) | 1~1072741824 | - | Set the numerator of the 1st set of electronic gear ratios | running settings | Effective immediately | 1048576 |
| P05-09 | Electronic gear ratio 1 (denominator) | 1~1072741824 | - | Set the denominator of the 1st set of electronic gear ratios | running settings | Effective immediately | 10000 |
| P05-11 | Electronic gear ratio 2 (molecular) | 1~1072741824 | - | Set the numerator of the second set of electronic gear ratios | running settings | Effective immediately | 1048576 |
| P05-13 | Electronic gear ratio 2 (denominator) | 1~1072741824 | - | Set the denominator of the second electronic gear ratio | running settings | Effective immediately | 10000 |

b) Electronic gear ratio switching setting

The electronic gear ratio finally selected for the servo drive should refer to the following table.

Table 6-15 Electronic Gear Ratio

| P05-02 | P05-39 | DI terminal level corresponding to FunIN.24 | Electronic gear ratio $\frac{B}{A}$ |
|-----------|--------|---|--|
| 0 | 0 | Invalid | $\frac{P05 - 07}{P05 - 09}$ |
| | | Valid | $\frac{P05 - 11}{P05 - 13}$ |
| | 1 | Invalid | $\frac{P05 - 11}{P05 - 13}$ |
| | | Valid | $\frac{P05 - 11}{P05 - 13}$ |
| 1~1048576 | - | - | $\frac{\text{Encoder resolution}}{P05 - 02}$ |

For a serial encoder, the motor resolution=(P/r), and n is the number of bits of the serial encoder.

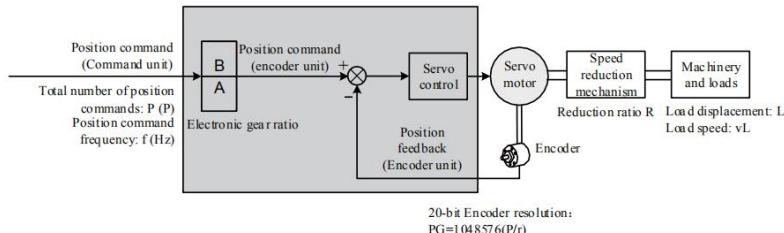
For example, a 17 bit serial encoder has an encoder resolution of=(P/r)=1048576 (P/r).

For orthogonal incremental encoders, encoder resolution=number of encoder lines $\times 4^n$.

For example, the number of orthogonal incremental encoder lines is 2500, and the encoder resolution is 10000 (P/r).

4) Electronic gear ratio calculation

The relationship between position command (command unit), load displacement, and electronic gear ratio is shown in the following figure:



5) Position command filtering

Position command filtering is the filtering of position commands (encoder units) after electronic gear

ratio frequency division or multiplication. It includes first order low-pass filtering and average filtering.

Position command filtering should be considered when:

- The position command output by the upper computer is not subjected to acceleration or deceleration processing;
- Low pulse command frequency;
- When the electronic gear ratio is more than 10 times.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--|---------------|------|--|------------------|----------------------|-----------------|
| P05-04 | First order low-pass filtering time constant | 0~6553.5 | ms | Set the time constant of the first order low-pass filter for position commands (encoder units) | Shutdown setting | Effectve immediately | 0.0 |
| P05-06 | Average filtering time constant | 0~128.0 | ms | Set the time constant of the average filter for position commands (encoder units) | Shutdown setting | Effectve immediately | 0.0 |

- This function has no effect on the amount of displacement (total number of position commands).
- If the set value is too large, it will lead to an increase in the delay of the response. Therefore, the filtering time constant should be set according to the actual situation.

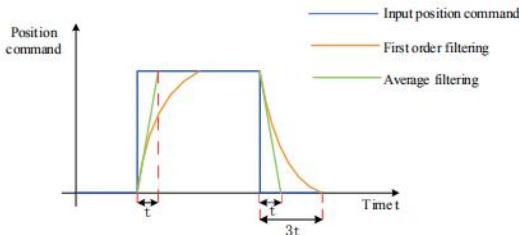


Figure 6-38 Schematic Diagram of Rectangular Position Command First Order Filtering and Average Filtering

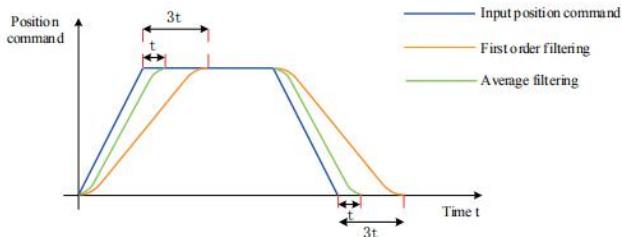


Figure 6-39 Schematic Diagram of Ladder Position Command First Order Filtering and Average Filtering

6) Position deviation clearing function

Position deviation=(position command position feedback) (encoder unit) The position deviation clearing function refers to the ability of the drive to clear the position deviation to zero when certain conditions are met (P05-16).

★Associated function code:

| Function code | Name | Setting range | Function | Setting method | Effective time | Factory setting |
|---------------|------------------------|---|---|------------------|-----------------------|-----------------|
| P05-16 | Clear action selection | 0: Clear the position deviation when the servo is enabled to be OFF or a fault occurs 1: Clear the position deviation pulse when the servo is enabled to be OFF or a fault occurs 2: Servo enable OFF or clear position deviation through DI input ClrPosErr signal | Set the conditions for clearing the position deviation. | Shutdown setting | Effective immediately | 0 |

When P05-16=2, configure one DI terminal of the servo drive to function 35 (FunIN.35: ClrPosErr, clear position deviation), and determine the valid logic for the DI terminal. It is recommended to use a fast

DI (DI8 or DI9) terminal.

★Associated function NO.:

| Code | Name | Function name | Function |
|----------|-----------|--------------------------|--|
| FunIN.35 | ClrPosErr | Clear position deviation | Valid, clear position deviation; Invalid, no cleanup running will be performed. |

7) Frequency division output function

By setting P05-17, the servo driver divides the number of pulses fed back by the encoder according to the set value and outputs them through the output port of the frequency division. The set value of P05-17 corresponds to the number of pulses output by PAO/PBO per turn (before 4 times the frequency).

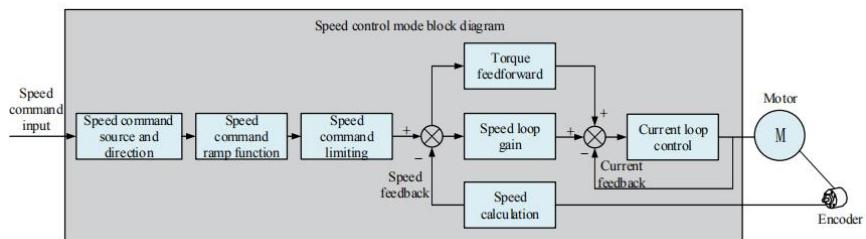
The servo pulse output source is selected by P05-38, and the pulse command synchronous output function is generally used for synchronous control occasions.

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---|------|---|------------------|-----------------------|-----------------|
| | | | | | ng | | |
| P05-17 | Encoder frequency division pulse number | 35~32767 | p/r | When P05-61<35, set the resolution of the output pulse to be equal to the number of PAO/PBO output pulses per rotation of the motor (before 4 times the frequency). | Shutdown setting | Effective immediately | 2500 |
| P05-38 | Servo pulse output source selection | 0: Encoder frequency division output 1: Pulse command synchronization output 2: Frequency division or synchronous output inhibition | - | Select servo pulse output source | Shutdown setting | Effective immediately | 0 |
| P05-41 | Z pulse output polarity selection | 0: Positive polarity output (Z pulse is high level) 1: Negative polarity output (Z pulse is low level) | - | Set the output level when the Z-phase pulse is valid | Shutdown setting | Effective immediately | 1 |
| P05-61 | Encoder frequency division pulse number (32 bits) | 0~262143 | p/r | When the setting value $P0561 \geq 35$ is set, the resolution of the output pulse is set to be equal to the number of PAO/PBO output pulses per rotation of the motor (before 4 times the frequency). | Shutdown setting | Effective immediately | 0 |

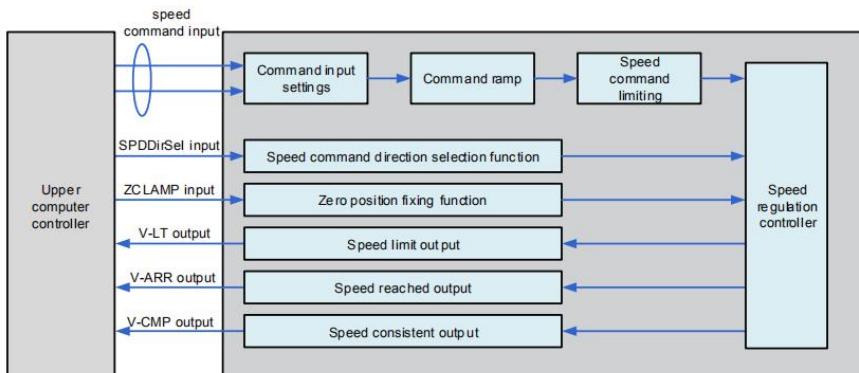
The output pulse feedback phase pattern can be adjusted by P02-03.

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--------------------|-----------------------------|------|---|------------------|----------------|-----------------|
| P02-03 | Output pulse phase | 0: A leads B 1: A lags B | - | Set the phase relationship between the A-phase pulse and the B-phase pulse of the pulse output. | Shutdown setting | Re-energyze | 0 |

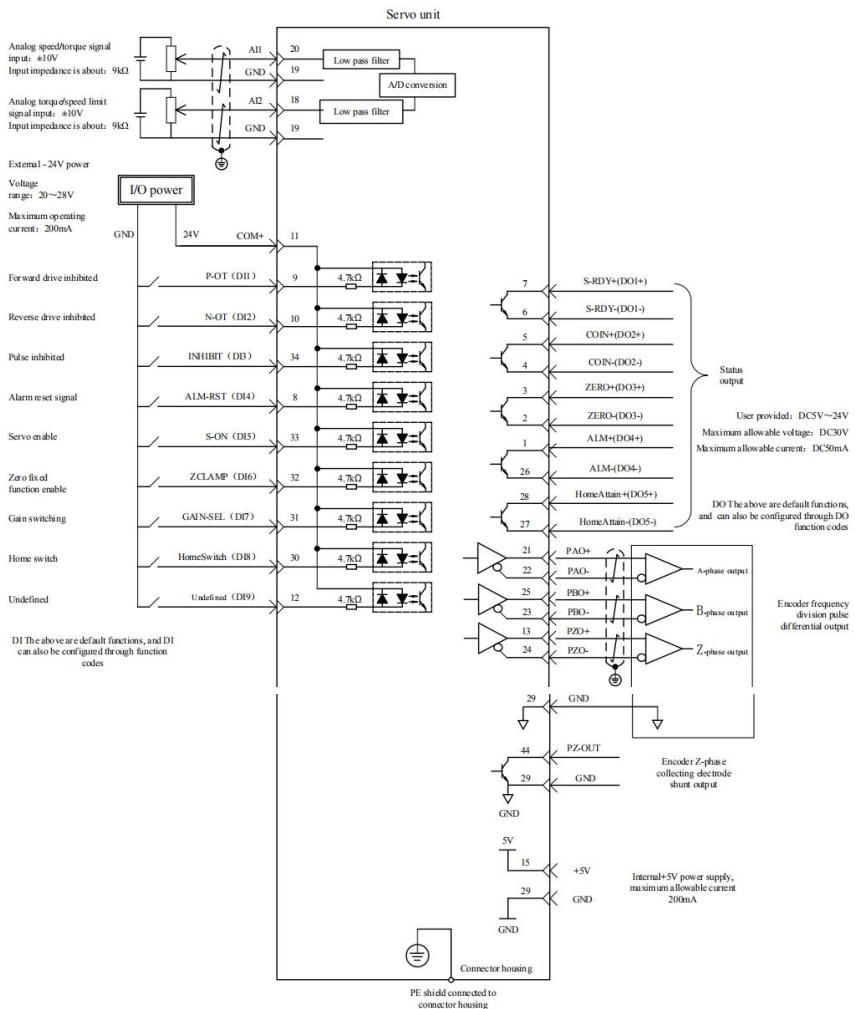
5.2 Speed control mode



Set the value of parameter P02-00 to 0 through the servo drive panel or drive debugging platform, and the servo drive will operate in speed control mode. Please set the servo drive parameters according to the mechanical structure and indicators. The following describes the basic parameter settings when using speed control mode.



5.2.1 Speed mode wiring



Represents twisted pair

Notes:

- Signal cables and power cables must be routed separately, at least 30cm apart;
- When the signal cable is not long enough to connect the cable, the shielding layer must be reliably connected to ensure reliable shielding and grounding;
- + 5V is referenced to GND. Do not exceed the maximum allowable current, otherwise the drive will not work normally.

1) Speed command source

The speed control mode has the following five speed command acquisition methods, which are set by function code P06-02.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|-------------------------|---|------|-----------------------------|------------------|-----------------------|-----------------|
| P06-02 | Speed command selection | 0: Main speed command A source 1: Auxiliary speed command B source 2: A+B 3: A/B switching 4: Communication given | - | Select speed command source | Shutdown setting | Effective immediately | 0 |

a) Main speed command A source

The main speed command A source includes two command forms: digital setting and analog voltage setting. The digital setting is an internal speed command, and the analog voltage setting is an external speed command

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|-----------------------------|--|------|---|------------------|-----------------------|-----------------|
| P06-00 | Main speed command A source | 0: Number given (P06-03) 1: AI1 2: AI2 | - | Select the source of the main speed command A | Shutdown setting | Effective immediately | 0 |

① Number given

It refers to setting the speed value through function code P06-03 as a speed command.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--------------------------------------|---------------|------|---|------------------|-----------------------|-----------------|
| P06-03 | Speed command keyboard setting value | -6000~6000 | rpm | Set the numerical value of the internal speed command with an accuracy of 1 rpm | running settings | Effective immediately | 200 |

b) Auxiliary speed command B source

The source of auxiliary speed command B includes three command forms: digital setting, analog voltage setting, and multi segment speed command. The digital given and multi segment speed commands are internal speed commands, and the analog voltage given is external speed commands.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|----------------------------------|--|------|---|------------------|-----------------------|-----------------|
| P06-01 | Auxiliary speed command source B | 0: Number given (P06-03) 1: AI1 2: AI2 3:0 (no effect) 4:0 (no effect) 5: Multi segment speed command | - | Select the source form of auxiliary speed command B | Shutdown setting | Effective immediately | 1 |

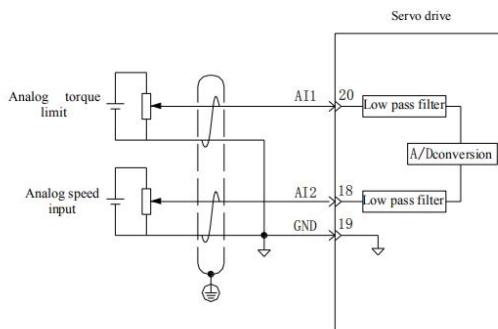
② Analog voltage setting

Refers to the processing of analog voltage signals output by the host computer or other devices as speed instructions.

•Analog voltage input terminal

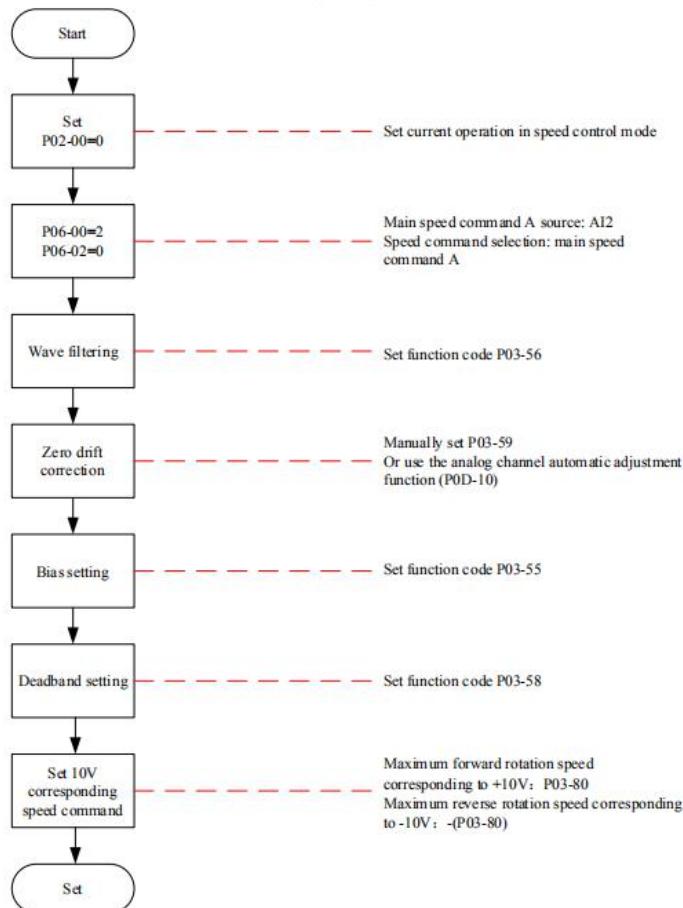
The servo drive has two analog input channels: AI1 and AI2, with a maximum input voltage of $\pm 10\text{Vdc}$ and an input impedance of about $9\text{k}\Omega$.

Analog input circuit:



- Operation method:

Take AI2 as an example to illustrate the analog voltage setting speed command method.



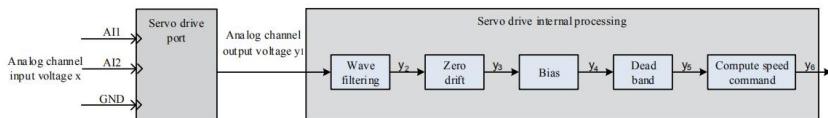
★Explanation of terms:

Zero drift: refers to the value of the servo drive sampling voltage relative to GND when the analog channel input voltage is zero.

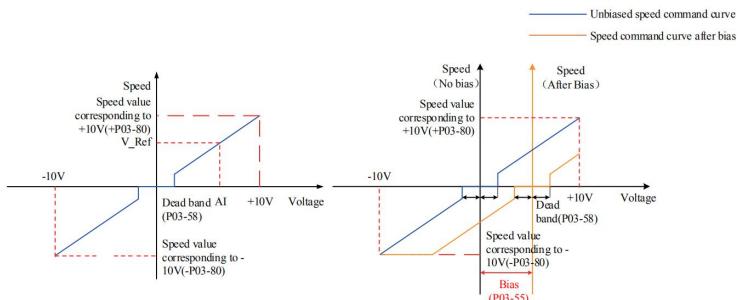
Offset: Refers to the input voltage value of the corresponding analog channel when the sampling voltage is zero after zero drift correction.

Deadband: Refers to the corresponding analog channel input voltage range when the sampling voltage is zero.

The unprocessed analog channel output voltage is shown in Figure 6-65 y_1 . After internal processing by the servo drive, the final speed command y_6 is obtained.



When there is no offset, it is shown in Figure 6-67, and when there is offset, it is shown in Figure 6-68. =After completing the correct settings, the AI2 sampling voltage value can be viewed in real time through P0B-22, and the speed command value corresponding to the input analog quantity can also be viewed through P0B-01



Relationship between final speed command value and input voltage x:

$$y_6 = \begin{cases} 0 & B-C \leq x \leq B+C \\ x-B & B+C < x \leq 10000 \text{ or } -10000 \leq x < B-C \end{cases}$$

Where: B: Offset; C: Deadband.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--|--|------|---|------------------|-----------------------|-----------------|
| P03-55 | AI2 Bias | -5000~5000 | mV | Set AI2 channel analog offset value | running settings | Effective immediately | 0 |
| P03-56 | AI2 input filtering time constant | 0~655.35 | ms | Set AI2 channel analog average filtering time constant | running settings | Effective immediately | 2.00 |
| P03-58 | AI2 Deadband | 0~1000.0 | mV | Set AI2 channel analog deadband value | running settings | Effective immediately | 10.0 |
| P03-59 | AI2 zero drift | -500.0~500.0 | mV | Set AI2 channel analog zero drift value | running settings | Effective immediately | 0.0 |
| P03-80 | Speed value corresponding to analog quantity 10V | 0~6000 | rpm | Set the corresponding speed value of analog quantity 10V | Shutdown setting | Effective immediately | 3000 |
| P0D-10 | Automatic adjustment of analog channel | 0: No action 1: AI1 adjustment 2: AI2 adjustment | - | Analog quantity AI1, AI2 channel zero drift automatic correction enable | Shutdown setting | Effective immediately | 0 |

c) Speed command direction setting

Speed command direction switching is achieved through DI, which allocates the DI function FunIN.26 to the corresponding DI terminal, and determines the current speed command direction based on the input signal on this DI terminal, thereby meeting the demand for speed command direction switching.

★Associated function code:

| Code | Name | Function name | Function |
|----------|-----------|---------------------------------|--|
| FunIN.26 | SPDDirSel | Speed command direction setting | Invalid - Forward direction Valid - Reverse direction |

The actual motor rotation direction is related to the rotation direction selection (P02-02), speed command direction, and speed command direction DI switching (FunIN. 26).

Table 6-27 Setting of Actual Rotation Direction of Motor in Speed Control Mode

| P02-02 | Speed command positive and negative | FunIN.26 | Actual motor rotation direction |
|--------|-------------------------------------|----------|---------------------------------|
| 0 | + | Invalid | Anticlockwise |
| 0 | + | Valid | Clockwise |
| 0 | - | Invalid | Clockwise |
| 0 | - | Valid | Anticlockwise |
| 1 | + | Invalid | Clockwise |
| 1 | + | Valid | Anticlockwise |
| 1 | - | Invalid | Anticlockwise |
| 1 | - | Valid | Clockwise |

2) Ramp function settings

Ramp function settings refer to converting speed commands with high acceleration into speed commands with relatively gentle acceleration, that is, by setting acceleration and deceleration times, to achieve the purpose of controlling acceleration.

In the speed control mode, excessive acceleration of the speed command will cause the motor to jump or vibrate violently. At this time, increasing the acceleration or deceleration time can achieve a smooth speed change of the motor and avoid mechanical damage caused by the above conditions.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------|------|--|------------------|-----------------------|-----------------|
| P06-05 | Speed command acceleration ramp time constant | 0~65535 | ms | Used to set the acceleration and deceleration time value of the speed command except for the multi segment speed command in the speed mode | running settings | Effective immediately | 0 |
| P06-06 | Speed command deceleration ramp time constant | 0~65535 | ms | | running settings | Effective immediately | 0 |



Caution:

- When the speed command source is given digitally, analog voltage, and jog speed, the acceleration and deceleration times are set using function codes P06-05 and P06-06;
- When the speed command source operates at multiple speeds, the acceleration and deceleration times are set through the P12 group of parameter settings. For details, see "[Group P12: Multi-segment speed parameters](#)" in Chapter 8.

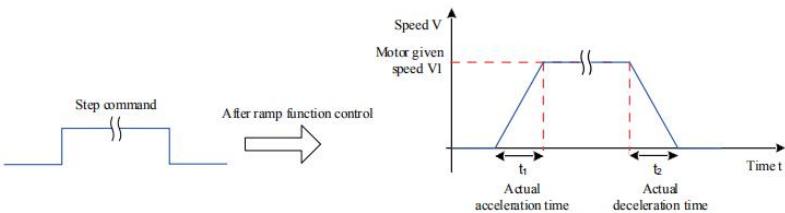


Figure 6-76 Schematic diagram of slope function definition

P06-05: The time for the speed command to accelerate from 0 to 1000 rpm.

P06-06: Time for the speed command to decelerate from 1000 rpm to 0.

Therefore, the actual acceleration and deceleration time calculation formula is as follows:

$$\text{Actual acceleration time } t_1 = \frac{\text{Speed command}}{1000} \times \text{Speed command acceleration ramp time}$$

$$\text{Actual deceleration time } t_2 = \frac{\text{Speed command}}{1000} \times \text{Speed command deceleration ramp time}$$

3) Speed command limiting

**Caution:**

- When the actual rotational speed of the motor exceeds the overspeed fault threshold P0A-08, the drive experiences FU.500 (motor overspeed). For the setting of P0A-08, please refer to the detailed parameter table in Chapter 8. The speed command limit must be less than P0A-08.

In speed control mode, the servo drive can limit the size of speed commands, and the sources of speed command limits include:

- P06-07: Set the amplitude limit of the speed commands in the positive and negative directions. If the speed commands in the positive and negative directions exceed the set value, they will be limited to this value.
- P06-08: Set the forward speed threshold. If the forward direction speed command exceeds the set value, it will be limited to this value.
- P06-09: Set the reverse speed threshold. If the negative direction speed command exceeds the set value, it will be limited to this value.
- Maximum motor speed (default limit point): determined by the actual motor model used.

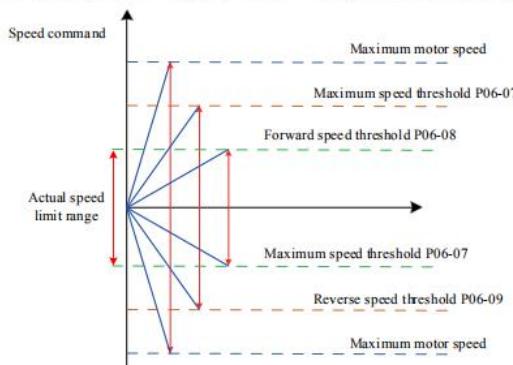


Figure 6-78 Example of Speed command limiting

The actual motor speed limit range meets the following requirements:

$$|\text{Amplitude of forward speed command}| \leq \min \{\text{maximum motor speed}, \text{P06-07}, \text{P06-08}\}$$

$$|\text{Amplitude of negative rotational speed command}| \leq \min \{\text{maximum rotational speed of motor, P06-07, P06-09}\}$$

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|-------------------------|---------------|------|-----------------------------------|------------------|-----------------------|-----------------|
| P06-07 | Maximum speed threshold | 0~6000 | rpm | Set the maximum speed limit value | running settings | Effective immediately | 6000 |
| P06-08 | Forward speed threshold | 0~6000 | rpm | Set the forward speed limit value | running settings | Effective immediately | 6000 |
| P06-09 | Reverse speed threshold | 0~6000 | rpm | Set the reverse speed limit value | running settings | Effective immediately | 6000 |

4) Zero position fixing function



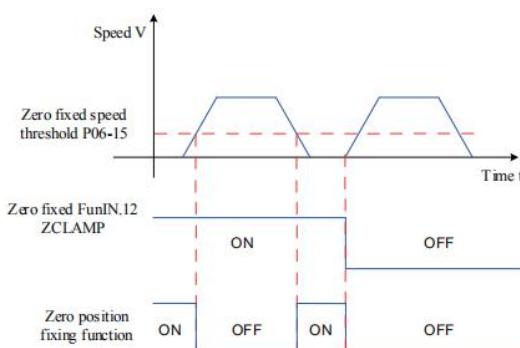
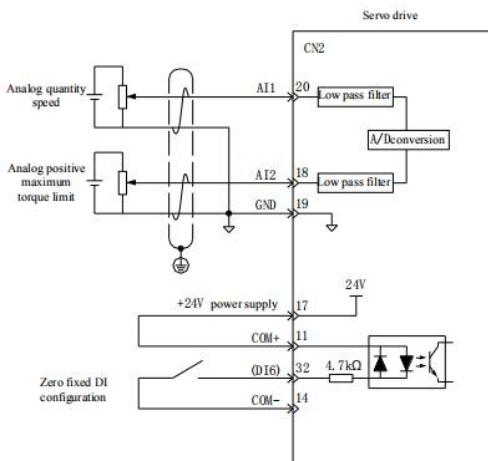
Caution:

- The zero position fixing function is used in systems where the upper computer device does not build a position loop in the speed control mode.
- If the servo motor oscillates in the zero position locked state, the position loop gain can be adjusted.

The zero position fixing function is to enter the zero position locking state of the servo motor when the zero position fixing DI signal FunIN.12 (ZCLAMP) is valid in the speed control mode, and the speed command amplitude is less than or equal to the P06-15 set value. At this time, a position loop is built inside the servo drive, and the speed command is invalid; The servo motor is fixed within ± 1 pulse of the effective position of the zero position fixing, and even if rotation occurs due to external forces, it will return to the zero position fixing.

If the speed command amplitude is greater than P06-15, the servo motor exits the zero position locking state, and at this time, the servo motor continues to operate according to the current input speed command.

If the zero fixed DI signal FunIN.12 (ZCLAMP) is invalid, the zero fixed function is invalid.



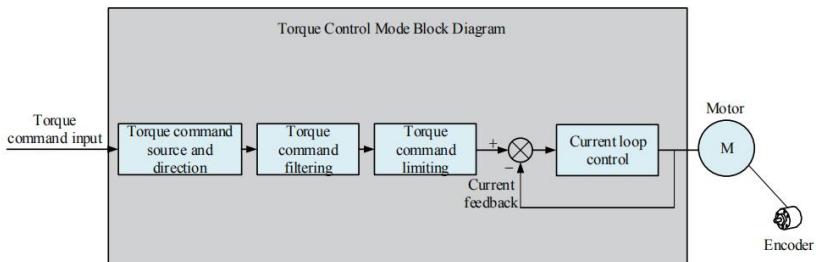
★Associated function code:

| Code | Name | Function name | Description |
|----------|--------|--------------------|--|
| FunIN.12 | ZCLAMP | Zero fixing enable | Invalid - disable zero fixing function Valid - enable zero position fixing function |

★Associated function code:

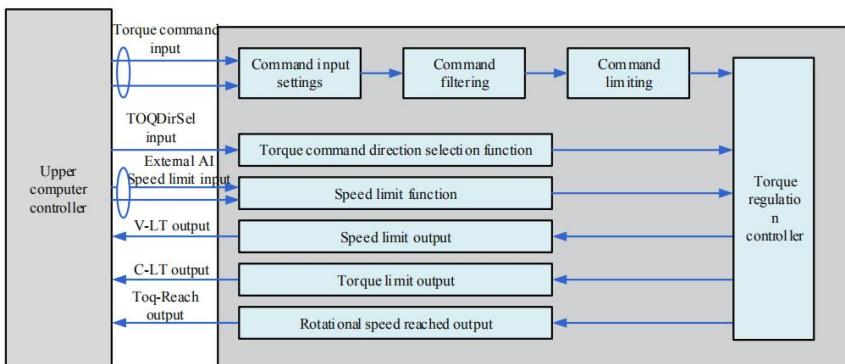
| Function code | Name | Setting range | Unit | Setting method | Effective time | Factory setting |
|---------------|----------------------------|---------------|------|------------------|-----------------------|-----------------|
| P06-15 | Zero fixed speed threshold | 0~6000 | rpm | running settings | Effective immediately | 10 |

5.3 Torque control mode

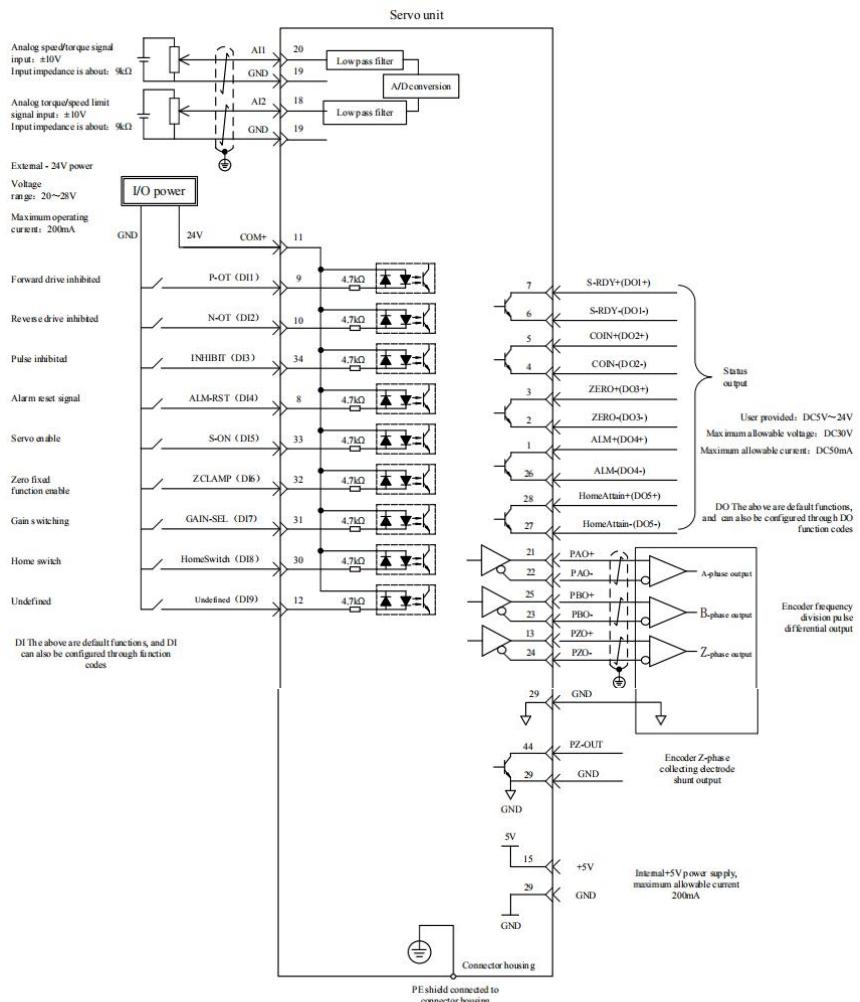


Set the value of parameter P02-00 to 2 through the servo drive panel or drive debugging platform, and the servo drive will operate in Torque control mode.

Please set the servo drive parameters according to the mechanical structure and indicators. The following describes the basic parameter settings when using Torque control mode.



5.3.1 Torque mode wiring



Represents twisted pair

Notes:

- Signal cables and power cables must be routed separately, at least 30cm apart;
- When the signal cable is not long enough to connect the cable, the shielding layer must be reliably connected to ensure reliable shielding and grounding;
- +5V is referenced to GND. Do not exceed the maximum allowable current, otherwise the drive will not work normally.

5.3.2 Torque command input setting

1) Torque instruction input setting

a) Torque command source

In torque control mode, there are two sets of sources for torque instructions: Source A and source B. It can be set in the following two ways:

- Digital Settings, that is, keyboard Settings. The torque value stored in function code P07-03 is the percentage of the rated torque as the torque command.
- The source of analog instruction refers to the conversion of the external input analog voltage signal into the torque instruction signal of the control motor. In this case, the correspondence between the analog quantity and the torque instruction can be specified arbitrarily.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---------------------------------|---|------|--|------------------|-----------------------|-----------------|
| P07-00 | Source of main torque command A | 0: Number given(P07-03) 1: AI1 2: AI2 | - | Select the source of the main torque command A | Shutdown setting | Effective immediately | 0 |

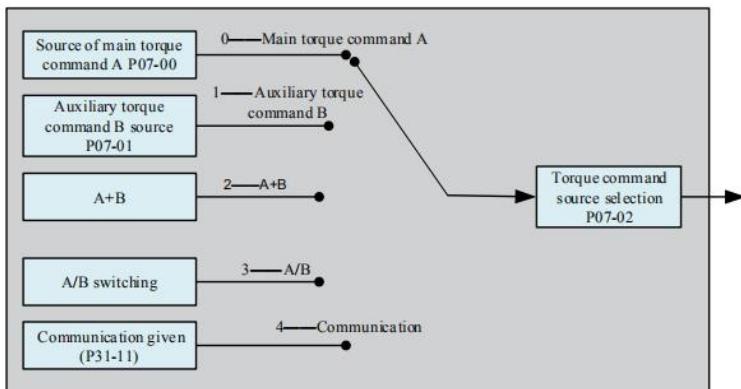
①Number given

It refers to the percentage of the commanded torque relative to the rated torque of the motor set by function code P07-03.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---------------------------------------|---------------|------|---|------------------|-----------------------|-----------------|
| P07-03 | Torque command keyboard setting value | -300.0~300.0 | % | Set the internal torque command to a numerical value with an accuracy of 0.1% | running settings | Effective immediately | 0 |

b) Torque control mode has the following five methods for obtaining torque commands, which are set by function code P07-02.



★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--------------------------|--|------|------------------------------|------------------|-----------------------|-----------------|
| P07-02 | Torque command selection | Source of main torque command A 1: Auxiliary torque command B source 2: A+B source 3: A/B switching 4: Communication given | - | Select Torque command source | Shutdown setting | Effective immediately | 0 |

c) Torque command direction setting

The torque command direction switch is realized through the DI terminal, that is, the DI function FunIN.25 is allocated to the corresponding DI terminal, and the current torque command direction is determined based on the input signal on this DI terminal to meet the demand for torque command direction switching.

| Code | Name | Function name | Description |
|----------|-----------|----------------------------------|--|
| FunIN.25 | ToqDirSel | Torque command direction setting | Invalid - the actual torque command direction is the same as the set direction Valid - the actual torque command direction is opposite to the set direction |

★Associated function code:

The actual motor rotation direction is related to the rotation direction selection (P02-02), torque command direction, and torque command direction DI switching (FunIN. 25).

| P02-02 | Positive and negative torque command | FunIN.25 | Actual motor rotation direction |
|--------|--------------------------------------|----------|---------------------------------|
| 0 | + | Invalid | Anticlockwise |
| 0 | + | Valid | Clockwise |
| 0 | - | Invalid | Clockwise |
| 0 | - | Valid | Anticlockwise |
| 1 | + | Invalid | Clockwise |
| 1 | + | Valid | Anticlockwise |
| 1 | - | Invalid | Anticlockwise |
| 1 | - | Valid | Clockwise |

②Analog voltage setting

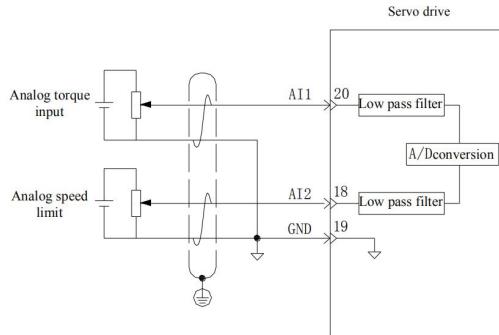
Refers to the processing of analog voltage signals output by the host computer or other devices as

torque instructions.

- Analog voltage input terminal

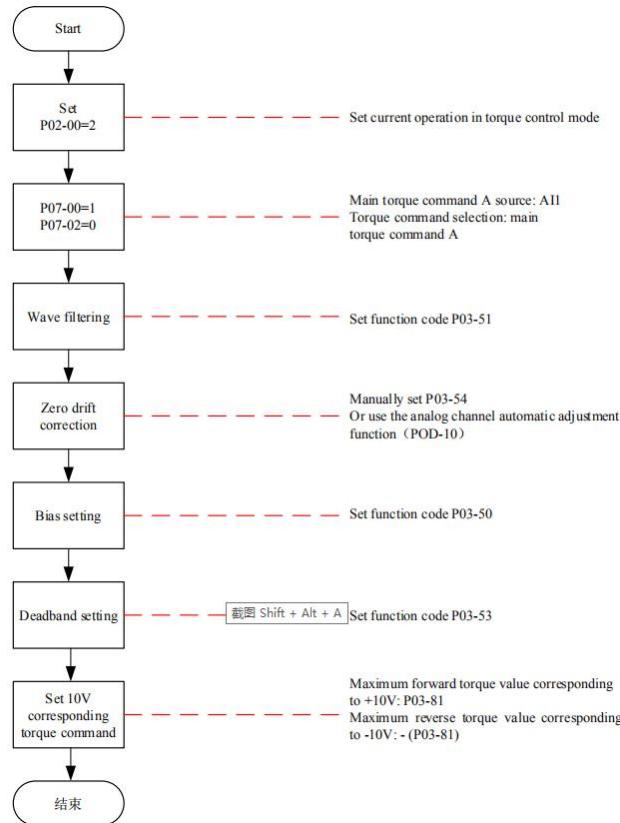
The servo drive has two analog input channels: AI1 and AI2, with a maximum input voltage of $\pm 10\text{Vdc}$ and an input impedance of about $9\text{k}\Omega$.

Analog input circuit:



- Operation method:

Take AI1 as an example to illustrate the analog voltage setting torque command method.



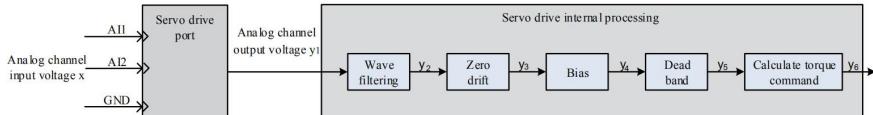
★Explanation of terms:

Zero drift: refers to the value of the servo drive sampling voltage relative to GND when the analog channel input voltage is zero.

Bias: Refers to the input voltage value of the corresponding analog channel when the sampling voltage is zero after zero drift correction.

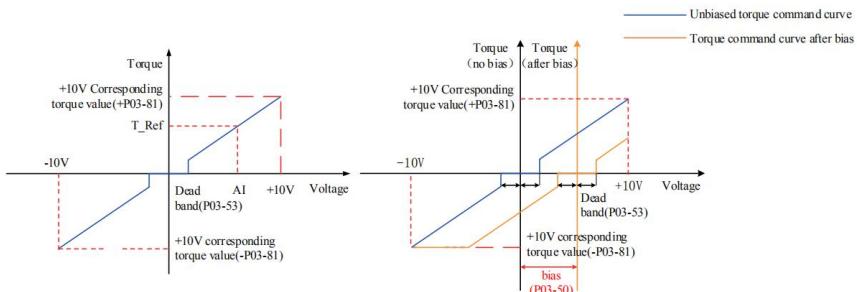
Deadband: Refers to the corresponding analog channel input voltage range when the sampling voltage is zero.

The unprocessed analog channel output voltage is shown in Figure6-851 , After internal processing by the servo drive, the torque command 6 is finally obtained.



This value will be used as the torque control mode analog torque command given value.

When there is no bias, it is shown in Figure 6-87, and when there is bias, it is shown in Figure 6-88. After completing the correct settings, the AI1 sampling voltage value can be viewed in real time through P0B-21, and the input analog torque command value can also be viewed through P0B-02.



★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------------------------|-------|---|------------------|-----------------------|-----------------|
| P03-50 | AI1 Offset | -5000~5000 | mV | Set AI1 channel analog offset value | running settings | Effective immediately | 0 |
| P03-51 | AI1 input filtering time constant | 0~655.35 | ms | Set AI1 channel analog average filtering time constant | running settings | Effective immediately | 2.00 |
| P03-53 | AI1 Deadband | 0~1000.0 | mV | Set AI1 channel analog deadband value | running settings | Effective immediately | 10.0 |
| P03-54 | AI1 zero drift | -500.0~500.0 | mV | Set AI1 channel analog zero drift value | running settings | Effective immediately | 0.0 |
| P03-81 | Torque value corresponding to analog quantity 10V | 1.00 to 8.00 times rated torque | times | Set the corresponding torque value of analog quantity 10V | Shutdown setting | Effective immediately | 1.00 |

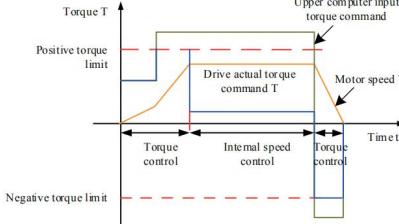
2) Torque command limit



Caution:

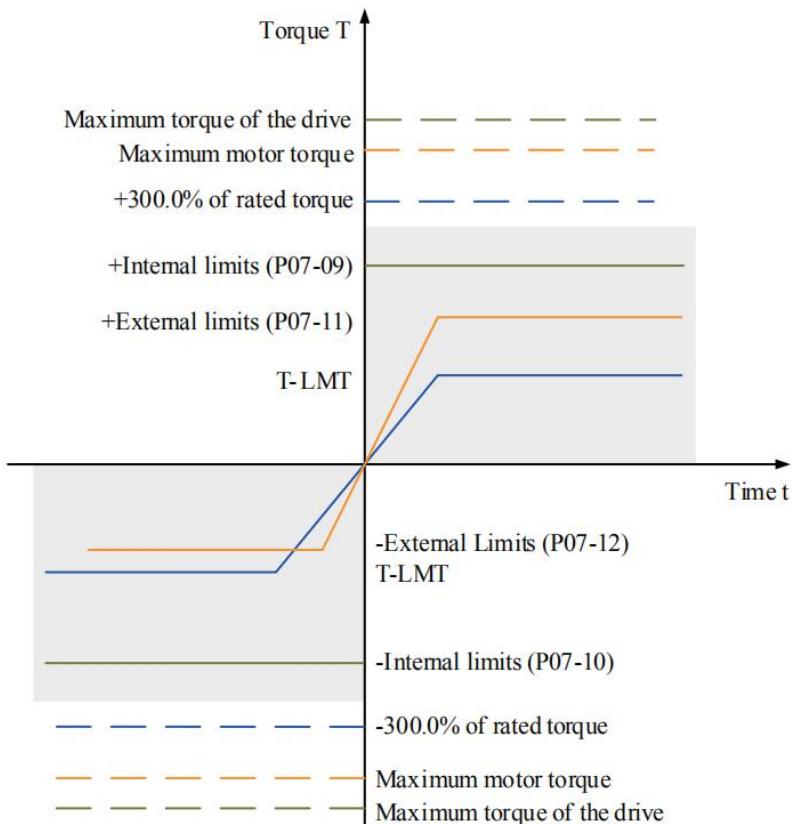
- Torque command limit is valid in position control, speed control, torque control, and hybrid control modes, and must be set!

To protect the drive and motor, torque commands should be limited.



When the absolute value of the torque command input by the upper computer or output by the speed regulator is greater than the absolute value of the Torque command limit, the torque command of the actual drive is limited to equal the Torque command limit value; Conversely, it is equal to the torque command value input by the upper computer or output by the speed regulator.

At any given moment, there is and only one torque limit value that is valid. The positive and negative torque limits shall not exceed the maximum torque of the drive and motor and $\pm 300.0\%$ of the rated torque.



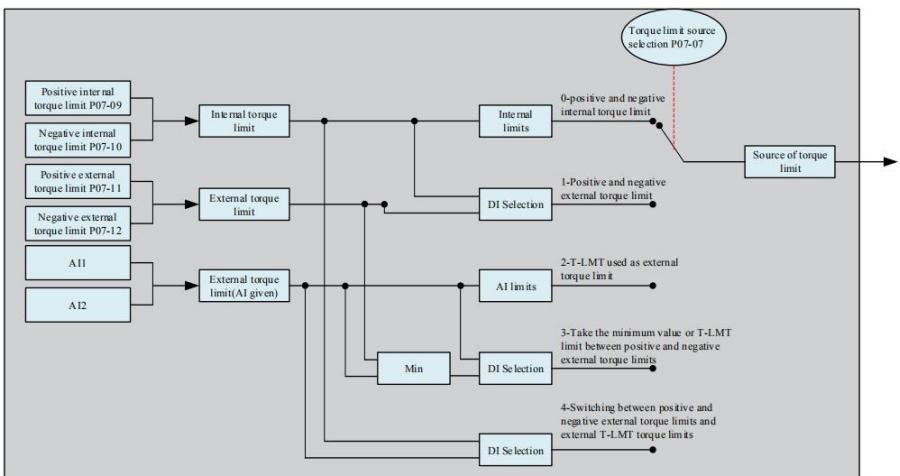
3) Set torque limit source

The torque limit source can be set by function code P07-07. After setting the torque limit, the drive torque command will be limited within the torque limit value. When the torque limit value is reached, the motor will operate with the torque limit value as the torque command. The torque limit value shall be set according to the load operation

requirements. If the setting is too small, the acceleration and deceleration capacity of the motor may be weakened, and during constant torque operation, the actual rotational speed of the motor cannot meet the required value.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|------------------------|--|------|----------------------------|------------------|-----------------------|-----------------|
| P07-07 | Source of torque limit | 0: Positive and negative internal torque limit 1: Positive and negative external torque limit 2: External T-LMT torque limit 3: Take the minimum value of positive and negative external torque limits and external T-LMT as the torque limit 4: Switching between positive and negative external torque limits and external T-LMT torque limits | - | Select torque limit source | Shutdown setting | Effective immediately | 0 |



The following illustrations show situations where the absolute value of the torque command input by the upper computer is greater than the absolute value of the torque limit value in torque mode.

At this time, the two DI terminals of the assigned drive are the DI functions FunIN.16 (P-CL: positive external torque limit) and FunIN.17 (N-CL: negative external torque limit), and the DI terminal logic is determined.

★Associated function code:

| Code | Name | Function name | Description |
|----------|------|--------------------------------|---|
| FunIN.16 | P-CL | Positive external torque limit | <p>Switch the torque limiting source according to the selection in P07-07.</p> <p>When P07-07=1: Valid: Forward rotation external torque limit is valid; Invalid: Forward internal torque limit is valid.</p> <p>When P07-07=3 and the AI limit value is greater than the forward rotation external limit value: Valid: Forward rotation external torque limit is valid; Invalid: AI torque limit is valid.</p> <p>When P07-07=4: Valid: AI torque limit is valid; Invalid: Forward internal torque limit is valid.</p> |
| FunIN.17 | N-CL | Negative external torque limit | <p>Switch the torque limiting source according to the selection in P07-07.</p> <p>When P07-07=1: Valid: The reverse external torque limit is valid; Invalid: The reverse internal torque limit is valid.</p> <p>When P07-07=3 and the AI limit value is less than the reverse external limit value: Valid: The reverse external torque limit is valid. Invalid: AI torque limit is valid.</p> <p>When P07-07=4: Valid: AI torque limit is valid; Invalid: The reverse internal torque limit is valid.</p> |

Set torque limit DO output signal

When the torque command reaches the torque limit value, the drive outputs a torque limit signal (FunOUT. 7: C-LT, torque limit signal) for use by the upper computer. At this time, one DO terminal of the drive should be assigned as the DO function FunOUT. 7, and the DO terminal logic should be determined.

★Associated function code:

| Code | Name | Function name | Description |
|----------|------|---------------------|---|
| FunOUT.7 | C-LT | Torque limit signal | <p>Valid: The drive torque command reaches the torque limit value and is limited to the limit value</p> <p>Invalid: The drive torque command does not reach the limit value</p> |

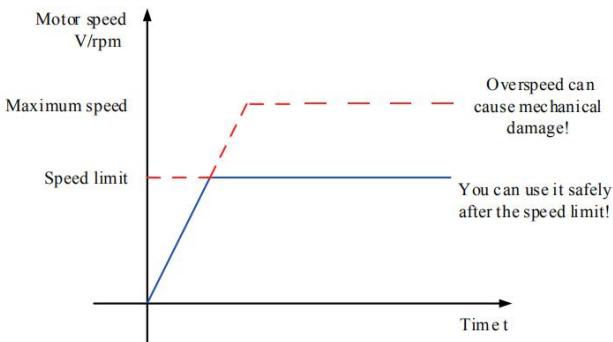
You need to set DI/ DO-related function codes for function and logical allocation. For example, when setting analog input AI, first specify T_LMT variable through function code P07-08, and then set the correspondence between torque and analog voltage.

When P07-07=1, the positive and negative external torque limit is triggered by the external DI setting (P-CL, N-CL), and the torque limit is performed according to the values set by P07-11 and P07-12. When the external limit and T_LMT and its combination limit exceed the internal limit, the internal limit system is adopted, that is, all the restrictions are restricted by the minimum limit value, so that the torque is limited within the

maximum torque range of the motor. The value of T_LMT is $|T_{LMT}|$ for forward conversion and $-|T_{LMT}|$ for inversion.

4) Speed limit in torque mode

In torque control mode, if the given torque command is too large, greater than the load torque on the mechanical side, it will cause the motor to continuously accelerate, possibly causing overspeed and damaging mechanical equipment. Therefore, in order to protect the machinery, it is necessary to limit the rotational speed of the motor.



Set speed limit source

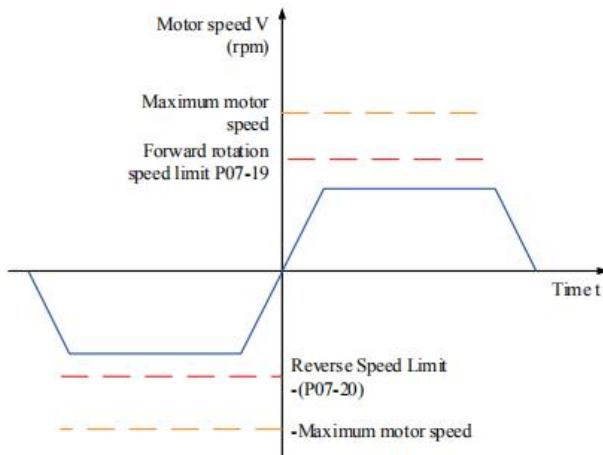
In torque mode, the selection of the speed limit source can be set by function code P07-17. After setting the speed limit, the actual motor speed will be limited within the speed limit value. After reaching the speed limit value, the motor operates at a constant speed with the speed limit value. The speed limit value should be set according to the load operation requirements.

★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|------------------------------|--|------|--|------------------|-----------------------|-----------------|
| P07-17 | Speed limit source selection | 0: Internal speed limit 1: Use V-LMT as external speed limit input 2: DI selects P07-19/P07-20 as the internal speed limit | - | Select speed limit in torque mode source | running settings | Effective immediately | 0 |

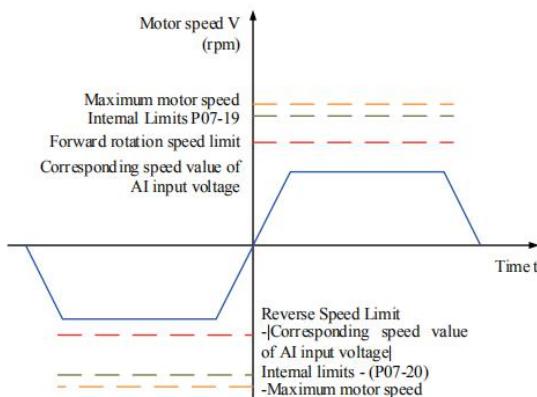
a) P07-17=0: Internal speed limit

When the motor rotates in different directions, the rotational speed is only determined by internal function codes P07-19 and P07-20.



b) P07-17=1: External speed limit

When the motor rotates in different directions, the corresponding voltage is limited by the input speed through the external analog channel specified in P07-18. When the AI input is less than the internal speed limit (P07-19/P07-20), the AI limit is valid; Conversely, when the AI input is greater than the internal speed limit (P07-19/P07-20), the internal speed limit is valid.



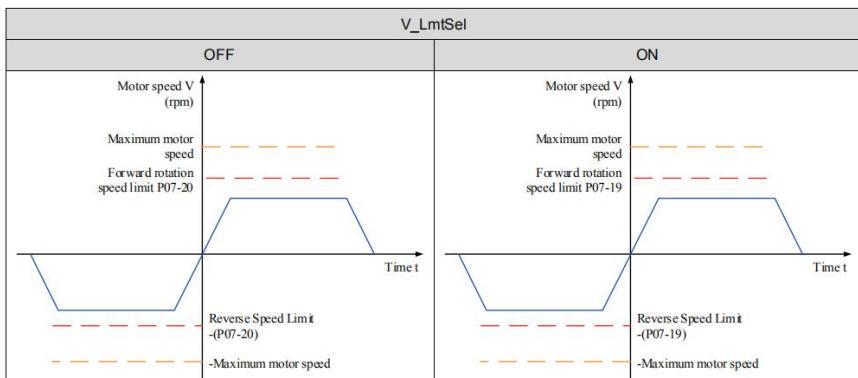
c) P07-17=2: DI mode selection speed limit

The servo drive selects P07-19 or P07-20 as the forward/reverse speed limit value based on the actual DI terminal logic.

At this point, the servo drive should be assigned a DI logic to the DI function FunIN.36 (V-LmtSel: Internal Speed Limit Source) and assigned a DI terminal logic.

★Associated function code:

| Code | Name | Function name | Description |
|----------|----------|-----------------------------|--|
| FunIN.36 | V_LmtSel | Internal speed limit source | Invalid: P07-19 as internal forward/reverse speed limit value Valid: P07-20 as internal forward/reverse speed limit value |



★Associated function code:

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|--|------------------|------|---|------------------|-----------------------|-----------------|
| P07-18 | V-LMT selection | 1: AI1 2: AI2 | - | Analog channel when selecting V-LMT as the speed limit source | running settings | Effective immediately | 1 |
| P07-19 | Forward speed limit value during torque control/speed limit value 1 during torque control | 0~6000 | rpm | Set the forward speed limit value in torque mode/Set the Speed limit in torque mode value 1 | running settings | Effective immediately | 3000 |
| P07-20 | Negative speed limit value during torque control/speed limit value during torque control 2 | 0~6000 | rpm | Set the reverse speed limit in torque mode/Set the Speed limit in torque mode value 2 | running settings | Effective immediately | 3000 |

Set speed limit DO output signal

In torque mode, when the absolute value of the actual rotational speed of the servo motor exceeds the speed limit and the time reaches P07-40, it is considered that the actual rotational speed of the servo motor is limited. At this time, the servo drive can output a speed limit (FunOUT. 8: V-LT) signal for use by the upper computer. On the contrary, if any condition is not met, the speed limited signal is invalid.

The judgment of the speed limited (FunOUT. 8: V-LT) signal is only performed in the torque mode and Servo running state.

One DO terminal of the servo drive should be assigned as the DO function FunOUT. 8, and the DO terminal logic should be set.

★Associated function code:

| Code | Name | Function name | Description |
|----------|------|---------------|--|
| FunOUT.8 | V-LT | Speed limited | Invalid: The motor speed has not reached the speed limit Valid: The motor speed reaches the speed limit value, and the speed limit value is used as the speed command to build a speed loop internally for operation. |

5.4 Operating Instructions for Absolute Value System

5.4.1 Summary

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 () ,

Can store 16 bit multi turn data. The absolute value system composed of absolute value encoders is

divided into absolute position linear mode and absolute position rotation mode, which can be used in

position, speed, and Torque control mode. When the drive is powered off, the encoder backs up data

through the battery. After power on, the drive calculates the absolute position of the machine through the

absolute position of the encoder, without repeating the mechanical home reset operation.

When matching LCDA630P series servo drives with absolute value encoders, it is necessary to set the motor number P00-00=14130 (17 bit encoder),

Set P02-01 (absolute value system selection) based on actual application. "FU.731 (encoder battery fault) will occur when the battery is first connected. It is necessary to set P0D-20=1 to reset the encoder fault, and then perform the home reset operation.".

Note: When P02-02 (Rotation direction selection) or P0D-20 (Absolute encoder reset enable)

operations are modified, the absolute position of the encoder will undergo sudden changes, resulting in changes in the mechanical absolute position reference. Therefore, it is necessary to perform a mechanical home reset operation. When using the internal Home reset function of the drive, the internal of the drive will automatically calculate the

deviation between the absolute position of the machine and the absolute position of the encoder after the home reset is completed, and store it in the drive EEPROM.

5.4.2 Relevant function code setting

1) Absolute value system setting

Set P00-00=14130 to select a 17 bit encoder motor, and select the absolute position mode through P02-01.

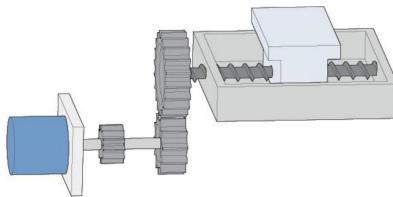
| Function code | Name | Setting range | Function | Setting method | Effective time | Factory setting |
|---------------|---------------------------------|--|--|------------------|----------------|-----------------|
| P00-00 | Motor number | 14130: Tamagawa absolute encoder motor 22 <input type="checkbox"/> 220V level incremental encoder motor 38 <input type="checkbox"/> 380V level incremental encoder motor | Select Tamagawa absolute encoder motor | Shutdown setting | Re-energize | 14130 |
| P00-08 | Absolute value encoder type | 14100: Multi turn absolute encoder Other: Single turn absolute value encoder | Absolute value type selection | Shutdown setting | Re-energize | 0 |
| P02-01 | Absolute value system selection | 0: Incremental position mode 1: Absolute position linear mode 2: Absolute position rotation mode | Select absolute position mode | Shutdown setting | Re-energize | 0 |

In absolute position mode, the system automatically detects whether the motor number is an absolute encoder motor. If the setting is incorrect, a "FU.122 absolute position mode product matching fault" occurs.

2) Absolute Position Linear Mode

| Function code | Name | Setting range | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------|--|----------------|----------------|-----------------|
| P0B-07 | Absolute position counter | - | In position mode, display the current absolute position of the motor (command unit) | Display | - | 0 |
| P0B-58 | Mechanical absolute position (low 32 bits) | - | In absolute position linear mode or absolute position rotation mode, the load position is converted to the position of the motor end | Display | - | 0 |
| P0B-60 | Mechanical absolute position (high 32 bits) | - | The absolute position fed back by the absolute value encoder. | Display | - | 0 |
| P0B-77 | Absolute encoder absolute position (low 32 bits) | - | | Display | - | 0 |
| P0B-79 | Absolute encoder absolute position (high 32 bits) | - | | Display | - | 0 |

This mode is mainly used in situations where the load stroke range of the device is fixed and the encoder's multi turn data does not overflow, as shown in the following figure for the ball screw drive mechanism.



Assume that the mechanical absolute positions (P0B-58 and P0B-60) are P, The absolute position of the encoder isP 【The range of Pis -2 38~(2 38 -1)】 ,The absolute position linear mode position offset (P05-46 and P05-48) isP, then the relationship between the three isP=P-P.

Assume that the gear ratio of the electronic gear wheel is

, The absolute position counter (P0B-07) represents the current absolute position of the machine (command unit), $P0B-07=P/()$.

The absolute position linear mode position offset P05-46 and P05-48 defaults to 0. The drive Home reset function is enabled. After the home reset is completed, the drive automatically calculates the encoder absolute position and mechanical absolute position deviation, assigns values to P05-46 and P05-48, and saves them in the EEPROM.

The absolute position linear mode encoder multi turn data range is - 32768 to 32767. If the number of forward turns is greater than 32767 or the number of reverse turns is less than - 32768, a FU.735 encoder

3) Absolute position rotation mode

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------|--------------|--|------------------|-----------------------|-----------------|
| P05-50 | Absolute position rotation mode mechanical gear ratio (numerator) | 1-65535 | 1 | The mechanical transmission gear ratio of the load to the motor in the absolute position rotation mode is valid when P05-52=0 and P05-53=0. | Shutdown setting | Effective immediately | 65535 |
| P05-51 | Absolute position rotation mode mechanical gear ratio (denominator) | | | | Shutdown setting | Effective immediately | 1 |
| P05-52 | Absolute position rotation mode Number of pulses per load rotation | 0~4294967295 | Encoder unit | The number of pulses that the motor end rotates during one rotation of the load in the absolute position rotation mode. | Shutdown setting | Effective immediately | 0 |
| P05-54 | (Encoder unit low 32 bits) | | | | Shutdown setting | Effective immediately | 0 |
| P0B-58 | Absolute position rotation mode Number of pulses per load rotation | - | Encoder unit | In absolute position linear mode or absolute position rotation mode, the load position is converted to the position of the motor end. | Display | - | 0 |
| P0B-60 | (Encoder unit height 32 bits) | - | Encoder unit | In the absolute position rotation mode, the position within 1 rotation of the rotating load is converted to the motor position at the motor end. | Display | - | 0 |
| P0B-77 | Mechanical absolute position (low 32 bits) | - | Encoder unit | | Display | - | 0 |
| P0B-79 | Mechanical absolute position (high 32 bits) | - | Encoder unit | The absolute position fed back by the absolute value encoder. | Display | - | 0 |
| P0B-81 | Absolute encoder absolute position (low 32 bits) | - | Encoder unit | In the absolute position rotation mode, the position within 1 rotation of the rotating load is converted to the motor position at the motor end. | Display | - | 0 |
| P0B-83 | Absolute encoder absolute position (high 32 bits) | - | Encoder unit | | Display | - | 0 |
| P0B-85 | Rotation load single turn position | - | Command unit | In absolute position rotation mode, rotate the load within 1 rotation. | Display | - | 0 |

This mode is mainly used for unlimited load travel range of the equipment. When the power is off, the number of rotations of the motor in one direction is less than 32767, as shown in the figure below to rotate the load.

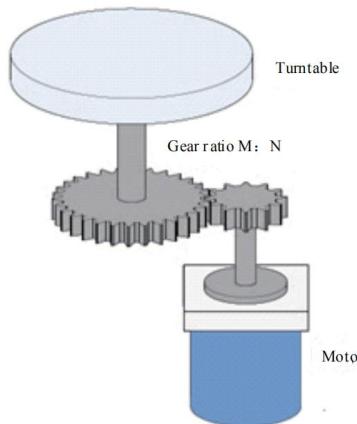


Figure 6-113 Schematic Diagram of the Relationship between Encoder Feedback Position and Rotating Load Position The upper limit of mechanical absolute position calculated internally by the drive is preferably calculated using P05-52 and P05-54. When P05-52 and P05-54 are both 0, the mechanical gear ratios P05-50 and P05-51 are used for calculation. Assume encoder resolution R_E , $R_E=223$, assume that the number of encoder pulses corresponding to one rotation of the load is R_M , P05-52 or When P05-54 is not equal to 0, $R_M=P05-54 \times 232 + P05-52$; when P05-52, P05-54 are both 0, $R_M=R_E \times \frac{P05-50}{P05-51}$

Assume that the electronic gear ratio is $\frac{B}{A}$, the absolute position counter (P0B-07) represents the current absolute position of the machine (command unit), $P0B-07 = R_M / (\frac{B}{A})$ the corresponding relationship between the position of a single rotation of the rotating load and the position of the turntable is shown in the following figure.

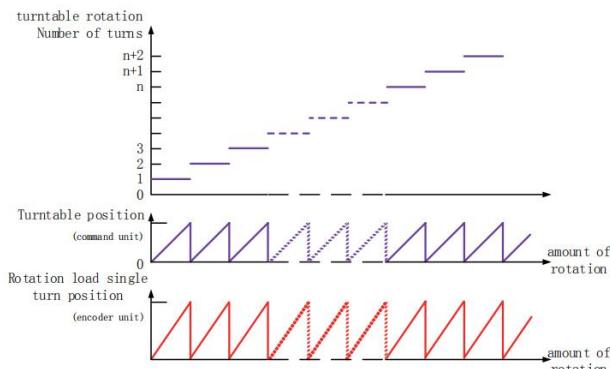


Figure 6-112 Schematic diagram of the corresponding relationship between the position of a single rotation

of the rotating load and the position of the turntable

The relationship between the encoder feedback position and the rotation load single turn is shown in the following figure:

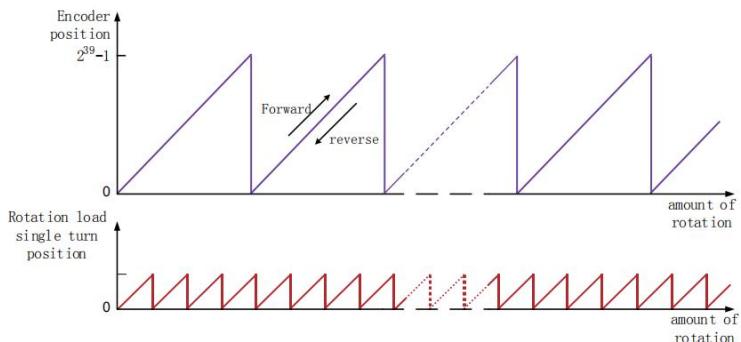


Figure 6-113 Schematic diagram of the relationship between encoder feedback position and rotating load position

Absolute position rotation mode multi turn data range is unlimited, shielding FU.735 encoder multi turn count overflow fault.

4) Encoder feedback data

Absolute value Encoder feedback data can be divided into encoder rotation number data and encoder position within 1 rotation. Incremental position mode has no encoder rotation number data feedback.

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|---------------|--------------|---|----------------|----------------|-----------------|
| P0B-70 | Absolute encoder rotation number data | - | r | The number of rotations fed back by the absolute value encoder. | Display | - | 0 |
| P0B-71 | Absolute encoder position within 1 turn | - | Encoder unit | Absolute position within 1 turn feedback from the absolute value encoder. | Display | - | 0 |

5) Encoder multi turn overflow fault selection

The encoder multi turn overflow fault is shielded by setting P0A-36 in the absolute position linear mode.

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---|----------------------------------|------|---|------------------|-----------------------|-----------------|
| P0A-36 | Encoder multi turn overflow fault selection | 0: Do not shield 1: Shielding | - | The encoder multi turn overflow fault is shielded by setting P0A-36 in the absolute position linear mode. | Shutdown setting | Effective immediately | 0 |

6) Absolute encoder reset operation

Reset the encoder internal fault by setting P0D-20 or reset the encoder to feedback multi turn data.

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|-------------------------------|--|------|--|------------------|-----------------------|-----------------|
| P0D-20 | Absolute encoder reset enable | 0: No action 1: Reset fault 2: Reset fault and multi turn data | - | Reset the encoder internal fault by setting P0D-20 or reset the encoder to feedback multi turn data. | Shutdown setting | Effective immediately | 0 |

After performing the reset encoder feedback multi turn data operation, the absolute position of the encoder changes abruptly, requiring a mechanical home reset operation.

5.4.3 Precautions for using the absolute value system battery box

"FU.731 (encoder battery fault) will occur when the battery is first turned on. It is necessary to set P0D-20=1 to reset the encoder fault before performing absolute position system operation.".

When the detected battery voltage is less than 3.0V, FU.730 (encoder battery warning) will occur.

Please replace the battery as follows:

- Step 1: The drive is powered on and in a non operating state;
- Step 2: Replace the battery;
- Step 3: After the drive automatically releases FU.730 (encoder battery warning), there are no other abnormal warnings and the drive can operate normally.

NOTE:

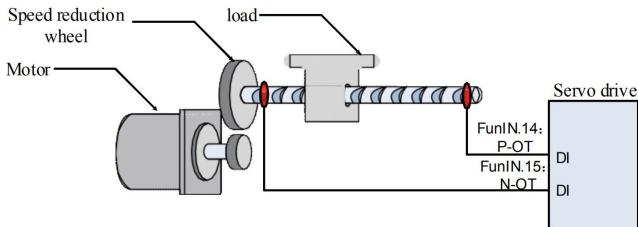
- In the case of servo power fault, replacing the battery and powering on again will cause FU.731 (encoder battery fault), and multiple laps of data will undergo sudden changes. Please set P0D-20=1 to reset the encoder fault and perform the Home reset function operation again;

- When the drive is powered off, please ensure that the maximum rotational speed of the motor does not exceed 6000 rpm to ensure that the encoder position information is accurately recorded;

- During storage, please store according to the specified ambient temperature and ensure reliable battery contact and sufficient power, otherwise the encoder position information may be lost.

5.4.4 Soft limit function

Traditional hardware limit function: In traditional methods, the limit position can only be given by external signals, which connect external sensor signals to the servo drive CN2 interface.



Soft limit function: It refers to comparing the internal position feedback of the drive with the set limit value, and immediately giving an alarm and performing shutdown operations when the limit value is exceeded. This function can be used in both the absolute position mode and the incremental position mode. The incremental position mode requires setting P0A-40=2. After the drive is powered on, first perform the home reset to find the machine home, and then enable the Soft Limit function.

1) Comparison of advantages and disadvantages between traditional hardware limit

function and soft limit function

| Traditional hardware limit function | | Soft limit function | |
|-------------------------------------|--|---------------------|---|
| 1 | Can only be limited to linear motion, single rotation motion | 1 | Not only can it be used in linear motion, but also in rotational mode |
| 2 | External installation of mechanical limit switches is required | 2 | No hardware wiring required to prevent misoperation due to poor line contact |
| 3 | Unable to determine abnormal mechanical slip | 3 | Internal position comparison to prevent mechanical slipping causing abnormal movement |
| 4 | When the power is cut off, the machine moves out of the limit position and cannot be judged or alarmed | | |

2) Soft limit related function code

| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|---------------------------------|--|--------------|--|------------------|-----------------------|-----------------|
| P0A-40 | Soft limit setting | 0: Soft limit not enabled 1: Enable soft limit immediately after power on 2: Enable soft limit after Zero return | 1 | Soft limit function selection. | Shutdown setting | Effective immediately | 0 |
| P0A-41 | Absolute position limit maximum | -2147483648~-2147483647 | Command unit | Soft limit function Absolute position limit maximum value. | Shutdown setting | Effective immediately | 2147483647 |
| P0A-43 | Absolute position limit minimum | -2147483648~-2147483647 | Command unit | Soft limit function Absolute position limit minimum value. | Shutdown setting | Effective immediately | -2147483648 |

- When P0A-40=0, the Soft limit function is not enabled;
- When P0A-40=1, the soft limit function is enabled immediately after the drive is powered on. When the absolute position counter (P0B-07) is greater than P0A-41, a FU.950 warning occurs, and a forward overtravel shutdown is performed; When the absolute position counter (P0B-07) is less than P0A-43, a FU.952 warning occurs, and a negative overtravel shutdown is performed;
- When P0A-40=2, after the drive is powered on, the soft limit is not enabled before the zero point reset. After the zero point reset, when the absolute position counter (P0B-07) is greater than P0A-41, a 221 FU.950 warning occurs, and a forward override shutdown is performed; After zero point reset, when the absolute position counter (P0B-07) is less than P0A-43, a FU.952 warning occurs and a forward overtravel shutdown is performed;
- When P0A-41<P0A-43, the two values are interchanged.

5.5 Adjustment

5.5.1 Inertia identification

The load inertia ratio (P08-15) refers to:

$$\text{Load inertia ratio} = \frac{\text{Total rotational inertia of mechanical load}}{\text{Motor's own rotational inertia}}$$

The load inertia ratio is an important parameter of a servo system. Setting the load inertia ratio correctly helps to quickly complete debugging.

The load inertia ratio can be manually set or automatically identified through the Inertia identification function of the servo drive.

The servo drive provides two Inertia identification automatic identification methods:

1) Offline Inertia identification

Use the "Rotate Inertia Identification Function (P0D-02)" to rotate the motor by operating the keys on the servo drive panel to achieve Inertia identification without the need for

The intervention of the upper computer is called Offline Inertia identification;

2) Online Inertia identification

The upper computer sends commands to the drive, and the servo motor operates according to the instructions to complete Inertia identification, which is called Online Inertia identification.



To accurately calculate the load inertia ratio using the Inertia identification function, the following conditions need to be met:

- The actual maximum motor speed is higher than 150 rpm;
- During actual motor acceleration and deceleration, the acceleration is above 3000 rpm/s; •The load torque is relatively stable and cannot change drastically;
- The actual load inertia ratio shall not exceed 120 times;

If the actual load inertia ratio is large and the drive gain is low, it will cause the motor to act slowly and cannot meet the maximum rotational speed and acceleration requirements of the motor. At this time, the speed loop gain P08-00 can be increased and the Inertia identification can be performed again.

If vibration occurs during the identification process, immediately stop Inertia identification and reduce the gain.

In addition, large backlash of the transmission mechanism may cause Inertia identification to fail.

5.5.2 Offline Inertia identification

Before performing Offline Inertia identification, first confirm the following:

1) The movable stroke of the motor shall meet two requirements

a) There is more than 1 turn of movable travel between the mechanical limit switches, positive and negative:

Before performing Offline Inertia Identification, please make sure that a limit switch is installed on the machine and that the motor has a movable stroke of more than 1 turn, both positive and negative, to prevent overtravel during Inertia Identification and cause accidents!

b) Meet the requirements of P09-09 (Number of motor rotations required to complete a single Inertia identification):

Check the current maximum speed of Inertia identification (P09-06), the time to accelerate to the maximum speed during Inertia identification (P09-07), and the number of motor rotations required to complete Inertia identification (P09-09). Ensure that the operational stroke of the motor at this stop position is greater than the set value of P09-09. Otherwise, appropriately reduce the set value of P09-06 or P09-07 until this requirement is met.

2)Estimated load inertia ratio P08-15 value

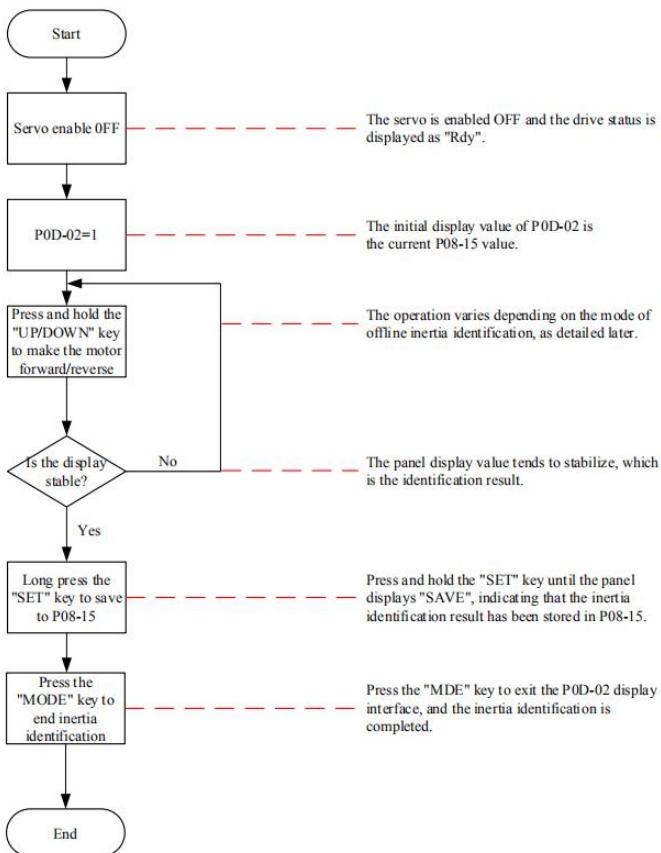
If P08-15 is the default value (1.00) and the actual load inertia ratio is greater than 30.00, the motor may act slowly and cause identification fault. At this time, the following two measures can be taken:

- a) Preset P08-15 as a larger initial value:

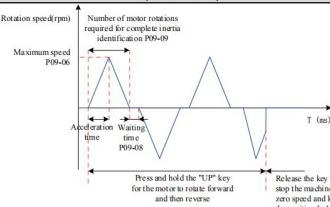
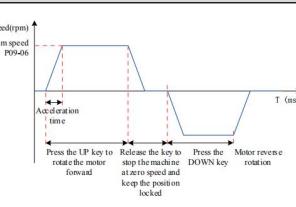
The preset value is recommended to start at 5.00 times and gradually increase until the Panel display value is updated during the identification process.

- b) Increase the rigidity level of the drive appropriately (P09-01) to enable the actual rotational speed of the motor to reach the maximum speed of Inertia identification (P09-06).

The general operation process of Offline Inertia identification is as follows:



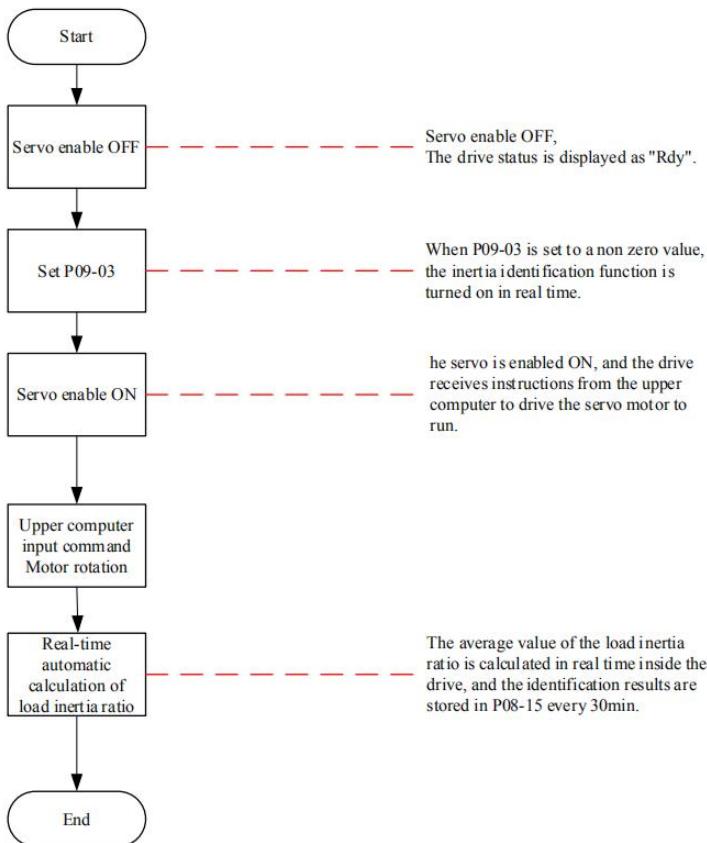
Offline Inertia identification is divided into two modes: positive and negative triangular wave mode and JOG jog mode. The command forms of the two modes are different.

| Items | Positive and negative triangular wave form (P09-05=0) | JOG jog mode (P09-05=1) |
|------------------------------------|---|--|
| Command form |  <p>Number of motor rotations required for complete inertia identification P09-09</p> <p>Acceleration time</p> <p>Waiting time P09-08</p> <p>Deceleration time</p> <p>Press and hold the "UP" key for the motor to rotate forward and then reverse</p> <p>Release the key to stop the machine at zero speed and keep the position locked</p> |  <p>Maximum speed P09-06</p> <p>Acceleration time</p> <p>Press the UP key to rotate the motor forward</p> <p>Release the key to stop the machine at zero speed and keep the position locked</p> <p>Press the DOWN key</p> <p>Motor reverse rotation</p> |
| Maximum speed | P09-06 | P09-06 |
| Acceleration and deceleration time | P09-07 | P09-07 |
| Items | Positive and negative triangular wave form (P09-05=0) | JOG jog mode (P09-05=1) |
| deceleration time | | |
| Key Description | <p>Long press and hold the UP key: the motor rotates forward first and then reverses</p> <p>Long press and hold the DOWN key: the motor reverses first and then rotates forward</p> <p>Release the key: stop at zero speed and keep the position locked</p> | <p>Press the UP key: the motor rotates forward</p> <p>Press the DOWN key: the motor reverses</p> <p>Release the key: stop at zero speed and keep the position locked</p> |
| Interval time | P09-08 | Time interval between two key operations |
| Number of motor rotations | $\leq P09-09$ | Human control |
| Applicable occasions | Where the motor stroke is short | Places where the motor stroke is long and can be controlled manually |

★Associated function code:

5.5.3 Online Inertia identification

The servo drive provides the Online Inertia identification function. The general operation process of Online Inertia identification is as follows:



The difference between setting P09-03 to 1-3 is that the real-time update speed of the load inertia ratio (P08-15) is different:

- P09-03=1: Suitable for situations where the actual load inertia ratio hardly changes, such as machine tools, wood carving machines, etc.
- P09-03=2: Suitable for situations where the actual load inertia ratio changes slowly.
- P09-03=3: Suitable for situations where the actual load inertia ratio may change rapidly, such as handling robots.

★RelatedFunction code:

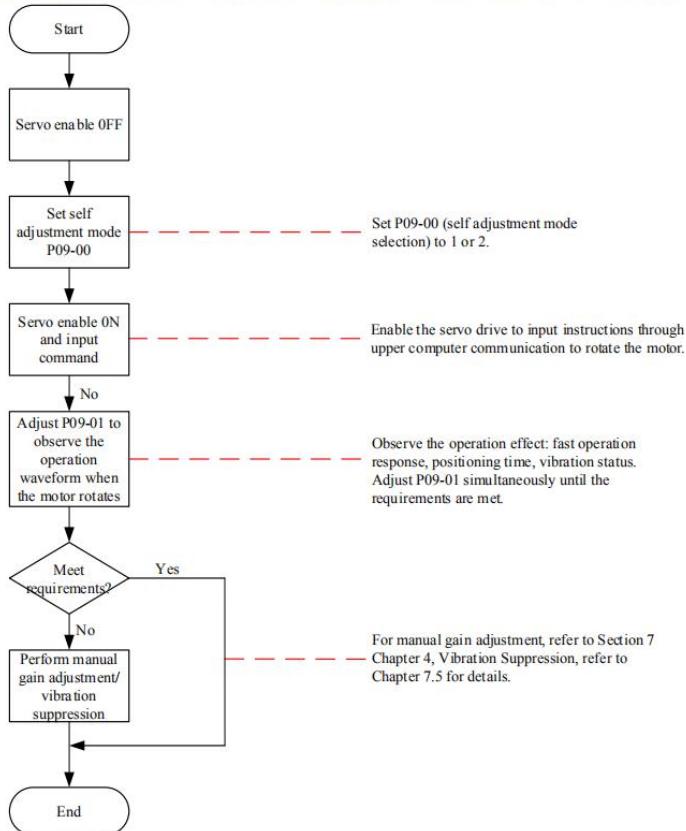
| Function code | Name | Setting range | Unit | Function | Setting method | Effective time | Factory setting |
|---------------|------------------------------------|---|------|---|------------------|-----------------------|-----------------|
| P09-03 | Online Inertia identification mode | 0: Turn off online identification 1: Enable online identification, basically unchanged 2: Enable online identification and slow change 3: Enable online identification to quickly change | - | Set the mode of Online Inertia identification | running settings | Effective immediately | 0 |

5.5.4 Automatic gain adjustment

Automatic gain adjustment means that through the rigidity level selection function (P09-01), the servo drive will automatically generate a set of matching gain parameters to meet the requirements of rapidity and stability.



- Before using the Automatic gain adjustment function, be sure to obtain the load inertia ratio correctly!



The value range of the rigidity level (P09-01) is between 0 and 31 levels. Level 0 corresponds to the weakest rigidity and the smallest gain; Level 31 corresponds to the strongest rigidity and maximum gain. According to different load types, the following empirical values can be used for reference:

| Recommended rigidity grade | Type of load mechanism |
|----------------------------|---|
| Level 4-8 | Some large machinery |
| Level 8-15 | Low rigidity applications such as belts |
| Level 15-20 | High rigidity applications such as ball screw and direct connection |

Appendix

➤ Recommended cables and wires

| Cables | AWG | UL | Heat resistant | Notes |
|--|-------------------------|------------|-------------------|---|
| Motor power (<750W) | 18 | 2517 | 105°C | |
| Motor power (>1kW) | 14 ¹⁾ | 2501 | 105°C | |
| AC220V input (<750W) ※ include FG cable | 18 | 1015 quite | 105°C | |
| AC220V input (>1kW) ※ include FG cable | 14 ¹⁾ | 1015 quite | 105°C | |
| Encoder | Power: 22 Signal: 24 | 20276 | 80°C | 5P (10 core) shielded wire maximum 20m (When using shielded twisted pair cable) |
| User I/O | 26 | 1007 quite | 80°C | Shielded twisted pair cable Recommended length below 50cm |
| Regenerative resistor connection | 18 | 1015 | 105°C | |
| Resistor | 18 | 2517 | 105°C | 1P (2 cores) |
| Communication between drives ² | 28 | 20539quite | 80 °C | Ribbon cable 10-core Accessories (2.54mm pitch) |

Note: ■ Cable length should be determined according to actual usage conditions.

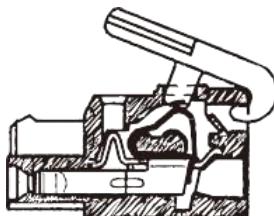
1) 1kW servo motor can use AWG16 wire.

2) For multi-axis drives.

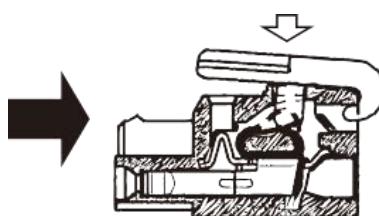
⇒Wiring instructions for servo drive power connector (L1C/ L2C, L1/ L2/ L3, U/ V/ W)

Use the included spudger when wiring.

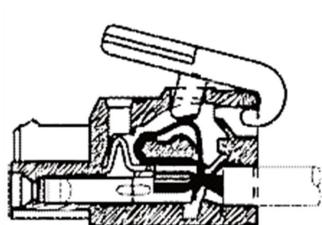
Cable connection steps:



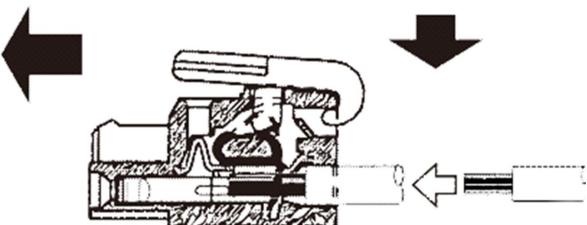
1) The wiring rod is installed on the bracket.
(Free loading and unloading)



2) Depress the wiring rod in the direction of the arrow



4) Loosen the wiring rod.



3) Press the terminal bar and insert the cable in the direction of the arrow.

Chapter 6 Parameter summary

| Function code | Data specifications | Function code | Data specifications |
|---------------|-----------------------------|---------------|---|
| P00 group | Servo motor parameters | P0A group | Fault and protection parameters |
| P01 group | Drive parameters | P0B group | Monitoring parameters |
| P02 group | Basic control parameters | P0C group | Communication parameters |
| P03 group | Terminal input parameters | P0D group | Auxiliary function parameters |
| P04 group | Terminal output parameters | P0F group | Full closed loop function parameters |
| P05 group | Position control parameters | P11 group | Multi-segment position function parameters |
| P06 group | Speed control parameters | P12 group | Multi-stage speed parameters |
| P07 group | Torque control parameters | P17 group | Virtual DIDO parameters |
| P08 group | Gain parameters | P30 group | Communication read servo related variables |
| P09 group | Self-tuning parameters | P31 group | Communication given servo related variables |

P00 Group Servo motor datasheet

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|------------------------------|---|-------------------|-----------------|----------------|--------------|------------------|
| P00 00 | Motor number | 14130: Domochuan absolute encoder motor 22□□□: 220V Class Incremental Encoder Motor 38□□□: 380V Class Incremental Encoder Motor | - | 14130 | Re-energize | Stop setting | ALL |
| P00 02 | Non-standard | - | - | - | - | Display | - |
| P00 04 | Encoder version number | - | - | - | - | Display | - |
| P00 05 | Bus Motor Number | - | - | - | - | Display | - |
| P00 08 | Absolute Encoder Type | 14100: Multi-loop absolute encoder Other: Single-loop absolute encoder | - | - | Re-energize | Stop setting | ALL |
| P00 09 | Rated voltage | 0-220 1-380 | V | - | Re-energize | Stop setting | - |
| P00 10 | Rated power | 0.01~655.35 | kW | - | Re-energize | Stop setting | - |
| P00 11 | Rated current | 0.01~655.35 | A | - | Re-energize | Stop setting | - |
| P00 12 | Rated torque | 0.01~655.35 | Nm | - | Re-energize | Stop setting | - |
| P00 13 | Max torque | 0.10~655.35 | Nm | - | Power up again | Stop setting | - |
| P00 14 | Rated speed | 100~6000 | rpm | - | Power up again | Stop setting | - |
| P00 15 | Max speed | 100~6000 | rpm | - | Power up again | Stop setting | - |
| P00 16 | rotary inertia Jm | 0.01~655.35 | kgcm ² | - | Power up again | Stop setting | - |
| P00 17 | Number of pole pairs of PMSM | 2~360 | Opposite | - | Power up again | Stop setting | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|---------------------------------------|--|----------|-----------------|----------------|--------------|------------------|
| P00 18 | stator resistance | 0.001~65.535 | Ω | - | Power up again | Stop setting | - |
| P00 19 | Stator Inductance Lq | 0.01~655.35 | mH | - | Power up again | Stop setting | - |
| P00 20 | Stator Inductance Ld | 0.01~655.35 | mH | - | Power up again | Stop setting | - |
| P00 21 | Linear back EMF coefficient | 0.01~655.35 | mV/rpm | - | Power up again | Stop setting | - |
| P00 22 | Moment coefficient Kt | 0.01~655.35 | Nm/Arm s | - | Power up again | Stop setting | - |
| P00 23 | Electrical constant Te | 0.01~655.35 | ms | - | Power up again | Stop setting | - |
| P00 24 | Mechanical constant Tm | 0.01~655.35 | ms | - | Power up again | Stop setting | - |
| P00 28 | Position offset of absolute encoder | 0~1073741824 | P/r | - | Power up again | Stop setting | - |
| P00 30 | Encoder Selection (HEX) | 0 x000- Ordinary incremental encoder (UVW-ABZ) 0 x013-17bit Bus incremental encoder | 1 | 0x013 | Power up again | Stop setting | - |
| P00 31 | PPR of encoder | 0~1073741824 | P/r | 1048576 | Power up again | Stop setting | - |
| P00 33 | Electrical angle of Signal Z | 0.0~360 | ° | 180 | Power up again | Stop setting | - |
| P00 34 | Electrical angle of phase U rise edge | 0.0~360 | ° | 180 | Power up again | Stop setting | - |

P01 Group Servo Drive datasheet

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|------------------------------|---------------|------|-----------------|----------------|--------------|------------------|
| P01 00 | MCU Software Version Number | 0~65535 | - | - | - | Display | - |
| P01 01 | FPGA Software Version Number | 0~65535 | - | - | - | Display | - |
| P01 02 | Servo Drive SN | 0~65535 | - | - | Power up again | Stop setting | - |

P02 Group Basic control parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|---------------------------------|--|------|-----------------|-----------------------|--------------|------------------|
| P02 00 | Control Mode Selection | 0: Speed mode 1: position mode 2: Torque mode 3: Torque mode↔speed mode 4: Speed mode↔Position mode 5: Torque mode↔Position mode 6: Torque mode↔speed↔position hybrid mode | - | 1 | Effective immediately | Stop setting | - |
| P02 01 | Absolute value system selection | 0: Incremental Location Mode 1: Absolute Position Linear Mode 2: Absolute position rotation mode | - | 0 | Power up again | Stop setting | ALL |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|---|---|------|-----------------|-----------------------|--------------|------------------|
| P02 02 | rotating direction selection | 0: take the CCW direction as the positive direction (A lead B) 1: in CW direction (reversal mode, A lag B) | - | 0 | Power up again | Stop setting | PST |
| P02 03 | Output pulse phase | 0: take the CCW direction as the positive direction (A lead B) 1: in CW direction (reversal mode, A lag B) | - | 0 | Power up again | Stop setting | PST |
| P02 05 | stop model at S-ON off | 0: free shutdown, maintain free running state 1: zero speed shutdown, maintain free running state | - | 0 | Effective immediately | Stop setting | PST |
| P02 06 | Fault No.2 Stop Mode Selection | 0: free shutdown, maintain free running state 1: zero speed shutdown, maintain free running state | - | 0 | Effective immediately | Stop setting | PST |
| P02 07 | Choice of Overhaul Mode | 0: free shutdown, maintain free running state 1: zero speed shutdown, position locked 2: zero speed shutdown, maintain free running state | - | 1 | Effective immediately | Stop setting | PST |
| P02 08 | Fault No.1 Stop Mode Selection | 0- Free shutdown, free running | - | 0 | Effective immediately | Stop setting | PST |
| P02 09 | delay from brake output ON to command received | 0~500 | ms | 250 | Effective immediately | Run settings | PS |
| P02 10 | delay from brake output OFF to motor de-energized in static state | 1~1000 | ms | 150 | Effective immediately | Run settings | PS |
| P02 11 | motor speed threshold at brake output OFF in rotating state | 0~3000 | rpm | 30 | Effective immediately | Run settings | PS |
| P02 12 | Rotate state, motor does not power to lock output OFF delay | 1~1000 | ms | 500 | Effective immediately | Run settings | PS |
| P02 15 | LED Warning Display Select | 0: immediately output warning messages 1: do not output warning messages | - | 0 | Effective immediately | Stop setting | PST |
| P02 18 | Servo Enable (S-ON) Filter time constant | 0~64 | ms | 0 | Effective immediately | Stop setting | PST |
| P02 21 | Brake resistance minimum allowed by driver | - | Ω | - | - | Display | PST |
| P02 22 | Built-in Brake Resistance Power | - | W | - | - | Display | PST |
| P02 23 | Built-in brake resistance | - | Ω | - | - | Display | PST |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting way | Related patterns |
|---------------|----|--------------------------------------|--|------|-----------------|-----------------------|--------------|------------------|
| P02 | 24 | Resistance heat dissipation factor | 10~100 | % | 30 | Effective immediately | Stop setting | PST |
| P02 | 25 | Brake resistance settings | 0: Use Built-in Brake Resistance 1: external brake resistance, natural cooling 2: use external brake resistor to force air cooling 3: does not use brake resistance, all rely on capacitance absorption | - | 0 | Effective immediately | Stop setting | PST |
| P02 | 26 | External brake resistance power | 1~65535 | W | - | Effective immediately | Stop setting | PST |
| P02 | 27 | External brake resistance resistance | 1~1000 | Ω | - | Effective immediately | Stop setting | PST |
| P02 | 30 | User password | 0~65535 | - | 0 | Power up again | Stop setting | PST |
| P02 | 31 | System parameter initialization | 0: no operation 1: Recovery of factory setting (except P00/P01 sets of parameters) 2: troubleshooting records | - | 0 | Effective immediately | Stop setting | PST |
| P02 | 32 | Panel Default Display | 0~99 | - | 50 | Effective immediately | Run settings | - |
| P02 | 33 | EtherCAT Software Version Number | - | - | - | - | Display | - |
| P02 | 34 | CAN Software Version Number | - | - | - | - | Display | - |
| P02 | 38 | Fault short circuit braking time | 0~30000 | ms | 5000 | Effective immediately | Run settings | PST |
| P02 | 39 | Fault Short Circuit Brake Threshold | 0~3000 | 0.1% | 1000 | Effective immediately | Run settings | PST |

P03 Group Terminal input parameters

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|--------------------------------------|---|------|-----------------|---------------------|----------------|------------------|
| P03 | 00 | Effective DI function distribution 1 | 0~0xFFFF Bit0: correspond FunIN.1 Bit1: correspond FunIN.2 Bit15: correspond FunIN.16 | - | 0 | Power up again | Run settings | - |
| P03 | 01 | Effective DI function distribution 2 | 0~0xFFFF Bit0: correspond FunIN.17 Bit1: correspond FunIN.18 Bit15: correspond FunIN.32 | - | 0 | Power up again | Run settings | - |
| P03 | 02 | DI1 Terminal function selection | 0~37 | - | 14 | Outage takes effect | Run settings | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| P03 03 | DI1 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings | - |
| P03 04 | DI2 Terminal function selection | 0~37 | - | 15 | Outage takes effect | Run settings | - |
| P03 05 | DI2 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings | - |
| P03 06 | DI3 Terminal function selection | 0~37 | - | 13 | Outage takes effect | Run settings | - |
| P03 07 | DI3 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings | - |
| P03 08 | DI4 Terminal function selection | 0~37 | - | 2 | Outage takes effect | Run settings | - |
| P03 09 | DI4 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings | - |
| P03 10 | DI5 Terminal function selection | 0~37 | - | 1 | Outage takes effect | Run settings | - |
| P03 11 | DI5 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling | - | 0 | Outage takes effect | Run settings | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|------|---------------------------------|--|-----------------|---------------|---------------------|------------------|
| | | edges are effective | | | | | |
| P03 | 12 | DI6 Terminal function selection | 0~37 | - | 12 | Outage takes effect | Run settings |
| P03 | 13 | DI6 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings |
| P03 | 14 | DI7 Terminal function selection | 0~37 | - | 3 | Outage takes effect | Run settings |
| P03 | 15 | DI7 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings |
| P03 | 16 | DI8 Terminal function selection | 0~37 | - | 31 | Outage takes effect | Run settings |
| P03 | 17 | DI8 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings |
| P03 | 18 | DI9 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings |
| P03 | 19 | DI9 Terminal logic selection | Input polarity :0~4 0: means low level valid 1: indicates high level of efficiency 2: indicates that the rising edge is effective 3: indicates that the decline is effective 4: indicates that the rising and falling edges are effective | - | 0 | Outage takes effect | Run settings |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--------------------------------------|--|-------------------------|-------------------------|-----------------------|----------------|------------------|
| P03 34 | Effective DI Function Distribution 3 | 0~0xFFFF Bit0: corresponding FunIN.33 Bit1: corresponding FunIN.34 Bit15: corresponding FunIN.48 | - | 0 | Power up again | Run settings | - |
| P03 35 | Effective DI Function Distribution 4 | 0~0xFFFF Bit0: corresponding FunIN.49 Bit1: corresponding FunIN.50 Bit15: corresponding FunIN.64 | - | 0 | Power up again | Run settings | - |
| P03 50 | AI1 offset | -5000~5000 | mV | 0 | Effective immediately | Run settings | - |
| P03 51 | AI1 Input filter time constant | 0~655.35 | ms | 2.00 | Effective immediately | Run settings | - |
| P03 53 | AI1 blind spot | 0~1000.0 | mV | 10.0 | Effective immediately | Run settings | - |
| P03 54 | AI1 drift | -500.0~500.0 | mV | 0.0 | Effective immediately | Run settings | - |
| P03 55 | AI2 offset | -5000~5000 | mV | 0 | Effective immediately | Run settings | - |
| P03 56 | AI2 Input filter time constant | 0~655.35 | ms | 2.00 | Effective immediately | Run settings | - |
| P03 58 | AI2 blind spot | 0~1000.0 | mV | 10.0 | Effective immediately | Run settings | - |
| P03 59 | AI2 drift | -500.0~500.0 | mV | 0.0 | Effective immediately | Run settings | - |
| P03 80 | Analog 10 V corresponding velocity | 0rpm~9000rpm | 1rpm | 3000rpm | Effective immediately | Stop setting | - |
| P03 81 | Analog 10 V corresponding torque | 1.00 times ~8.00 times rated torque | 1.00 times rated torque | 1.00 times rated torque | Effective immediately | Stop setting | - |

P04 Group Terminal output parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---------------------------------|---------------|------|-----------------|---------------------|----------------|------------------|
| P04 00 | DO1 Terminal function selection | 0~22 | - | 1 | Outage takes effect | Run settings | - |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---------------------------------|--|------|-----------------|-----------------------|----------------|------------------|
| P04 | 01 | DO1 Terminal logic selection | Output polarity reversal settings :0~1 The output L low level when 0: 0: indicates valid (optocoupler conduction) 1: output H high level when valid (optocoupler off) | - | 0 | Outage takes effect | Run settings | - |
| P04 | 02 | DO2 Terminal function selection | 0~22 | - | 5 | Outage takes effect | Run settings | - |
| P04 | 03 | DO2 Terminal logic selection | Output polarity reversal settings :0~1 The output L low level when 0: 0: indicates valid (optocoupler conduction) 1: output H high level when valid (optocoupler off) | - | 0 | Outage takes effect | Run settings | - |
| P04 | 04 | DO3 Terminal function selection | 0~22 | - | 3 | Outage takes effect | Run settings | - |
| P04 | 05 | DO3 Terminal logic selection | Output polarity reversal settings :0~1 The output L low level when 0: 0: indicates valid(optocoupler conduction) 1: output H high level when valid (optocoupler off) | - | 0 | Outage takes effect | Run settings | - |
| P04 | 06 | DO4 Terminal function selection | 0~22 | - | 11 | Outage takes effect | Run settings | - |
| P04 | 07 | DO4 Terminal logic selection | Output polarity reversal settings :0~1 The output L low level when 0: 0: indicates valid (optocoupler conduction) 1: output H high level when valid (optocoupler off) | - | 0 | Outage takes effect | Run settings | - |
| P04 | 08 | DO5 Terminal function selection | 0~22 | - | 16 | Outage takes effect | Run settings | - |
| P04 | 09 | DO5 Terminal logic selection | Output polarity reversal settings :0~1 The output L low level when 0: 0: indicates valid (optocoupler conduction) 1: output H high level when valid (optocoupler off) | - | 0 | Outage takes effect | Run settings | - |
| P04 | 22 | DO original selection | 0~31 | - | 0 | Effective immediately | Stop setting | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-----------------------|---|-------|-----------------|-----------------------|----------------|------------------|
| P04 50 | AO1 Signal selection | 00: motor speed V/1000rpm 01: speed instruction (1 V/1000rpm) 02: torque instruction (1 V/100%) 03: position deviation (0.05 V/instruction unit) 04: position deviation (0.05 V/encoder unit) 05: position instruction speed (1 V/1000rpm) 06: Positioning Completion Instruction (Location completed :5 V Location not completed :0 V) 07: speed feedforward (1 V/1000rpm) 08: AI1 voltage 09: AI2 voltage | - | 0 | Effective immediately | Run settings | - |
| P04 51 | AO1 offset voltage | -10000~10000 | mV | 5000 | Effective immediately | Run settings | - |
| P04 52 | AO1 multiplying power | -99.99 ~99.99 | Times | 1.00 | Effective immediately | Run settings | - |
| P04 53 | AO2 Signal selection | 00: motor speed (1 V/1000rpm) 01: speed instruction (1 V/1000rpm) 02: torque instruction (1 V/100%) 03: position deviation (0.05 V/instruction unit) 04: position deviation (0.05 V/encoder unit) 05: position instruction speed (1 V/1000rpm) 06: Positioning Completion Instruction (Location completed: 5 V Location not completed :0 V) 07: speed feedforward (1 V/1000rpm) 08: AI1 voltage 09: AI2 voltage | - | 0 | Effective immediately | Run settings | - |
| P04 54 | AO2 offset voltage | -10000~10000 | mV | 5000 | Effective immediately | Run settings | - |
| P04 55 | AO2 multiplying power | -99.99 ~99.99 | Times | 1.00 | Effective immediately | Run settings | - |

P05 Group Position control parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-----------------------------|--|------|-----------------|-----------------------|----------------|------------------|
| P05 00 | Location instruction source | 0: Pulse Instruction 1: step given 2: multi-segment position instruction given | - | 0 | Effective immediately | Stop setting | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|------|-----------------|-----------------------|----------------|------------------|
| P05 01 | Pulse instruction input terminal selection | 0: low speed 1: High Speed | - | 0 | Effective immediately | Stop setting | P |
| P05 02 | Number of position instructions per rotation of motor | 0 ~1048576 | P/r | 0 | Power up again | Stop setting | P |
| P05 04 | First-order low-pass filter time constant | 0~6553.5 | ms | 0.0 | Effective immediately | Stop setting | P |
| P05 05 | Step by step | -9999 ~9999 | 指令单位 | 50 | Effective immediately | Stop setting | P |
| P05 06 | Average filter time constant | 0.0~128.0 | ms | 0.0 | Effective immediately | Stop setting | P |
| P05 07 | Electronic tooth ratio 1 (Molecules) | 1~1073741824 | - | 1048576 | Effective immediately | Run settings | P |
| P05 09 | Electronic tooth ratio 1 (denominator) | 1~1073741824 | - | 10000 | Effective immediately | Run settings | P |
| P05 11 | Electronic tooth ratio 2 (Molecules) | 1~1073741824 | - | 1048576 | Effective immediately | Run settings | P |
| P05 13 | Electronic tooth ratio 2 (denominator) | 1~1073741824 | - | 10000 | Effective immediately | Run settings | P |
| P05 15 | Pulse instruction pattern | 0: pulse direction, positive logic 1: pulse direction, negative logic 2: A phase B phase orthogonal pulse ,4x frequency 3: CW CCW | - | 0 | Power up again | Stop setting | P |
| P05 16 | Clear action selection | 0: servo enable OFF and clearance of position deviation in case of failure Remove position deviation pulse 1: OFF of enable and failure 2: enable OFF and clear position deviation through DI input ClrPosErr signal | - | 0 | Effective immediately | Stop setting | P |
| P05 17 | Number of frequency division pulses | 35 ~32767 | P/r | 2500 | Power up again | Stop setting | - |
| P05 19 | Speed feedforward control selection | 0: Speedless Feed 1: Internal Speed Feed 2: use AI1 as a speed feedforward input 3: use AI2 as a speed feedforward input | - | 1 | Effective immediately | Stop setting | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|----------------------------|-----------------|-----------------------|----------------|------------------|
| P05 20 | Location Complete Output Condition | Output 0: absolute value of position deviation is less than P05-21 When the absolute value of 1: position deviation is less than P05-21 and the filtered position instruction is 0, the output is When the absolute value of 2: position deviation is less than P05-21 and the position instruction before filtering is 0, the output is When the absolute value of 3: position deviation is less than the location completion / approach threshold, and the position instruction filter is 0, at least the P05-60 time is kept valid | - | 0 | Effective immediately | Run settings | P |
| P05 21 | Location completion threshold | 1 ~65535 | Encoder / Instruction Unit | 734 | Effective immediately | Run settings | P |
| P05 22 | Positioning proximity threshold | 1 ~65535 | Encoder / Instruction Unit | 65535 | Effective immediately | Run settings | P |
| P05 23 | Interrupt fixed length enable | 0: No Interrupt Fixed Length Function 1: Use interrupt length fixing function | - | 0 | Power up again | Stop setting | P |
| P05 24 | Interrupt long displacement | 0 ~1073741824 | Instruction Unit | 10000 | Effective immediately | Run settings | P |
| P05 26 | Constant length constant speed running speed | 0~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P05 27 | Interrupt long acceleration and deceleration time | 0~1000 | ms | 10 | Effective immediately | Run settings | P |
| P05 29 | Fixed length lock release signal | Uncable | - | 1 | Effective immediately | Run settings | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---------------------------------|---|------|-----------------|-----------------------|----------------|------------------|
| P05 30 | Origin Reversion Enable Control | 0: Close Origin Recovery 1: input the HomingStart signal through the DI to enable the origin recovery function 2: input the HomingStart signal through the DI to enable the electrical return function Activate 3: origin immediately 4: immediate origin recovery 5: Activate Electrical Return Zero 6: origin at current position | - | 0 | Effective immediately | Run settings | P |
| P05 31 | Origin Recovery Mode | 0 : forward return zero, deceleration point, origin is origin switch 1: reverse return zero, deceleration point, origin is origin switch 2: forward return zero, deceleration point, origin is motor Z signal 3 : reverse return zero, deceleration point, origin for motor Z signal 4 : forward return zero, deceleration point is origin switch, origin is motor Z signal 5 : reverse zero, deceleration point is origin switch, origin is motor Z signal 6 : forward return zero, deceleration point, origin is forward overpass switch 7 : reverse zero, deceleration point, origin is reverse overpass switch 8 : forward return zero, deceleration point is forward overrun switch, origin is motor Z signal 9 : reverse return zero, deceleration point is reverse overrun switch, origin is motor Z signal 10:forward to zero, deceleration point, origin is mechanical limit position 11 : reverse return zero, deceleration point, origin is mechanical limit position 12:forward return zero, deceleration point is mechanical limit position, origin is motor Z signal 13: reverse zero, deceleration point is mechanical limit position, origin is motor Z signal | - | 0 | Effective immediately | Stop setting | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---|------------------|-----------------|-----------------------|----------------|------------------|
| P05 32 | Speed of high-speed search for origin switch signal | 0~3000 | rpm | 100 | Effective immediately | Run settings | P |
| P05 33 | Speed of low speed search for origin switch signal | 0~1000 | rpm | 10 | Effective immediately | Run settings | P |
| P05 34 | Time of acceleration and deceleration when searching origin | 0~1000 | ms | 1000 | Effective immediately | Stop setting | P |
| P05 35 | Limit the time to find the origin | 0~65535 | ms | 10000 | Effective immediately | Stop setting | P |
| P05 36 | Mechanical origin offset | -1073741824 ~1073741824 | Instruction unit | 0 | Effective immediately | Stop setting | P |
| P05 38 | Servo Pulse Output Source Selection | 0: encoder frequency division output 1: Pulse command synchronous output 2: frequency division or synchronous output prohibited | - | 0 | Power up again | Stop setting | P |
| P05 39 | Electronic gear ratio switching conditions | 0: position instruction (unit only) is 0 and switches after 2.5 m/s 1: real-time switching | - | 0 | Effective immediately | Stop setting | P |
| P05 40 | Mechanical Origin Offset and Limit Treatment | 0: P05-36 is the coordinate after the origin is returned, and the reverse origin is found 1: P05-36 is the relative offset after the origin is returned, and the reverse origin is found after the limit is triggered again to enable the origin to be returned 2: P05-36 is the origin after the return of the coordinates, encounter limit automatic reverse change 3: P05-36 is the relative offset after the origin is returned, the limit is automatically reversed | - | 0 | Effective immediately | Stop setting | P |
| P05 41 | Z Pulse Output Polarity Selection | 0: positive polarity output (Z pulse is high level) 1: negative output (Z pulse low level) | - | 1 | Power up again | Stop setting | P |
| P05 43 | Position pulse along selection | Active on falling edge Active on rising edge | 1 | 0 | Power up again | Run settings | PST |
| P05 46 | Absolute position linear mode position bias (low 32 bits) | -2147483648~2147483647 | Encoder unit | 0 | Effective immediately | Stop setting | ALL |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|------------------------|--------------|-----------------|-----------------------|----------------|------------------|
| P05 48 | Absolute position linear mode position bias (high 32 bits) | -2147483648~2147483647 | Encoder unit | 0 | Effective immediately | Stop setting | ALL |
| P05 50 | Absolute position rotation mode mechanical gear ratio (molecule) | 1-65535 | - | 65535 | Effective immediately | Stop setting | ALL |
| P05 51 | Absolute position rotation mode mechanical gear ratio (denominator) | 1-65535 | - | 1 | Effective immediately | Stop setting | ALL |
| P05 52 | Absolute position rotation mode load rotation cycle number of pulses (low 32 bits) | 0~ 4294967295 | Encoder unit | 0 | Effective immediately | Stop setting | ALL |
| P05 54 | Absolute position rotation mode load rotation cycle number of pulses (32 bits high) | 0~ 127 | Encoder unit | 0 | Effective immediately | Stop setting | ALL |
| P05 56 | Threshold of zero velocity judgment | 0~1000 | rpm | 2 | Effective immediately | Run settings | P |
| P05 58 | Contact Stop Zero Torque Limit | 0~300.0 | % | 100.0% | Effective immediately | Run settings | P |
| P05 59 | Location Completion Window Time | 0~30000 | ms | 1 | Effective immediately | Run settings | P |
| P05 60 | Positioning completion retention time | 0~30000 | ms | 0 | Effective immediately | Run settings | P |
| P05 61 | Number of divider pulses (32 bits) | 0~262143 | p/r | 0 | Power up again | Stop setting | - |

P06 Group Speed control parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--------------------------------------|---|------|-----------------|-----------------------|----------------|------------------|
| P06 00 | A Source of Main Speed Instruction | 0:Number given (P06-03) 1:AI1 2:AI2 | - | 0 | Effective immediately | Stop setting | S |
| P06 01 | Auxiliary Speed Instruction B Source | 0:Number given (P06-03) 1:AI1 2:AI2 3:0(neutrality) 4:0(neutrality) 5:Multi-segment speed instruction | - | 1 | Effective immediately | Stop setting | S |
| P06 02 | Speed Instruction Selection | 0:A Source of Main Speed Instruction 1:Auxiliary Speed Instruction B Source 2:A+B 3:A/B switch 4:Communications | - | 0 | Effective immediately | Stop setting | S |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|--|------|-----------------|-----------------------|----------------|------------------|
| P06 | 03 | Speed command keyboard setting | -6000~6000 | rpm | 200 | Effective immediately | Run settings | S |
| P06 | 04 | Set point speed | 0~6000 | rpm | 100 | Effective immediately | Run settings | S |
| P06 | 05 | Speed command acceleration ramp time constant | 0~65535 | ms | 0 | Effective immediately | Run settings | S |
| P06 | 06 | Speed command acceleration ramp time constant | 0~65535 | ms | 0 | Effective immediately | Run settings | S |
| P06 | 07 | Maximum Speed Threshold | 0~6000 | rpm | 6000 | Effective immediately | Run settings | S |
| P06 | 08 | Forward velocity threshold | 0~6000 | rpm | 6000 | Effective immediately | Run settings | S |
| P06 | 09 | Reverse velocity threshold | 0~6000 | rpm | 6000 | Effective immediately | Run settings | S |
| P06 | 11 | Torque Feedforward Control Selection | 0:No torque feed 1:Internal torque feed | - | 1 | Effective immediately | Run settings | PS |
| P06 | 15 | Zero fixed speed threshold | 0~6000 | rpm | 10 | Effective immediately | Run settings | S |
| P06 | 16 | Motor rotation speed threshold | 0~1000 | rpm | 20 | Effective immediately | Run settings | S |
| P06 | 17 | Speed consistent signal threshold | 0~100 | rpm | 10 | Effective immediately | Run settings | S |
| P06 | 18 | Speed reaches signal threshold | 10~6000 | rpm | 1000 | Effective immediately | Run settings | S |
| P06 | 19 | Zero speed output signal threshold | 1~6000 | rpm | 10 | Effective immediately | Run settings | S |

P07 GroupTorque control parameters

Torque instruction 100% corresponding to motor rated torque.

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---------------------------------------|---|------|-----------------|-----------------------|----------------|------------------|
| P07 | 00 | A source of master torque instruction | 0:Number given (P07-03) 1:AI1 2:AI2 | - | 0 | Effective immediately | Stop setting | T |
| P07 | 01 | Auxiliary torque instruction B source | 0:Number given (P07-03) 1:AI1 2:AI2 | - | 1 | Effective immediately | Stop setting | T |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|------|-----------------|-----------------------|----------------|------------------|
| P07 02 | Torque Directive Selection | 0: Source of main torque command A 1: Source of auxiliary torque command B 2: Source of main command A + source of auxiliary command B 3: Main command A source/auxiliary command B source switch 4: Communication setting | - | 0 | Effective immediately | Stop setting | T |
| P07 03 | Torque instruction keyboard setting | -300.0~300.0 | % | 0 | Effective immediately | Run settings | T |
| P07 05 | Torque instruction filter time constant | 0~30.00 | ms | 0.79 | Effective immediately | Run settings | PST |
| P07 06 | Second torque instruction filtering time constant | 0~30.00 | ms | 0.79 | Effective immediately | Run settings | PST |
| P07 07 | Torque limitation sources | 0: positive and negative internal torque limits 1: positive and negative external torque limits (using P-CL,N-CL options) 2: T-LMT used as external torque limit input 3: torque limit is the minimum value of positive and negative external torque and external T-LMT (using P-CL,N-CL selection) Switch between 4: positive and negative internal torque limit and T-LMT torque limit (using P-CL,N-CL selection) | - | 0 | Effective immediately | Stop setting | PST |
| P07 08 | T-LMT selection | 1: AI1 2: AI2 | - | 2 | Effective immediately | Stop setting | PST |
| P07 09 | Positive internal torque limit | 0.0~300.0 | % | 300.0 | Effective immediately | Run settings | PST |
| P07 10 | Negative internal torque limit | 0.0~300.0 | % | 300.0 | Effective immediately | Run settings | PST |
| P07 11 | Positive external torque limit | 0.0~300.0 | % | 300.0 | Effective immediately | Run settings | PST |
| P07 12 | Negative External Torque Limit | 0.0~300.0 | % | 300.0 | Effective immediately | Run settings | PST |
| P07 17 | Selection of speed limit sources | 0: internal speed limits (Speed limit for torque control) 1: V-LMT used as an external speed limit input 2: select the P07-19/P07-20 as an internal speed limit via FunIN.36(V-SEL); | - | 0 | Effective immediately | Run settings | T |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|------------------|------|-----------------|-----------------------|----------------|------------------|
| P07 | 18 | V-LMT Selection | 1: AI1 2: AI2 | - | 1 | Effective immediately | Run settings | T |
| P07 | 19 | Torque control forward speed limit value / torque control speed limit value 1 | 0~6000 | rpm | 3000 | Effective immediately | Run settings | T |
| P07 | 20 | Negative Speed Limit for Torque Control / Speed Limit for Torque Control 2 | 0~6000 | rpm | 3000 | Effective immediately | Run settings | T |
| P07 | 21 | Torque reaches reference value | 0.0~300.0 | % | 0.0 | Effective immediately | Run settings | PST |
| P07 | 22 | Torque reaches effective value | 0.0~300.0 | % | 20.0 | Effective immediately | Run settings | PST |
| P07 | 23 | Torque arrives invalid | 0.0~300.0 | % | 10.0 | Effective immediately | Run settings | PST |
| P07 | 40 | Speed restricted window in torque mode | 0.5~30.0 | ms | 1.0 | Effective immediately | Run settings | T |

P08 Group Gain class parameters

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|--|---|------|-----------------|-----------------------|----------------|------------------|
| P08 | 00 | speed gain | 0.1~2000.0 | Hz | 25.0 | Effective immediately | Run settings | PS |
| P08 | 01 | Speed loop integral time constant | 0.15~512.00 | ms | 31.83 | Effective immediately | Run settings | PS |
| P08 | 02 | Position loop gain | 0.0~2000.0 | Hz | 40.0 | Effective immediately | Run settings | P |
| P08 | 03 | Second speed loop gain | 0.1~2000.0 | Hz | 40.0 | Effective immediately | Run settings | PS |
| P08 | 04 | No.2 Speed loop integral time constant | 0.15~512.00 | ms | 40.00 | Effective immediately | Run settings | PS |
| P08 | 05 | No.2 Position loop gain | 0.0~2000.0 | Hz | 64.0 | Effective immediately | Run settings | P |
| P08 | 08 | Second Gain Mode Settings | 0: The first gain is fixed, and the external DI is used for P/I switching; 1: Use gain switching according to the conditions of P08-09 | - | 1 | Effective immediately | Run settings | PST |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|------------------------------------|--|-----------------------------------|-----------------|-----------------------|----------------|------------------|
| P08 09 | Gain switching condition selection | 0: The first gain is fixed (PS) 1: Use external DI switch (PS) 2: Torque command is large (PS) 3: Large speed command (PS) 4: Speed command change rate is large (PS) 5: Speed command high and low speed threshold (PS) 6: Large position deviation (P) 7: Position command (P) 8: Positioning completed (P) 9: The actual speed is large (P) 10: Position command + actual speed (P) | - | 0 | Effective immediately | Run settings | PST |
| P08 10 | Gain switching delay time | 0.0~1000.0 | ms | 5.0 | Effective immediately | Run settings | PST |
| P08 11 | Gain Switching Level | 0~20000 | According to switching conditions | 50 | Effective immediately | Run settings | PST |
| P08 12 | Gain switching delay | 0~20000 | According to switching conditions | 30 | Effective immediately | Run settings | PST |
| P08 13 | Position gain switching time | 0.0~1000.0 | ms | 3.0 | Effective immediately | Run settings | P |
| P08 15 | Load moment of inertia ratio | 0.00~120.00 | 倍 | 1.00 | Effective immediately | Run settings | PST |
| P08 18 | Speed feed filter time constant | 0.00~64.00 | ms | 0.50 | Effective immediately | Run settings | P |
| P08 19 | Speed feedforward gain | 0.0~100.0 | % | 0.0 | Effective immediately | Run settings | P |
| P08 20 | Torque feed filter time constant | 0.00~64.00 | ms | 0.50 | Effective immediately | Stop setting | PS |
| P08 21 | Torque Feedforward Gain | 0.0~200.0 | % | 0.0 | Effective immediately | Run settings | PS |
| P08 22 | Speed Feedback Filter Option | 0: Disable speed feedback average filtering 1: Speed feedback 2 times average filtering 2: Speed feedback 4 times average filtering 3: Speed feedback 8 times average filtering 4: Speed feedback 16 times average filtering | - | 0 | Effective immediately | Stop setting | PS |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---------------|------|-----------------|-----------------------|----------------|------------------|
| P08 23 | Speed feedback low pass filter cutoff frequency | 100~4000 | Hz | 4000 | Effective immediately | Run settings | PS |
| P08 24 | Pseudo-differential feedforward control coefficient | 0.0~100.0 | - | 100.0 | Effective immediately | Run settings | PS |

P09 Group Self-adjusting parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---|------|-----------------|-----------------------|----------------|------------------|
| P09 00 | Self adjustment mode selection | 0: parameter self-adjustment is invalid, manual adjustment of parameters 1: Parameter self-adjustment mode, use rigidity meter to automatically adjust gain parameters 2: Positioning mode, use rigidity meter to automatically adjust gain parameters | - | 0 | Effective immediately | Run settings | PST |
| P09 01 | Rigid grade selection | 0~31 | - | 12 | Effective immediately | Run settings | PST |
| P09 02 | Adaptive Trap Mode Selection | 0: The adaptive notch filter is no longer updated 1: An adaptive notch filter is effective (the third group of notch filters) 2: An adaptive notch filter is effective (Group 3 and 4 notch filter) 3: Only test the resonance point, displayed on P09-24 4: Restore the values of the 3rd and 4th notch filters to the factory state | - | 0 | Effective immediately | Run settings | PST |
| P09 03 | On-line Inertial Identification Mode | 0: Disable online identification 1: Open online recognition, slowly changing 2: Open online identification, general changes 3: Open online recognition, rapid changes | - | 0 | Effective immediately | Run settings | RST |
| P09 04 | Selection of Low Frequency Resonance Suppression Mode | 0: Manually set the vibration frequency 1: Automatically identify the vibration frequency | - | 0 | Effective immediately | Run settings | P |
| P09 05 | Offline Inertial Identification Mode Selection | 0: Positive and negative triangle wave mode 1: JOG mode | - | 0 | Effective immediately | Stop setting | PST |
| P09 06 | Maximum velocity for inertia identification | 100~1000 | rpm | 500 | Effective immediately | Stop setting | PST |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---------------|------|-----------------|-----------------------|----------------|------------------|
| P09 07 | Acceleration to maximum velocity time constant for inertia identification | 20~800 | ms | 125 | Effective immediately | Stop setting | PST |
| P09 08 | Waiting time after completion of single inertia identification | 50~10000 | ms | 800 | Effective immediately | Stop setting | PST |
| P09 09 | Complete single inertia identification number of motor turns | 0.00~2.00 | r | - | - | Display | PST |
| P09 12 | Group 1 Trap Frequency | 50~4000 | Hz | 4000 | Effective immediately | Run settings | PS |
| P09 13 | Group 1 Trap width rating | 0~20 | - | 2 | Effective immediately | Run settings | PS |
| P09 14 | Group 1 Trap depth rating | 0~99 | - | 0 | Effective immediately | Run settings | PS |
| P09 15 | Group 2 Trap Frequency | 50~4000 | Hz | 4000 | Effective immediately | Run settings | PS |
| P09 16 | Group 2 Trap width rating | 0~20 | - | 2 | Effective immediately | Run settings | PS |
| P09 17 | Group 2 Trap depth rating | 0~99 | - | 0 | Effective immediately | Run settings | PS |
| P09 18 | Group 3 Trap Frequency | 50~4000 | Hz | 4000 | Effective immediately | Run settings | PS |
| P09 19 | Group 3 Trap width rating | 0~20 | - | 2 | Effective immediately | Run settings | PS |
| P09 20 | Group 3 Trap depth rating | 0~99 | - | 0 | Effective immediately | Run settings | PS |
| P09 21 | Group 4 Trap Frequency | 50~4000 | Hz | 4000 | Effective immediately | Run settings | PS |
| P09 22 | Group 4 Trap width rating | 0~20 | - | 2 | Effective immediately | Run settings | PS |
| P09 23 | Group 4 Trap depth rating | 0~99 | - | 0 | Effective immediately | Run settings | PS |
| P09 24 | Resonance Frequency Identification Results | 0~2 | Hz | 0 | - | Display | PS |
| P09 30 | Torque disturbance compensation gain | 0.0~100.0 | % | 0.0 | Effective immediately | Run settings | PS |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---------------|------|-----------------|-----------------------|----------------|------------------|
| P09 | 31 | Time constant of torque disturbance observer filter | 0.00~25.00 | ms | 0.50 | Effective immediately | Run settings | PS |
| P09 | 38 | Frequency resonance frequency | 1.0~100.0 | Hz | 100.0 | Effective immediately | Run settings | P |
| P09 | 39 | Low Frequency Resonance Frequency Filter Setting | 0~10 | - | 2 | Effective immediately | Run settings | P |

P0A Group Fault and Protection Parameters

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|--|---------------------------|-----------------|-----------------------|----------------|------------------|
| P0A | 00 | Power Input Lack Protection Selection | 0: Enable fault prohibit warning 1: Enable faults and warnings 2: Prohibit faults and warnings | - | 0 | Effective immediately | Run settings | - |
| P0A | 03 | Power-down save feature enables selection | 0: Do not perform power-down save 1: Execute power-down save | - | 0 | Effective immediately | Run settings | - |
| P0A | 04 | Motor overload protection gain | 50~300 | % | 100 | Effective immediately | Stop setting | - |
| P0A | 08 | Failure threshold for overspeed | 0~10000 | rpm | 0 | Effective immediately | Run settings | PST |
| P0A | 09 | Maximum position pulse frequency | 100~4000 | kHz | 4000 | Effective immediately | Stop setting | P |
| P0A | 10 | Fault threshold with excessive position deviation | 1 ~1073741824 | Encoder unit/command unit | 3145728 | Effective immediately | Run settings | P |
| P0A | 12 | Vehicle protection features enable | 0: No speed protection 1: Turn on speed protection | - | 1 | Effective immediately | Run settings | PST |
| P0A | 16 | Determination of Low Frequency Resonance Position Deviation | 1-1000 | Encoder unit | 5 | Effective immediately | Run settings | P |
| P0A | 17 | Location setting unit selection | 0: Encoder unit 1: Command unit | - | 0 | Effective immediately | Stop setting | P |
| P0A | 19 | DI8 Filter time constant | 0~255 | 25ns | 80 | Power up again | Stop setting | - |
| P0A | 20 | DI9 Filter time constant | 0~255 | 25ns | 80 | Power up again | Stop setting | - |
| P0A | 24 | Filter Time of Low Speed Pulse Input Pin | 0~255 | 25ns | 30 | Power up again | Stop setting | P |
| P0A | 25 | Velocity feedback display value filter time constant | 0~5000 | ms | 50 | Effective immediately | Stop setting | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|------------------|-----------------|-----------------------|----------------|------------------|
| P0A 26 | Motor overload shield enables | 0: Open motor overload detection 1: shielding motor overload warning and fault detection | - | 0 | Effective immediately | Stop setting | - |
| P0A 27 | Velocity DO filter time constant | 0~5000 | ms | 10 | Effective immediately | Stop setting | - |
| P0A 28 | filter time constant of orthogonal encoder | 0~255 | 25ns | 30 | Power up again | Stop setting | - |
| P0A 30 | High speed pulse input pin filter time constant | 0~255 | 25ns | 3 | Power up again | Stop setting | P |
| P0A 32 | Time window for overtemperature protection | 10~65535 | ms | 200 | Effective immediately | Run settings | - |
| P0A 33 | Overtemperature protection enables | 0: Detection of Overtemperature Protection blocking of shielded motor 1: Monitoring of overtemperature protection for motor shutoff | - | 1 | Effective immediately | Run settings | - |
| P0A 36 | Encoder Multiple Loop Overflow Fault Selection | No shielding | - | 0 | Effective immediately | Stop setting | ALL |
| P0A 40 | Soft Limit Set | 0: not soft limit 1: soft limit immediately after power on 2: soft limit after the origin is zero | 1 | 0 | Effective immediately | Stop setting | PST |
| P0A 41 | Maximum Soft Limit | -2147483648~2147483647 | Instruction unit | 2147483647 | Effective immediately | Stop setting | PST |
| P0A 43 | Minimum Soft Limit Value | -2147483648~2147483647 | Instruction unit | 2147483648 | Effective immediately | Stop setting | PST |
| P0A 47 | Lock protection test enables | 0: No 1: Enable | - | 1 | Effective immediately | Run settings | ALL |
| P0A 48 | Gravity Load Detection Value | 0~300.0 | % | 30.0 | Effective immediately | Run settings | ALL |

P0B Group Monitoring parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|---------------|------|-----------------|---------------|----------------|------------------|
| P0B 00 | Actual motor speed | - | rpm | - | - | Display | PST |
| P0B 01 | Speed instruction | - | rpm | - | - | Display | PS |
| P0B 02 | Internal torque instruction (relative to rated torque) | - | % | - | - | Display | PST |
| P0B 03 | Input signal (DI signal) monitoring | - | - | - | - | Display | PST |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---|------------------|-----------------|-----------------------|----------------|------------------|
| P0B 05 | Output signal (DO signal) monitoring | - | - | - | - | Display | PST |
| P0B 07 | Absolute position counter (32-bit decimal display) | - | Instruction Unit | - | - | Display | PST |
| P0B 09 | Mechanical angle (number of pulses starting at origin) | - | Encoder Unit | - | - | Display | PST |
| P0B 10 | Electrical angle | - | ° | - | - | Display | PST |
| P0B 11 | Input position instruction corresponding speed information | - | rpm | - | - | Display | P |
| P0B 12 | Average load rate | - | % | - | - | Display | PST |
| P0B 13 | Input instruction pulse counter (32-bit decimal display) | - | Instruction Unit | - | - | Display | P |
| P0B 15 | Encoder position deviation counter (32-bit decimal display) | - | Encoder Unit | - | - | Display | P |
| P0B 17 | Feedback pulse counter (32-bit decimal display) | - | Encoder Unit | - | - | Display | PST |
| P0B 19 | Total power-up time (32-bit decimal display) | - | s | - | - | Display | PST |
| P0B 21 | AI1 Sampling voltage values | - | V | - | - | Display | PST |
| P0B 22 | AI2 Sampling voltage values | - | V | - | - | Display | PST |
| P0B 24 | Phase current RMS | - | A | - | - | Display | PST |
| P0B 26 | Bus voltage | - | V | - | - | Display | PST |
| P0B 27 | Module temperature values | - | °C | - | - | Display | PST |
| P0B 33 | Failure logging | 0: Current fault 1: Last 1 failure 2: Last 2 failure 9: Last 9 failures | - | 0 | Effective immediately | Run settings | PST |
| P0B 34 | Number of failures selected | - | - | - | - | Display | PST |
| P0B 35 | Selected fault timestamp | - | s | - | - | Display | PST |
| P0B 37 | Motor speed at selected faults | - | rpm | - | - | Display | PST |
| P0B 38 | Electrical U phase current at selected fault | - | A | - | - | Display | PST |
| P0B 39 | Electrical V phase current at selected fault | - | A | - | - | Display | PST |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---------------|---------------------|-----------------|---------------|----------------|------------------|
| P0B 40 | Bus voltage at selected fault | - | V | - | - | Display | PST |
| P0B 41 | Input terminal status at selected fault | - | - | - | - | Display | PST |
| P0B 42 | Output terminal status at selected fault | - | - | - | - | Display | PST |
| P0B 53 | Position Deviation Counter | - | Instruction Unit | - | - | Display | P |
| P0B 55 | Actual motor speed(0.1rpm) | - | rpm | - | - | Display | PST |
| P0B 58 | Mechanical absolute position (32 bits low) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 60 | Mechanical absolute position (32 bits high) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 64 | Real-time input position instruction counter | - | Unit of instruction | - | - | Display | PST |
| P0B 70 | Absolute value encoder rotation circle data | - | r | 0 | - | Display | ALL |
| P0B 71 | In-circle position of absolute encoder | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 77 | Absolute encoder absolute position (low 32 bits) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 79 | Absolute encoder absolute position (high 32 bits) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 81 | Rotating load single loop position (low 32 bits) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 83 | Rotating load single loop position (high 32 bits) | - | Encoder Unit | 0 | - | Display | ALL |
| P0B 85 | Rotating Load Single Circle Position | - | Unit of instruction | 0 | - | Display | ALL |

P0C Group Communication parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|------------------------|--|------|-----------------|-----------------------|----------------|------------------|
| P0C 00 | Servo Axis Address | 1~247, 0 for broadcast address | - | 1 | Effective immediately | Run settings | PST |
| P0C 02 | Serial Port Rate Setup | 0: 2400Kbp/s 1: 4800Kbp/s 2: 9600Kbp/s 3: 19200Kbp/s 4: 38400Kbp/s 5: 57600Kbp/s | - | 2 | Effective immediately | Run settings | PST |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---|------|-----------------|-----------------------|----------------|------------------|
| P0C | 03 | MODBUS data format | 0: no check ,2 end bits 1: parity ,1 end bit 2: check ,1 end bit 3: no check ,1 end bit | - | 3 | Effective immediately | Run settings | PST |
| P0C | 08 | CAN Communication rate setting | 0: 20K 3: 125K 1: 50K 4: 250K 2: 100K 5: 500K 6: 1M 7: 1M | - | 5 | Effective immediately | Run settings | PST |
| P0C | 09 | communicationVDI | Prohibition of enabling | - | 0 | Effective immediately | Stop setting | PST |
| P0C | 10 | VDI default value after power on | Bit0-VDI11 default values Bit15-VDI16 default values | - | 0 | Power up again | Run settings | PST |
| P0C | 11 | Communication VDO | 0: prohibition 1: enabling | - | 0 | Effective immediately | Stop setting | PST |
| P0C | 12 | Default level when VDO function is selected as 0 | Bit0-VDO1 default values Bit15-VDO16 default values | - | 0 | Effective immediately | Stop setting | PST |
| P0C | 13 | MODBUS communication write function code is updated to EEPROM | 0: do not update EEPROM 1: update EEPROM except P0B and P0D groups | - | 1 | Effective immediately | Run settings | PST |
| P0C | 14 | MODBUS Error code | New agreement: 0 x0001: Illegal function (command code) 0 x0002: Illegal data address 0 x0003: Illegal data 0 x0004: Station equipment malfunction Old Agreement: x0002: command code is not x03/0x06/0x10 0 0 x0004: Servo calculates that the CRC check code received by the data frame is not equal to the data frame check code 0 x0008: Access function code does not exist 0 x0010: Write the value of the function code beyond the upper and lower limits of the function code 0 x0080: The written function code can only be modified in the servo shutdown state while the servo is currently in operation state | 1 | - | - | Display | - |
| P0C | 16 | CAN communication write function code is updated to EEPROM | 0: do not update EEPROM 1: update EEPROM except P0B and P0D groups | - | 0 | Effective immediately | Run settings | PST |
| P0C | 25 | MODBUS Response Delay | 0~5000 | ms | 1 | Effective immediately | Run settings | PST |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---|------|-----------------|-----------------------|----------------|------------------|
| P0C | 26 | MODBUS High-level Order of Communication Data | 0: higher 16, lower 16 1: lower 16, higher 16 | 1 | 1 | Effective immediately | Run settings | PST |
| P0C | 30 | MODBUS Error frame format selection | 0: old agreement 1: new agreement (standard agreement) | 1 | 1 | Effective immediately | Run settings | PST |

P0D Group Auxiliary function parameters

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---|------|-----------------|-----------------------|----------------|------------------|
| P0D | 00 | Software Reset | 0: No Operation 1: Enable | - | 0 | Effective immediately | Stop setting | - |
| P0D | 01 | Fault reset | 0: No Operation 1: Enable | - | 0 | Effective immediately | Stop setting | - |
| P0D | 02 | Off-line Inertial Identification Function | - | - | - | Effective immediately | Run setting | - |
| P0D | 03 | Retention parameter | - | - | - | - | - | - |
| P0D | 05 | Emergency shutdown | 0: no operation 1: enable emergency shutdown | - | 0 | Effective immediately | Run setting | - |
| P0D | 10 | Automatic adjustment of analog channels | 0: no operation 1: AI1 adjustments 2: AI2 adjustments | - | 0 | Effective immediately | Stop setting | - |
| P0D | 11 | JOG Test run function | (Self-contained filtering (FFT)) | - | - | - | - | - |
| P0D | 17 | DIDO Mandatory input and output enable | 0: no operation 1: force DI enable, force DO not 2: force DO enable, force DI not 3: forced DIDO enables | - | 0 | Effective immediately | Run setting | - |
| P0D | 18 | DI Mandatory input given | 0~0x01FF | - | 0x01FF | Effective immediately | Run setting | - |
| P0D | 19 | DO Forced output given | 0~0x001F | - | 0 | Effective immediately | Run setting | - |
| P0D | 20 | Absolute encoder reset enable | 0: no operation 1: Reset Fault 2: reset fault and multi-loop data | - | 0 | Effective immediately | Stop setting | ALL |
| P0D | 24 | Gravity Load Identification | 0: not identified 1: Open Identification | - | 0 | Effective immediately | Run setting | - |

P0F Group Full closed-loop functional parameters

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|------|---------------|------|-----------------|---------------|----------------|------------------|
| | | | | | | | | |

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---|-----------------------|-----------------|-----------------------|----------------|------------------|
| POF | 00 | Encoder Feedback Mode | 0~2 | - | 0 | Effective immediately | Stop setting | P |
| POF | 01 | External Encoder Usage | 0: used in standard operating direction 1: used in reverse direction | - | 0 | Effective immediately | Stop setting | P |
| POF | 04 | Number of external encoder pulses rotated by motor | 0 ~1073741824 | External encoder Unit | 10000 | Power up again | Stop setting | P |
| POF | 08 | Excessive threshold for full closed-loop position deviation | 0 ~1073741824 | External encoder Unit | 10000 | Effective immediately | Run settings | P |
| POF | 10 | Full closed loop position deviation clearance setting | 0~100 | r | 0 | Effective immediately | Run settings | P |
| POF | 13 | Mixed Vibration Suppression Filter Time Constant | 0~6553.5 | ms | 0 | Effective immediately | Run settings | P |
| POF | 16 | Full closed loop position deviation counter | -1073741824 ~1073741824 | External encoder Unit | 0 | - | Display | P |
| POF | 18 | Internal encoder feedback pulse counter | -1073741824 ~1073741824 | Internal encoder Unit | 0 | - | Display | P |
| POF | 20 | External encoder feedback pulse counter | -1073741824 ~1073741824 | External encoder Unit | 0 | - | Display | P |

P11 Group Multi-segment position function parameter

| Function code | | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|----|---|---|------|-----------------|-----------------------|----------------|------------------|
| P11 | 00 | Multi-segment location operation mode | 0: stop at the end of a single operation (P11-01 Select the number of segments) 1: Cyclic operation (P11-01 selects the number of segments) 2: DI switching operation (selected by DI) 3: Sequential operation (P11-01 for selection of segment number) | - | 1 | Effective immediately | Stop setting | P |
| P11 | 01 | Number of terminal segments of displacement instruction | 1~16 | - | 1 | Effective immediately | Stop setting | P |
| P11 | 02 | Residual treatment | Valid in the other three modes except DI mode 0: Continue to run the unfinished segment 1: Restart operation from the first segment | - | 0 | Effective immediately | Stop setting | P |
| P11 | 03 | Time unit | 0: ms 1: s | - | 0 | Effective immediately | Stop setting | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|--|------------------|-----------------|-----------------------|----------------|------------------|
| P11 04 | Type of displacement instruction | 0: Relative displacement command 1: Absolute displacement instruction | - | 0 | Effective immediately | Stop setting | P |
| P11 05 | Sequence Run Start Select | 0~16 | - | 0 | Effective immediately | Stop setting | P |
| P11 12 | Paragraph 1 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 14 | Maximum speed of displacement in section 1 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 15 | Paragraph 1 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 16 | Paragraph 1 displacement acceleration and deceleration time | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 17 | Paragraph 2 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 19 | Maximum speed of displacement in section 2 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 20 | Paragraph 2 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 21 | Waiting time after completion of displacement in paragraph 2 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 22 | Paragraph 3 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 24 | Maximum speed of displacement in section 3 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 25 | Paragraph 3 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 26 | Waiting time after completion of displacement in paragraph 3 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 27 | Paragraph 4 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 29 | Maximum speed of displacement in section 4 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 30 | Paragraph 4 displacement acceleration and | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|-------------------------|------------------|-----------------|-----------------------|----------------|------------------|
| | deceleration time | | | | | | |
| P11 31 | Waiting time after completion of displacement in paragraph 4 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 32 | Paragraph 5 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 34 | Maximum speed of displacement in section 5 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 35 | Paragraph 5 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 36 | Waiting time after completion of displacement in paragraph 5 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 37 | Paragraph 6 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 39 | Maximum speed of displacement in section 6 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 40 | Paragraph 6 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 41 | Waiting time after completion of displacement in paragraph 6 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 42 | Paragraph 7 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 44 | Maximum speed of displacement in section 7 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 45 | Paragraph 7 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 46 | Waiting time after completion of displacement in paragraph 7 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 47 | Paragraph 8 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 49 | Maximum speed of displacement in section 8 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 50 | Paragraph 8 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|-------------------------|------------------|-----------------|-----------------------|----------------|------------------|
| P11 51 | Waiting time after completion of displacement in paragraph 8 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 52 | Paragraph 9 moving displacement | -1073741824 ~1073741824 | instruction unit | 10000 | Effective immediately | Run settings | P |
| P11 54 | Maximum speed of displacement in section 9 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 55 | Paragraph 9 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 56 | Waiting time after completion of displacement in paragraph 9 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 57 | Paragraph 10 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 59 | Maximum speed of displacement in section 10 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 60 | Paragraph 10 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 61 | Waiting time after completion of displacement in paragraph 10 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 62 | Paragraph 11 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 64 | Maximum speed of displacement in section 11 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 65 | Paragraph 11 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 66 | Waiting time after completion of displacement in paragraph 11 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 67 | Paragraph 12 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 69 | Maximum speed of displacement in section 12 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 70 | Paragraph 12 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|-------------------------|------------------|-----------------|-----------------------|----------------|------------------|
| P11 71 | Waiting time after completion of displacement in paragraph 12 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 72 | Paragraph 13 moving displacement | -1073741824 ~1073741824 | Instructions | 10000 | Effective immediately | Run settings | P |
| P11 74 | Maximum speed of displacement in section 13 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 75 | Paragraph 13 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 76 | Waiting time after completion of displacement in paragraph 13 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 77 | Paragraph 14 moving displacement | -1073741824 ~1073741824 | Instruction Unit | 10000 | Effective immediately | Run settings | P |
| P11 79 | Maximum speed of displacement in section 14 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 80 | Paragraph 14 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 81 | Waiting time after completion of displacement in paragraph 14 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 82 | Paragraph 15 moving displacement | -1073741824 ~1073741824 | Instruction Unit | 10000 | Effective immediately | Run settings | P |
| P11 84 | Maximum speed of displacement in section 15 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 85 | Paragraph 15 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 86 | Waiting time after completion of displacement in paragraph 15 | 0~10000 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 87 | Paragraph 16 moving displacement | -1073741824 ~1073741824 | Instruction Unit | 10000 | Effective immediately | Run settings | P |
| P11 89 | Maximum speed of displacement in section 16 | 1~6000 | rpm | 200 | Effective immediately | Run settings | P |
| P11 90 | Paragraph 16 displacement acceleration and deceleration time | 0~65535 | ms(s) | 10 | Effective immediately | Run settings | P |
| P11 91 | Waiting time after | 0~10000 | ms(s) | 10 | Effective | Run | P |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|---------------|------|-----------------|---------------|----------------|------------------|
| | completion of displacement in paragraph 16 | | | | immediately | settings | |

P12 Group Multi-segment speed parameter

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|---------|-----------------|-----------------------|----------------|------------------|
| P12 00 | Multi-segment speed instruction running mode | 0: stop at the end of a single operation P12-01 Select the number of segments) 1: Cyclic operation (P12-01 selects the number of segments) 2: Switch through external DI | - | 1 | Effective immediately | Stop setting | S |
| P12 01 | Selection of terminal segments of speed instruction | 1~16 | - | 16 | Effective immediately | Stop setting | S |
| P12 02 | Runtime unit selection | 0-sec 1-min | - | 0 | Effective immediately | Stop setting | S |
| P12 03 | Acceleration time 1 | 0~65535 | ms | 10 | Effective immediately | Stop setting | S |
| P12 04 | Deceleration time 1 | 0~65535 | ms | 10 | Effective immediately | Stop setting | S |
| P12 05 | Acceleration time 2 | 0~65535 | ms | 50 | Effective immediately | Stop setting | S |
| P12 06 | Deceleration time 2 | 0~65535 | ms | 50 | Effective immediately | Stop setting | S |
| P12 07 | Acceleration time 3 | 0~65535 | ms | 100 | Effective immediately | Stop setting | S |
| P12 08 | Deceleration time3 | 0~65535 | ms | 100 | Effective immediately | Stop setting | S |
| P12 09 | Acceleration time 4 | 0~65535 | ms | 150 | Effective immediately | Stop setting | S |
| P12 10 | Deceleration time 4 | 0~65535 | ms | 150 | Effective immediately | Stop setting | S |
| P12 20 | Paragraph 1 Speed Directive | -6000~6000 | rpm | 0 | Effective immediately | Stop setting | S |
| P12 21 | Paragraph 1 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 22 | Paragraph 1 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|---------|-----------------|-----------------------|----------------|------------------|
| P12 23 | Paragraph 2 Speed Directive | -6000~6000 | rpm | 100 | Effective immediately | Stop setting | S |
| P12 24 | Paragraph 2 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 25 | Paragraph 2 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 26 | Paragraph 3 Speed Directive | -6000~6000 | rpm | 300 | Effective immediately | Stop setting | S |
| P12 27 | Paragraph 3 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 28 | Paragraph 3 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 29 | Paragraph 4 Speed Directive | -6000~6000 | rpm | 500 | Effective immediately | Stop setting | S |
| P12 30 | Paragraph 4 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 31 | Paragraph 4 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 32 | Paragraph 5 Speed Directive | -6000~6000 | rpm | 700 | Effective immediately | Stop setting | S |
| P12 33 | Paragraph 5 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 34 | Paragraph 5 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 35 | Paragraph 6 Speed Directive | -6000~6000 | rpm | 900 | Effective immediately | Stop setting | S |
| P12 36 | Paragraph 6 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|--|---------|-----------------|-----------------------|----------------|------------------|
| P12 | 37 Paragraph 6 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 | 38 Paragraph 7 Speed Directive | -6000~6000 | rpm | 600 | Effective immediately | Stop setting | S |
| P12 | 39 Paragraph 7 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 40 Paragraph 7 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 | 41 Paragraph 8 Speed Directive | -6000~6000 | rpm | 300 | Effective immediately | Stop setting | S |
| P12 | 42 Paragraph 8 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 43 Paragraph 8 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 | 44 Paragraph 9 Speed Directive | -6000~6000 | rpm | 100 | Effective immediately | Stop setting | S |
| P12 | 45 Paragraph 9 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 46 Paragraph 9 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 | 47 Paragraph 10 Speed Directive | -6000~6000 | rpm | -100 | Effective immediately | Stop setting | S |
| P12 | 48 Paragraph 10 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 49 Paragraph 10 Acceleration and deceleration | 0: Zero acceleration and deceleration time 1: Acceleration and deceleration time 1 | - | 0 | Effective immediately | Stop setting | S |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|------|---|--|-----------------|---------------|-----------------------|------------------|
| | | 2: Acceleration and deceleration time 2 3: Acceleration and deceleration time 3 4: Acceleration and deceleration time 4 | | | | | |
| P12 | 50 | Paragraph 11 Speed Directive | -6000~6000 | rpm | -300 | Effective immediately | Stop setting S |
| P12 | 51 | Paragraph 11 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting S |
| P12 | 52 | Paragraph 11 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting S |
| P12 | 53 | Paragraph 12 Speed Directive | -6000~6000 | rpm | -500 | Effective immediately | Stop setting S |
| P12 | 54 | Paragraph 12 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting S |
| P12 | 55 | Paragraph 12 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting S |
| P12 | 56 | Paragraph 13 Speed Directive | -6000~6000 | rpm | -700 | Effective immediately | Stop setting S |
| P12 | 57 | Paragraph 13 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting S |
| P12 | 58 | Paragraph 13 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting S |
| P12 | 59 | Paragraph 14 Speed Directive | -6000~6000 | rpm | -900 | Effective immediately | Stop setting S |
| P12 | 60 | Paragraph 14 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting S |
| P12 | 61 | Paragraph 14 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting S |
| P12 | 62 | Paragraph 15 Speed | -6000~6000 | rpm | -600 | Effective | Stop S |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|--|---------|-----------------|-----------------------|----------------|------------------|
| | Directive | | | | immediately | setting | |
| P12 | 63 Paragraph 15 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 64 Paragraph 15 Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |
| P12 | 65 Paragraph 16 Speed Directive | -6000~6000 | rpm | -300 | Effective immediately | Stop setting | S |
| P12 | 66 Paragraph 16 instruction run time | 0~6553.5 | S (min) | 5.0 | Effective immediately | Stop setting | S |
| P12 | 67 Paragraph 16. Acceleration and deceleration | 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 | - | 0 | Effective immediately | Stop setting | S |

P17 Group Virtual DIDO parameters

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-------------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| P17 | 00 VDI1 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 01 VDI1 Terminal logic selection | 0: indicates VDI1 write 1 is valid 1: indicates that VDI1 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 02 VDI2 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 03 VDI2 Terminal logic selection | 0: indicates VDI2 write 1 is valid 1: indicates that VDI2 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 04 VDI3 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 05 VDI3 Terminal logic selection | 0: indicates VDI3 write 1 is valid 1: indicates that VDI3 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 06 VDI4 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 07 VDI4 Terminal logic selection | 0: indicates VDI4 write 1 is valid 1: indicates that VDI4 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 | 08 VDI5 Terminal | 0~37 | - | 0 | Outage | Run | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-----------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| | function selection | | | | takes effect | settings | |
| P17 09 | VDI5 Terminal logic selection | 0: indicates VDI5 write 1 is valid 1: indicates that VDI5 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 10 | VDI6 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 11 | VDI6 Terminal logic selection | 0: indicates VDI6 write 1 is valid 1: indicates that VDI6 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 12 | VDI7 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 13 | VDI7 Terminal logic selection | 0: indicates VDI7 write 1 is valid 1: indicates that VDI7 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 14 | VDI8 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 15 | VDI8 Terminal logic selection | 0: indicates VDI8 write 1 is valid 1: indicates that VDI8 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 16 | VDI9 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 17 | VDI9 Terminal logic selection | 0: indicates VDI9 write 1 is valid 1: indicates that VDI9 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 18 | VDI10 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 19 | VDI10 Terminal logic selection | 0: indicates VDI10 write 1 is valid 1: indicates that VDI10 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 20 | VDI11 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 21 | VDI11 Terminal logic selection | 0: indicates VDI11 write 1 is valid 1: indicates that VDI11 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 22 | VDI12 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 23 | VDI12 Terminal logic selection | 0: indicates VDI12 write 1 is valid 1: indicates that VDI12 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 24 | VDI13 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 25 | VDI13 Terminal logic selection | 0: indicates VDI13 write 1 is valid 1: indicates that VDI13 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-----------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| P17 26 | VDI14 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 27 | VDI14 Terminal logic selection | 0: indicates VDI14 write 1 is valid 1: indicates that VDI14 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 28 | VDI15 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | - |
| P17 29 | VDI15 Terminal logic selection | 0: indicates VDI14 write 1 is valid 1: indicates that VDI14 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 30 | VDI16 Terminal function selection | 0~37 | - | 0 | Outage takes effect | Run settings | |
| P17 31 | VDI16 Terminal logic selection | 0: indicates VDI16 write 1 is valid 1: indicates that VDI16 write value changes from 0 to 1 | - | 0 | Outage takes effect | Run settings | - |
| P17 32 | VDO Virtual level | - | - | - | - | Display | - |
| P17 33 | VDO1 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 34 | VDO1 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 35 | VDO2 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 36 | VDO2 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 37 | VDO3 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 38 | VDO3 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 39 | VDO4 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 40 | VDO4 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 41 | VDO5 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 42 | VDO5 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 43 | VDO6 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 44 | VDO6 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|-----------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| P17 45 | VDO7 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 46 | VDO7 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 47 | VDO8 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 48 | VDO8 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 49 | VDO9 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 50 | VDO9 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 51 | VDO10 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 52 | VDO10 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 53 | VDO11 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 54 | VDO11 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 55 | VDO12 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 56 | VDO12 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 57 | VDO13 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 58 | VDO13 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 59 | VDO14 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 60 | VDO14 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 61 | VDO15 Terminal function selection | 0~22 | - | 0 | Outage takes effect | Run settings | - |
| P17 62 | VDO15 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |
| P17 63 | VDO16 Terminal function selection | 0~22 | - | 0 | Outage takes | Run settings | - |

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--------------------------------|--|------|-----------------|---------------------|----------------|------------------|
| | | | | | effect | | |
| P17 64 | VDO16 Terminal logic selection | 0: means valid output 1 1: means valid output 0 | - | 0 | Outage takes effect | Run settings | - |

P30 Group Communication read servo-related variables

Panel invisible

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|---|---------------|------|-----------------|---------------|-------------------------|------------------|
| P30 00 | Communications read servo state | - | - | - | - | Communication read only | PST |
| P30 01 | Communication Read DO Function Status 1 | - | - | - | - | Communication read only | PST |
| P30 02 | Communication Read DO Function 2 | - | - | - | - | Communication read only | PST |
| P30 03 | Communication read input pulse instruction sampling | - | - | - | - | Display | PST |

P31 Group Communication gives servo-related variables

Panel invisible

| Function code | Name | Setting range | Unit | Factory setting | Effective way | Setting method | Related patterns |
|---------------|--|--------------------|------|-----------------|-----------------------|----------------|------------------|
| P31 00 | Communication given VDI virtual level | 0~65535 | - | 0 | Effective immediately | Run settings | PST |
| P31 04 | Communication given DO output state | 0~31 | - | 0 | Effective immediately | Run settings | PST |
| P31 09 | Communication Given Speed Command | -6000.000~6000.000 | rpm | 0 | Effective immediately | Run settings | S |
| P31 11 | Communication given torque instruction | -100.000~100.000 | % | 0 | Effective immediately | Run settings | T |

DIDO Function definition

| Code | Name | Function | Description | Notes |
|--|------|--------------|---|--|
| Enter the signal function instructions | | | | |
| FunIN.1 | S-ON | Servo Enable | Invalid - Servo motor disable; Effective - Servo motor power on. | The logical selection of the corresponding terminal must be set to: level valid. When the corresponding DI or VDI terminal of this function changes, or when the logic selection of the corresponding terminal changes, the change needs to be electrified again before the change takes effect. |

| Code | Name | Function | Description | Notes |
|----------|----------|--|---|---|
| FunIN.2 | ALM-RST | Failure and warning reset (along effective function) | Invalid - Servo motor disable; Effective - Servo motor power on. | The logical selection of the corresponding terminal must be set to: edge valid. If the selection level is valid, the drive internal force is set to edge valid. According to the alarm type, some alarm reset servo can continue to work. |
| FunIN.3 | GAIN-SEL | Gain switching | When P08-08=0 : Invalid-speed control loop for PI control; Effective-speed control ring for P control. When P08-08=1, press the P08-09 settings. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.4 | CMD-SEL | Switching of Mainand Auxiliary Operation Instruction | Invalid - the current running instruction is A; Valid - the current running instruction is B. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.5 | DIR-SEL | Multi-segment speed DI switching operation direction setting | Invalid - default instruction direction; Valid - instruction in reverse direction. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.6 | CMD1 | Multi-segment running instruction switch 1 | 16 instruction selection | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.7 | CMD2 | Multi-segment operation instruction switch 2 | 16 instruction selection | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.8 | CMD3 | Multi-segment running instruction switch 3 | 16 instruction selection | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.9 | CMD4 | Multi-segment operation instruction switching 4 | 16 instruction selection | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.10 | M1-SEL | Mode switching 1 | According to the selected control mode (3,4,5),switch between speed, position, torque | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.11 | M2-SEL | Mode switching 2 | According to the selected control mode (6), switch between speed, position, torque. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.12 | ZCLAMP | Zero-position fixed enable | Effective - enable zero-bit fixed function; Invalid-Nozero-bit fixing function. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |

| Code | Name | Function | Description | Notes |
|----------|---------|--------------------------------|---|---|
| FunIN.13 | INHIBIT | Position Directive Prohibition | Effective - enable zero-bit fixed function; Invalid-No zero-bit fixing function. | Originally for pulse prohibition function. Now upgrade to position instruction prohibition, including internal and external position instructions. The logical selection of the corresponding terminal must be set to: level valid. |
| FunIN.14 | P-OT | Forward Overpass Switch | Effective - No positive drive; Invalid - Allows forward drive. | When the mechanical motion exceeds the movable range, enter the overrun prevention function: the logic selection of the corresponding terminal, it is recommended to set to: level effective. |
| FunIN.15 | N-OT | Reverse Overpass Switch | When the mechanical movement exceeds the movable range, enter the over-range prevention function: Effective - No reverse drive; Invalid - allows reverse drive. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.16 | P-CL | Positive external torque limit | According to the choice of P07-07, the torque limit source is switched. P07-07=1: Effective - Positive external torque limit is effective; Invalid - positive internal torque limit valid. P07-07=3 and AI the limit value is greater than the positive external limit value: Effective - Positive external torque limit is effective; Invalid - AI torque limit valid. P07-07=4: Effective - AI torque limit effective; Invalid - positive internal torque limit valid. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.17 | N-CL | Negative External Torque Limit | According to the choice of P07-07, the torque limit source is switched. P07-07=1: Effective-reversal external torque limit effective; Invalid-reversal internal torque limit valid. P07-07=3 and AI the limit value is less than the reverse external limit value: Effective - Reverse external torque limit valid. Invalid - AI torque limit valid. At P07-07=4: Effective - AI torque limit effective; Invalid-reversal internal torque limit valid. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |

| Code | Name | Function | Description | Notes |
|-------------|-------------|--|--|---|
| FunIN.18 | JOGCMD+ | Forward Point Movement | Valid - enter according to a given instruction; Invalid - Run instruction stop input. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.19 | JOGCMD- | Negative orientation point | Valid - reverse input according to a given instruction; Invalid - Run instruction stop input. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.20 | POSSTEP | Step enable | Effective-executes the instruction step quantity instruction; Invalid - the instruction is zero and is located. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.21 | HX1 | Handwheel power signal1 | HX1 valid, HX2 invalid: X10 | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.22 | HX2 | Handwheel power signal2 | HX1 invalid, HX2 valid: X100 Additional: X1 | |
| FunIN.23 | HX_EN | Handwheel enable signal | Invalid - Position control according to P05-00 function code selection; Effective-receive handwheel pulse signal in position mode for position control. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.24 | GEAR_SEL | Electronic gear selection | Invalid - electronic gear ratio 1; Effective - electronic gear ratio 2. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.25 | TOQDirSel | Torque Instruction Direction Setting | Invalid - positive direction; Valid - in the opposite direction. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.26 | SPDDirSel | Speed Instruction Direction Setting | Invalid - positive direction; Valid - in the opposite direction. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.27 | POSDirSel | Position Instruction Direction Setting | Invalid - positive direction; valid - in the opposite direction. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.28 | PosInSen | Multi-segment position instruction enables | Effective Invalid - ignores internal multi-segment instructions; valid - start internal multiple segments. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.29 | XintFree | Discontinuation of interrupt duration | Invalidity - prohibition; Effective - enabling. | The logic selection of the corresponding terminal is recommended to be set to: edge valid. |

| Code | Name | Function | Description | Notes |
|----------|----------------|------------------------------|--|---|
| FunIN.31 | HomeSwitch | Origin switch | Invalid - not triggered; Effective - trigger. | The logic selection of the corresponding terminal is recommended to be set to: edge valid. The DI function is recommended to be configured to DI8 or DI9 terminals. |
| FunIN.32 | HomingStart | Origin Recovery Enable | Invalidity - prohibition; Effective - enabling. | The logic selection of the corresponding terminal is recommended to be set to: edge valid. |
| FunIN.33 | XinthInhibit | Interrupt length prohibition | Effective - prohibition of interruption; Invalid - Allow interrupt fixed length. | The logical selection of the corresponding terminal must be set to: level valid. If set to 2(rising edge valid) drive internal will be forced to change to 1(high level effective); If set to 3(descent edge valid), drive internal force is changed to 0(low level valid); if set to 4(rise edge, descent edge are valid), drive internal force is changed to 0(low level valid) |
| FunIN.34 | Emergency Stop | emergency shut down | Effective-zero speed after shutdown position lock; Invalid-when running state has no effect. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.35 | ClrPosErr | Clear position deviation | Effective-zeroposition deviation; Invalid-position deviation is not clear. | The logic selection of the corresponding terminal is recommended to be set to: edge valid. The DI function is recommended to be configured to DI8 or DI9 terminals. |
| FunIN.36 | V_LmtSel | Internal speed limit source | valid - P07-19 as internal positive and negative velocity limits (P07-17=2); Invalid - P07-20 as internal positive and negative speed limit (P07-17=2). | The logic selection of the corresponding terminal is recommended to be set to: level effective. |
| FunIN.37 | PulseInhibit | Pulse instruction forbidden | During position control mode, when the position instruction source is pulse instruction (P05-00=0); Invalid - respondable impulse instruction; valid - does not respond to impulse instructions. | The logic selection of the corresponding terminal is recommended to be set to: level effective. |

Output Signal Function Description

| Code | Name | Function | Description | Notes |
|-----------|-------|----------------------|--|-------|
| FunOUT.1 | S-RDY | Servo ready | Servo ready to receive S-ON valid signal: Effective - Servo ready; Invalid - Servo not ready. | - |
| FunOUT.2 | TGON | Motor rotary output | If the speed of the servo motor is higher than the speed threshold: Effective - motor rotation signal is effective; Invalid - motor rotation signal invalid. | - |
| FunOUT.3 | ZERO | Zero-speed | Output signal when servo motor stops turning: The effective motor speed is zero; Invalid motor speed is not zero. | - |
| FunOUT.4 | V-CMP | Speed consistency | During speed control, the absolute value of the difference between speed and speed instruction of servo motor is less than that of P06-17 speed deviation setting value. | - |
| FunOUT.5 | COIN | Location completed | During position control, the position deviation pulse is effective when it reaches the P05-21 range of positioning completion. | - |
| FunOUT.6 | NEAR | Location close | During position control, the position deviation pulse is effective when it reaches the positioning signal amplitude P05-22 set value. | - |
| FunOUT.7 | C-LT | Torque limitation | Torque limit confirmation signal: Effective - motor torque limitation; Invalid - Motor torque is not limited. | - |
| FunOUT.8 | V-LT | Speed limit | Confirmation signal of speed limitation in torque control: Effective - motor speed limit; Invalid-motor speed is not limited. | - |
| FunOUT.9 | BK | Lock output | Lock signal output: Effective - close, release lock; Invalid - start lock. | - |
| FunOUT.10 | WARN | Warning output | Warning output signal is valid. (conduction) | - |
| FunOUT.11 | ALM | Fault output | The state is valid when the fault is detected. | - |
| FunOUT.12 | ALMO1 | Output 3 alarm codes | Output 3 bit alarm code. | - |
| FunOUT.13 | ALMO2 | Output 3 alarm codes | Output 3 bit alarm code. | - |
| FunOUT.14 | ALMO3 | Output 3 alarm codes | Output 3 bit alarm code. | - |

| Code | Name | Function | Description | Notes |
|-----------|-----------------|-----------------------------|---|-------|
| FunOUT.15 | Xintcoin | Interrupt length completed | Effective - interrupt fixed length positioning completed; Invalid - interrupt fixed length positioning is not complete. | - |
| FunOUT.16 | HomeAttain | Origin output zero | Zero state of origin; Effective - zero origin; Invalid - the origin does not return to zero. | - |
| FunOUT.17 | ElecHome Attain | Electrical zero output | Electrical return status: Effective - electrical origin back to zero; Invalid - the electrical origin does not return to zero. | - |
| FunOUT.18 | ToQReach | Torque reaches output | Effective - the absolute value of torque reaches the set value; Invalid - the absolute value of torque is less than the set value. | - |
| FunOUT.19 | V-Arr | Speedto output | Effective-speed feedback to the set value; Invalid-speed feedback does not reach the set value. | - |
| FunOUT.20 | AngIntRdy | Angle Identification Output | Effective - complete angle identification; Invalid - Incomplete angle identification. | - |
| FunOUT.21 | DB | DB Brake output | Effective - dynamic brake relay disconnected; Invalid-dynamic brake relay suction. | |
| FunOUT.22 | CmdOk | Internal instruction output | Effective - Internal instruction completed; Invalid - Internal instruction not completed. | |

Chapter 7 Trouble shooting

7.1 Fault and warning handling at startup

7.1.1 Position control mode

➤ Fault inspection

| Boot process | Failure phenomenon | Reason | Confirmation method |
|---|--|---|--|
| Turn on the control power (L1C L2C) Main power supply (L1 L2) (L1 L2 L3) | The digital tube does not light up or does not display "rdy" | 1. Control power supply voltage failure | ◆After unplugging CN1, CN2, CN3, CN4, the fault still exists ◆Measure the AC voltage between (L1C, L2C). |
| | | 2. Main power supply voltage failure | ◆Single-phase 220V power supply models measure the AC voltage between (L1, L2). The main power supply DC bus voltage amplitude (voltage between B1/⊕, 1) is lower than 200V, and the digital tube displays "nrd". ◆Three-phase 220V/380V power supply models measure the AC voltage between (L1, L2, L3). The main power supply DC bus voltage amplitude (voltage between B1/⊕ and 1) is lower than 460V and the digital tube displays "nrd". |

| | | | | |
|--|-----------------------------|--|--|--|
| | | 2. The program terminal is shorted | ◆Check the terminal of the programming program to confirm whether it is short-circuited. | |
| | | 4. Servo drive failure | ◆ - | |
| | Display "FU.xxx" | Refer to Chapter 7.2 to find the cause and eliminate the fault. | | |
| Servo enable signal is valid (S-ON is ON) | Display "FU.xxx" | ■ After troubleshooting the above fault, the panel should display "rdy". | | |
| | | 1. The servo enable signal is invalid | ◆Switch the panel to the servo status display, and check whether the panel displays "rdy" instead of "run". ◆Check P03 and P17 groups, whether to set the servo enable signal (DI function 1: S-ON). If it has been set, check whether the corresponding terminal logic is valid; if not, set it and make the terminal logic valid. Refer to Chapter 6 "P03 Group: Terminal Input Parameters" setting method. ◆If the P03 group has set the servo enable signal and the corresponding terminal logic is valid, but the panel still displays "rdy", then check whether the DI terminal wiring is correct. Refer to Chapter 5. | |
| | | 2. Wrong control mode selection | ◆Check whether P02-00 is 1. If it is set to 2 by mistake (torque mode), the motor shaft is also in free running state because the default torque command is zero. | |
| ■ After troubleshooting the above fault, the panel should display "run". | | | | |
| Input position command | Servo motor does not rotate | Input position command counter (P0B-13) is 0 | ◆High/low speed pulse port wiring error When P05-00=0 pulse command source, check whether the high/low speed pulse port wiring is correct, please refer to Chapter 5 "Wiring", and check whether the setting of P05-01 matches. ◆Position command not entered 1. Whether to use DI function 13 (FunIN.13: Inhibit, position command prohibition) or DI function 37 (FunIN.37: PulseInhibit, pulse command prohibition) 2. When P05-00=0 pulse command source, the host computer or other pulse output device does not output pulses. Use an oscilloscope to check whether there is pulse input at the high/low speed pulse port. Please refer to Chapter 5 "Wiring"; 3. When P05-00=1 step command source, check whether P05-05 is 0, if it is not 0, check whether DI function 20 (FunIN.20: PosStep, step command enable) and corresponding Whether the terminal logic is valid; 4. When P05-00=2 multi-segment position command source, check whether the P11 group parameters are set correctly, if correct, check whether DI function 28 (FunIN.28: PosInSen, internal multi-segment position enable) and the corresponding terminal logic are valid. ; 5. If you have used the interrupt fixed-length function, check whether P05-29 is 1, (after the interrupted fixed-length operation is completed, can you directly respond to other position commands), if it is 1, confirm whether to use DI function 29 (FunIN.29: XintFree, interrupt fixed-length state release) release the locked state. | |

| | | | |
|--|---|---|---|
| | Servo motor reverse | Input position command counter (P0B-13) is negative | <ul style="list-style-type: none"> ◆ When P05-00=0 is the source of pulse command, check whether the parameter setting of P05-15 (pulse command form) corresponds to the actual input pulse. If it is inconsistent, the setting of P05-15 is wrong or the terminal wiring is wrong; ◆ P05-00=1 when the step command source, check the positive and negative values of P05-05; ◆ P05-00=2 When the multi-segment position command source, check the positive and negative of each segment of the P11 group; ◆ Check whether DI function 27 (FunIN.27: PosDirSel position command direction setting) has been set and whether the corresponding terminal logic is valid; Check whether the P02-02 parameter is set incorrectly. |
| ■ After troubleshooting the above fault, the motor can rotate. | | | |
| Unstable rotation at low speed | Unstable speed when rotating at low speed | Unreasonable gain setting | <ul style="list-style-type: none"> ◆ Automatic gain adjustment. |
| | Motor shaft vibration left and right | Load moment of inertia ratio(P08-15) too large | <ul style="list-style-type: none"> ◆ If it can be operated safely, perform inertia identification again; ◆ Automatic gain adjustment |
| ■ After troubleshooting, the servo motor can rotate normally. | | | |
| normal operation | No location | Creating non-compliant locations Deviation | <ul style="list-style-type: none"> ◆ Determine the input position instruction counter (P0B-13), feedback pulse counter (P0B-17) and mechanical stop position. the confirmation steps are as follows. |

➤ Fault Cause Checking Steps for Untimely Positioning

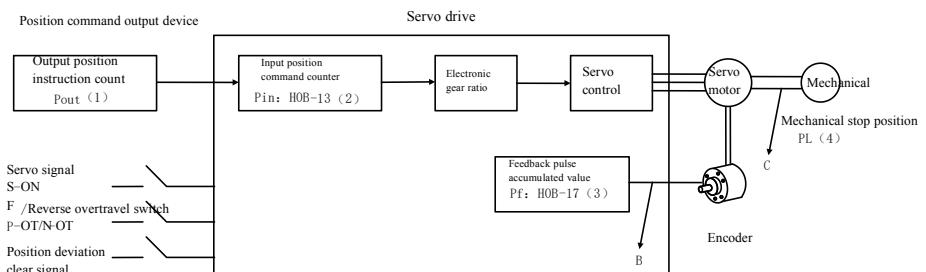


Figure 7-1 Block diagram of positioning control principle

Check the 4 signals above when the location is not correct:

- 1) Count value Pout; of output position instruction in position instruction output device;
- 2) The input position instruction counter received by the servo controller Pin, corresponds to the parameter P0B-13;
- 3) The cumulative value of feedback pulse of servo motor with encoder Pf, corresponding to parameter P0B-17;
- 4) PL of mechanical stops.

3 reasons for incorrect positioning, corresponding to the A、B、C, in the graph:

A means that the input bit is caused by noise in the connection between the output device of the 1:1 position instruction (especially the upper computer) and the servo driver

Set instruction count error;

During the operation of the motor, the input position instruction is interrupted.

Reason: servo enable signal is invalid (S-ON OFF), forward / reverse overrun switch signal (P-OT or N-OT) has

Effect, position deviation clearance signal (ClrPosErr) is effective;

B representation: encoder feedback position signal error (signal interference).

C representation: mechanical position sliding occurs between machinery and servo motor. In an ideal state where there is no positional deviation, the following relationship holds:

- $P_{out} = P_{in}$, Output position instruction count value = input position instruction counter
- $P_{in} \times \text{Electronic gear ratio} = P_f$, Input position instruction counter \times Electronic gear ratio = Feedback pulse accumulation
- $P_f \times \Delta L = PL$, Feedback pulse accumulation $\times 1$ position instruction corresponds to load displacement = Position of mechanical stop

In the event of inaccurate positioning, check method:

a) $P_{out} \neq P_{in}$

Failure cause : A

Exclusion Methods and Steps:

① Check pulse input terminals (For low- or high-speed pulse input terminals, refer to Chapter 5, "Wiring ") Whether use double stranded shield;

② If the open circuit input mode of collector in low speed pulse input terminal is selected, it should be changed to differential input mode;

③ Connection of pulse input terminals must be separated from the main circuit (L1C、L2C、L1L2L3、U、V、W) line;

④ A low-speed pulse input terminal is selected to increase the filter time constant (P0A-24);

Conversely, the high-speed pulse input terminal is selected to increase the filter time constant of the high-speed pulse input pin (P0A-30).

b) $P_{in} \times \text{Electronic gear ratio} \neq P_f$

Failure cause : B

Exclusion Methods and Steps:

① Check to see if there is a operation, resulting in the instruction not being fully executed and the servo has stopped;

② When the position deviation clearance signal (ClrPosErr) is valid, check whether the position deviation clearance mode (P05-16) is reasonable.

c) $P_f \times \Delta L \neq PL$

failure cause : C

Exclusion Methods and Steps: Check the mechanical connection step by step to find the position where the relative sliding occurs.

7.1.2 Speed Control Mode

| start-up procedure | Error | Reason | Confirmation way |
|-------------------------|---------------------------------|--|---|
| Switch on control power | Digital tube not on or on "rdy" | 1. Control power supply voltage failures | <ul style="list-style-type: none"> ◆ After pulling out the CN1、CN2、CN3、CN4, the fault still exists。 ◆ Measure AC voltage between (L1C、L2C). |

| | | | |
|---|--|---|---|
| (L1C L2C) Main power source (L1 L2) (L1 L2 L3) | 2. Main supply voltage fault Main supply voltage fault | ◆ Single phase 220 V power supply model measurement (L1、L2) between the AC voltage. Main power DC bus voltage amplitude (B1/⊕, ⊖ 1 voltage) less than 200 V digital tube display "rdy" | |
| | | ◆ Three-phase 220 V/380V power supply model measurement (L1L2L3) between the AC voltage. Main power supply DC bus voltage amplitude (B1/⊕, ⊖ 1 voltage) less than 460 V digital tube display "rdy". | |
| | | ◆ Check the terminal of the burning program to confirm that it is short connected. | |
| | 3. Short connection of burn program terminals 4. Servo Driver Failure | - | |
| Panel display "FU.XXX" | Refer to Section 7.2 to find causes and troubleshoot | | |
| ■ After troubleshooting, the panel should display "rdy" | | | |
| Servo enable signal set to be effective (S-ON is ON) | Shaft of servo motor in free state | Panel display "FU.XXX" Refer to Section 7.2 to find causes and troubleshoot | |
| | | 1. Servo enable signal invalid | |
| | | ◆ Switch the panel to the servo state display to see if the panel is displayed as "Rdy", instead of "run". ◆ View P03 and P17 groups to set servo enable signals (DI function 1: S-ON). If set, see if the corresponding terminal logic is valid; if not, set and make the terminal logic valid. Can refer to Chapter 6" Group P03: Terminal Input Parameters "setting method". ◆ When the P03 group has set the servo enable signal and the corresponding terminal logic is valid, but the panel still displays "rdy", check that the DI terminal wiring is correct, refer to Chapter 5. | |
| | 2. Control mode selection error | ◆ Check to see if the P02-00 is 0, and if it is set to 2(torque mode), the motor shaft is also in free operation because the default torque instruction is zero. | |
| ■ After troubleshooting, the panel should show "run". | | | |
| Input speed instruction | The servo motor does not rotate or rotate incorrectly | speed instruction (P0B-01)0 | ◆ AI wiring error When selecting analog input instructions, first check whether the AI analog input channel is selected correctly, and then check whether the AI terminal wiring is correct please refer to Chapter 5. Speed instruction selection error Check if the P06-02 is set correctly ◆ No speed instruction input or speed instruction exception 1. select analog input instruction, first check whether the relevant parameters AI P03 group are set correctly; then check whether the input voltage signal of external signal source is correct, can be observed by oscilloscope or read by P0B-21 or P0B-22; 2. the numbers to see if the P06-03 is correct; 3. multi-segment speed instruction to timing to see if P12 set parameters are correct; 4. communication timing to see if the P31-09 is correct; 5. the timing of the point speed instruction to see if the P06-04 is correct DI functions 18 and 19 have been set, and whether the corresponding terminal logic is valid; 6. see if the acceleration and deceleration time P06-05 and P06-06 settings are correct; 7. whether the zero-bit fixed function is incorrectly enabled, that is, to view the DI function; Whether the 8. is misconfigured and whether DI valid logic of the corresponding terminal is correct. |

| | | | |
|-------------------------|--------------------------------------|---|--|
| Input speed instruction | Servo motor reversal | Velocity instruction (P0B-01) is negative | <ul style="list-style-type: none"> ◆ When selecting analog input instruction, check whether the positive and negative polarity of input signal is reverse; ◆ Digital timing to see if the P06-03 is less than 0; ◆ A multi-segment speed instruction is given timing to view the positive and negative of each group of speed instructions in P12 group; ◆ Communication timing to see if the P31-09 is less than 0; ◆ Point speed instruction gives timing to see if the P06-04 value, DI function 18,19 valid logic and expected steering match; ◆ See if the DI function 26(FunIN.26 : SpdDirSel, speed instruction direction setting) and the corresponding terminal logic are valid; ◆ Check to see if the P02-02 parameter is set incorrectly. <p>■ After troubleshooting, the servo motor can rotate</p> |
| Low speed rotation | Unstable speed at low speed rotation | Unreasonable gain setting | <ul style="list-style-type: none"> ◆ Automatic gain adjustment. |
| | Motor shaft left and right vibration | Load moment of inertia ratio (P08-15) Too big | <ul style="list-style-type: none"> ◆ If it can operate safely, the inertia identification is carried out again; ◆ Automatic gain adjustment. |

7.1.3 Torque Control Mode

| Start-up procedure | Fault phenomenon | Reason | Confirmation method |
|--|--|--|---|
| Switch oncontrol power (L1C L2C) Main Power (L1 L2) (L1 L2 L3) | The digital tube is not on "rdy" | 1、Control power supply voltage failures | <ul style="list-style-type: none"> ◆ After pulling out the CN1、CN2、CN3、CN4, the fault still exists。 ◆ AC voltage between measurements (L1C、L2C); |
| | | 2、Control power supply voltage failures | <ul style="list-style-type: none"> ◆ Single phase 220 V power supply model measurement (L1、L2) between the AC voltage. Main power DC bus voltage amplitude (B1/+1 voltage) less than 200 V digital tube display "rdy". ◆ Three-phase 220 V/380V power supply model measurement (L1L2L3) between the AC voltage. Main power supply DC bus voltage amplitude (B1/+1 voltage) less than 460 V digital tube display "rdy". |
| | | 3、Short connection of burn program terminals | <ul style="list-style-type: none"> ◆ Check the terminal of the burning program to confirm that it is short connected. |
| | | 4、Servo Driver Failure | - |
| | panel display "FU.XXX" | Refer to Section 6.2 to find out the cause and troubleshoot. ■ After troubleshooting the above, the panel rdy". | |
| | Panel display "FU.XXX" | Refer to Section 6.2 to find out the cause and troubleshoot. | |
| Servo enable signal set to be effective (S-ON set ON) | The axis of the servo motor is in free running state | Servo enable signal invalid | <ul style="list-style-type: none"> ◆ Switch the panel to the servo state display to see if the panel is displayed as Rdy ", instead of run". ◆ View P03 and P17 groups to set servo enable signals (DI function 1: S-ON). If set, see if the corresponding terminal logic is valid; if not, set and make the terminal logic valid. Refer to Chapter 6, P03 Group: terminal input parameters setting method. ◆ When the P03 group has set the servo enable signal and the corresponding terminal logic is valid, but the panel still displays "rdy",, check that the DI terminal wiring is correct, refer to Chapter 5. |
| | | | ■ After troubleshooting, the panel should display run". |

| | | | | | | | | | | | |
|--------------------------------------|--|--|---|--------------------------------------|---|--|--------------------------------------|---------------------------|--------------------------------------|---|--|
| Input torque instruction | Servo motor not rotating | Internal torque instruction (P0B-02)0 | <p>AI wiring error For analog input instructions, see if the AI terminal wiring is correct, please refer to Chapter 4. Error in selecting torque instruction Check that the P07-02 is set correctly. No torque instruction entered When 1. select analog input instruction, first check whether the relevant parameters AI P03 group are set correctly; then check whether the input voltage signal of external signal source is correct, can be observed by oscilloscope or read by P0B-21 or P0B-22; 2. the number to time to see if the P07-03 is 0; 3. communication to timing to see if the P31-11 is 0.</p> | | | | | | | | |
| Input torque instruction | Servo motor reversal | Internal torque instruction (P0B-02) is negative | <ul style="list-style-type: none"> ◆ When the analog input instruction is selected, whether the input voltage polarity of the external signal source is reverse can be viewed by oscilloscope or through P0B-21 or P0B-22; ◆ Digital timing to see if the P07-03 is less than 0; ◆ Communication timing to see if the P31-11 is less than 0; ◆ See if the DI function 25(FunIN.25 : ToqDirSel, torque instruction direction setting) and the corresponding terminal logic are valid; ◆ Check to see if the P02-02 parameter is set incorrectly. <p>■ After removing the above fault, the servo motor can rotate.</p> | | | | | | | | |
| Low speed rotation | <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Unstable speed at low speed rotation</td> <td>Unreasonable gain setting</td> </tr> <tr> <td>Motor shaft left and right vibration</td> <td>Load moment of inertia ratio (P08-15) Too big</td> </tr> </table> | Unstable speed at low speed rotation | Unreasonable gain setting | Motor shaft left and right vibration | Load moment of inertia ratio (P08-15) Too big | <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>Unstable speed at low speed rotation</td> <td>Unreasonable gain setting</td> </tr> <tr> <td>Motor shaft left and right vibration</td> <td>Load moment of inertia ratio (P08-15) Too big</td> </tr> </table> | Unstable speed at low speed rotation | Unreasonable gain setting | Motor shaft left and right vibration | Load moment of inertia ratio (P08-15) Too big | <ul style="list-style-type: none"> ◆ Automatic gain adjustment. ◆ If it can run safely, the inertia identification is carried out again, and the automatic gain adjustment is carried out. |
| Unstable speed at low speed rotation | Unreasonable gain setting | | | | | | | | | | |
| Motor shaft left and right vibration | Load moment of inertia ratio (P08-15) Too big | | | | | | | | | | |
| Unstable speed at low speed rotation | Unreasonable gain setting | | | | | | | | | | |
| Motor shaft left and right vibration | Load moment of inertia ratio (P08-15) Too big | | | | | | | | | | |

7.2 Runtime failures and warning handling

7.2.1 Fault and Warning Code Table

Fault and warning classification

Servo drive failures and warnings are classified by severity into three categories ,1,2,3, severity :1>2>3, as follows:

- Category 1(NO.1) Non-resetable faults;
- Class 1(NO.1) Resetable faults;
- Class 2(NO.2) Resetable faults;
- Class 3(NO.3) Resetable warning .

"Resetable" means to stop the panel failure display by giving a reset signal.

Specific operation: set parameter P0D-01=1(fault reset) or use DI function 2(FunIN.2 : ALM-RST, fault and warning reset) and set to logic valid, can make panel stop fault display.

NO.1 、 NO.2 reset method of resetable fault: turn off servo enable signal (S-ON set to OFF), then set P0D-01=1 or use DI function 2.

NO.3 reset method of resetable warning: set P0D-01=1 or use DI function

3. Notes: ■ for some faults or warnings, you must change the settings to remove the cause before reset, but reset does not mean that the change takes effect. For changes that need to be re-controlled (L1C、L2C) to take effect, the control power must be re-controlled; for changes that require downtime to take effect, the servo enable must be turned off. After the change takes effect, the servo drive can run normally.

☆ Association function code:

| Function code | Name | Setting range | Unit | Factory setting | Setting | Effective time | Relevant models |
|---------------|-------------|---|------|-----------------|--------------|----------------|-----------------|
| P0D 01 | Fault reset | 0: no operation 1: failure and warning reset | - | 0 | Stop setting | take effect | - |

☆ Associated function number:

| Function code | Name | Function name | Function |
|---------------|---------|----------------------------------|---|
| FunIN.2 | ALM-RST | Failure and warning reset signal | <ul style="list-style-type: none"> ◆ The DI function is edge effective, the level continues to be high / low usually invalid. ◆ According to the alarm type, some alarm reset servo can continue to work. ◆ When assigned to low speed DI, if the DI logic is set to level effective, it will be forced to be effective along the change, and the effective level change must be kept above 3 ms, otherwise the fault reset function will be invalid. Do not assign fault reset function to fast DI, otherwise function is invalid. Invalid, no reset fault and warning; valid, reset fault and warning. |

1) Failure and warning records

The servo driver has the function of fault recording, which can record the last 10 faults and warning names and the state parameters of the servo driver when the fault or warning occurs. If repeated failures or warnings occur in the last 5 times, the fault or warning code, that is, the drive status, is recorded only once.

After the fault or warning reset, the fault record will still save the fault and warning; use the system parameter initialization function (P02-31=1 or 2) to clear the fault and warning record.

Through monitoring parameters P0B-33 you can select the number of failures or warnings from the current fault n,P0B-34 you can view the n 1 fault or warning name, P0B-35~P0B-42 you can view the status parameters of the servo driver when the first fault or warning occurs. FU.000". P0B-34 on panel when failure occurs

When viewing the P0B-34(n 1 fault or warning name) through the panel, the panel displays "FU.xxx","xxx" as fault or warning code; when reading through driving debugging platform software or communication, it reads decimal data of the code. It needs to be converted into hexadecimal data to reflect real fault or warning code, such as

| Panel displays failures or warnings“FU.xxx” | P0B-34 (decimal system) | P0B-34 (hexadecimal) | Illustration |
|---|-------------------------|----------------------|--|
| FU.101 | 257 | 0101 | 0: Class 1 Non-resetable Fault 101: Fault Code |
| FU.130 | 8496 | 2130 | 2: Class 1 Resetable Fault 130: Fault Code |
| FU.121 | 24865 | 6121 | 6: Class 2 Resetable Fault 121: Fault Code |
| FU.110 | 57616 | E110 | E: Class 3 Resetable Warning 110: Warning Code |

2) Fault and Warning Code Output

Servo drives can output the current highest level of fault or warning codes.

- a) "Fault coded output" means setting 3 DO terminals of the servo drive to DO functions 12,13,14, FunOUT.12 of which
- b) ALMO1(alarm code bit 1, abbreviated as AL1), FunOUT.13;
- c) ALMO2(alarm code bit 2, abbreviated as AL2), FunOUT.14;
- d) ALMO3(alarm code 3, abbreviated as AL3).

e) Different faults occur, the level of 3 DO terminals will change.

Category 1(NO.1) Non-reset faults:

| Display | Fault name | Fault type | Resets | Coding output | | |
|---------|--|------------|--------|---------------|-----|-----|
| | | | | AL3 | AL2 | AL1 |
| FU.101 | P02 and above group parameters are abnormal | NO.1 | No | 1 | 1 | 1 |
| FU.102 | Programmable logic configuration failure | NO.1 | No | 1 | 1 | 1 |
| FU.104 | Programmable logic interrupt fault | NO.1 | No | 1 | 1 | 1 |
| FU.105 | Internal program exception | NO.1 | No | 1 | 1 | 1 |
| FU.108 | Parameter storage failure | NO.1 | No | 1 | 1 | 1 |
| FU.111 | Internal fault | NO.1 | No | 1 | 1 | 1 |
| FU.120 | Product matching failure | NO.1 | No | 1 | 1 | 1 |
| FU.122 | Absolute position mode product matching failure | NO.1 | No | 1 | 1 | 1 |
| FU.136 | Data check error in motor ROM or parameter not saved | NO.1 | No | 1 | 1 | 1 |
| FU.201 | Over current 2 | NO.1 | No | 1 | 1 | 0 |
| FU.208 | FPGA system sampling operation timeout | NO.1 | No | 1 | 1 | 0 |
| FU.210 | Output short circuit to ground | NO.1 | No | 1 | 1 | 0 |
| FU.220 | Phase sequence error | NO.1 | No | 1 | 1 | 0 |
| FU.234 | Speed car | NO.1 | No | 1 | 1 | 0 |
| FU.740 | Encoder interference | NO.1 | No | 1 | 1 | 1 |
| FU.A33 | Encoder data is abnormal | NO.1 | No | 0 | 1 | 0 |

Note : "1" means valid , "0" means invalid, does not represent the level of the DO terminal.

f) Class 1 (NO.1) Resetable faults:

| Display | Fault name | Fault type | Resets | Encoding output | | |
|---------|--------------------------------------|------------|--------|-----------------|-----|-----|
| | | | | AL3 | AL2 | AL1 |
| FU.130 | DI function repeated allocation | NO.1 | Yes | 1 | 1 | 1 |
| FU.131 | DO function allocation exceeds limit | NO.1 | Yes | 1 | 1 | 1 |
| FU.207 | D/Q axis current overflow fault | NO.1 | Yes | 1 | 1 | 0 |
| FU.400 | Main circuit over voltage | NO.1 | Yes | 0 | 1 | 1 |
| FU.410 | Main circuit under voltage | NO.1 | Yes | 1 | 1 | 0 |
| FU.602 | Angle recognition failed | NO.1 | Yes | 0 | 0 | 0 |

g) Class 2 (NO.2) Resetable faults:

| Display | Fault name | Fault type | Resets | Encoding output | | |
|---------|-----------------------------------|------------|--------|-----------------|-----|-----|
| | | | | AL3 | AL2 | AL1 |
| FU.121 | Servo ON command invalid fault | NO.2 | Yes | 1 | 1 | 1 |
| FU.420 | Main circuit lack of phase | NO.2 | Yes | 0 | 1 | 1 |
| FU.430 | Control voltage under voltage | NO.2 | Yes | 0 | 1 | 1 |
| FU.500 | Over speed | NO.2 | Yes | 0 | 1 | 0 |
| FU.510 | Pulse output over speed | NO.2 | Yes | 0 | 1 | 0 |
| FU.610 | Drive overload | NO.2 | Yes | 0 | 0 | 0 |
| FU.620 | Motor over load | NO.2 | Yes | 0 | 0 | 0 |
| FU.625 | Brake closed abnormally | NO.2 | Yes | 0 | 0 | 0 |
| FU.626 | Brake opened abnormally | NO.2 | Yes | 0 | 0 | 0 |
| FU.630 | Motor blocked | NO.2 | Yes | 0 | 0 | 0 |
| FU.650 | Radiator overheated | NO.2 | Yes | 0 | 0 | 0 |
| FU.731 | Encoder battery failure | NO.2 | Yes | 1 | 1 | 1 |
| FU.733 | Encoder multi-turn counting error | NO.2 | Yes | 1 | 1 | 1 |

| | | | | | | |
|--------|---|------|-----|---|---|---|
| FU.735 | Encoder multi-turn counting over flow | NO.2 | Yes | 1 | 1 | 1 |
| FU.834 | AD sampling overvoltage | NO.2 | No | 1 | 1 | 1 |
| FU.835 | High-precision AD sampling failure | NO.2 | No | 1 | 1 | 1 |
| FU.B00 | Position deviation is too large | NO.2 | Yes | 1 | 0 | 0 |
| FU.B01 | Pulse input abnormal | NO.2 | Yes | 1 | 0 | 0 |
| FU.B02 | Full closed loop position deviation is too large | NO.2 | Yes | 1 | 0 | 0 |
| FU.B03 | Electronic gear ratio setting exceeds limit | NO.2 | Yes | 1 | 0 | 0 |
| FU.B04 | Full closed loop function parameter setting error | NO.2 | Yes | 1 | 0 | 0 |
| FU.D03 | CAN communication connection interrupted | NO.2 | Yes | 1 | 0 | 1 |

h) Warning reset:

| Display | Warning name | Fault type | Resets | Encoding output | | |
|---------|--|------------|--------|-----------------|-----|-----|
| | | | | AL3 | AL2 | AL1 |
| FU.110 | Frequency division pulse output setting failure | NO.3 | Yes | 1 | 1 | 1 |
| FU.601 | Back to origin timeout failure | NO.3 | Yes | 0 | 0 | 0 |
| FU.730 | Encoder battery warning | NO.3 | Yes | 1 | 1 | 1 |
| FU.831 | AI zero drift is too large | NO.3 | Yes | 1 | 1 | 1 |
| FU.900 | DI emergency brake | NO.3 | Yes | 1 | 1 | 1 |
| FU.909 | Motor overload warning | NO.3 | Yes | 1 | 1 | 0 |
| FU.920 | Braking resistor overload | NO.3 | Yes | 1 | 0 | 1 |
| FU.922 | External braking resistor is too small | NO.3 | Yes | 1 | 0 | 1 |
| FU.939 | Motor power line is broken | NO.3 | Yes | 1 | 0 | 0 |
| FU.941 | Change parameters need to be re-powered to take effect | NO.3 | Yes | 0 | 1 | 1 |
| FU.942 | Frequent parameter storage | NO.3 | Yes | 0 | 1 | 1 |
| FU.950 | Forward over travel warning | NO.3 | Yes | 0 | 0 | 0 |
| FU.952 | Reverse over travel warning | NO.3 | Yes | 0 | 0 | 0 |
| FU.980 | Encoder internal fault | NO.3 | Yes | 0 | 0 | 1 |
| FU.990 | Input phase loss warning | NO.3 | Yes | 0 | 0 | 1 |
| FU.994 | CAN address conflict | NO.3 | Yes | 0 | 0 | 1 |
| FU.A40 | Internal fault | NO.3 | Yes | 0 | 1 | 0 |

7.2.2 Trouble shooting method

FU.101: Abnormal servo internal parameters

1) Production mechanism:

The total number of function codes has changed, which usually appears after updating the software;

The function code parameter values of P02 group and later groups exceed the upper and lower limits, which usually appear after updating the software.

| Reason | Confirmation method | Treatment measures |
|---|---|---|
| 1. Control power supply voltage drops instantaneously | ◆ Confirm whether it is in the process of cutting off the control power (L1C, L2C) or a momentary power failure occurs. | After the system parameters are restored and initialized (P02-31=1), then rewrite the parameters. |

| | | |
|--|---|---|
| | <ul style="list-style-type: none"> ◆ Measure whether the input voltage on the non-drive side of the control cable meets the following specifications during operation: ◆ 220V drive: ◆ Effective value: 220V-240V ◆ Allowable deviation: -10% ~ +10% (198V~264V) ◆ 380V driver: ◆ Effective value: 380V-440V Allowable deviation: -10% ~ +10% (342V~484V) | Increase the power supply capacity or replace a large-capacity power supply. After the system parameters are restored and initialized (P02-31=1), rewrite the parameters. |
| 2. Instantaneous power failure during parameter storage | <ul style="list-style-type: none"> ◆ Confirm whether an instantaneous power failure occurs during parameter value storage. | Re-power on and re-write the parameters after the system parameters are restored and initialized (P02-31=1). |
| 3. The number of writes of the parameter within a certain period of time exceeds the maximum | <ul style="list-style-type: none"> ◆ Check whether the upper device frequently changes parameters. | Change the parameter writing method and rewrite. Or the servo drive is faulty, replace the servo drive. |
| 4. Updated software | <ul style="list-style-type: none"> ◆ Confirm whether the software has been updated. | Reset the drive model and motor model, and the system parameters are restored and initialized (P02-31=1) |
| 5. Servo drive failure | <ul style="list-style-type: none"> ◆ After turning on the power supply several times and restoring the factory parameters, if the fault is still reported, the servo drive has a fault. | Replace the servo drive |

2) FU.102: Programmable logic configuration failure

Production mechanism:

- FPGA and MCU software versions do not match;
- The FPGA or MCU related hardware is damaged, causing the MCU and FPGA to fail to establish communication

| Reason | Confirmation method | Treatment measures |
|--|---|---|
| 1.FPGA and MCU software version is not Match | <ul style="list-style-type: none"> ◆ Check the MCU software version number P01-00 and FPGA software version number P01-01 through the panel or drive debugging platform, etc., and confirm whether the highest non-zero values of the two software version numbers are consistent. | Consult our technical support to update the FPGA or MCU software that matches each other. |
| 2.FPGA Fault | <ul style="list-style-type: none"> ◆ The fault is still reported after turning on the power several times. | Replace the servo drive |

3) FU.104: Programmable logic interrupt fault

In order to distinguish the mechanism of the fault, the servo drive can display different internal fault codes under the same external fault code, which can be checked through P0B-45.

Production mechanism:

- MCU or FPGA access timeout

| Reason | Confirmation way | Settlement way |
|--|---|-------------------------|
| 1.FPGA fault(FU.104) 2. Handshake between FPGA and MCU is abnormal (FU.100) 3. Drive internal operation timeout (FU.940) | <ul style="list-style-type: none"> ◆ The fault is still reported after turning on the power several times. | Replace the servo drive |

4) FU.105: Internal program exception

Production mechanism:

- When EEPROM read/write function codes, the total number of function codes is abnormal.

- The range of the function code setting value is abnormal (usually after updating the program)

| Reason | Confirmation way | Settlement way |
|----------------------|---|---|
| 1. EEPROM error | ◆ Confirm according to the method of FU.101. | After the system parameters are restored and initialized (P02-31=1), power on again |
| 2. Servo drive error | ◆ The fault is still reported after turning on the power several times. | Replace the servo drive |

5) FU.108: Parameter storage failure

Production mechanism:

- Parameter value cannot be written to EEPROM; parameter value cannot be read from EEPROM.

| Reason | Confirmation way | Settlement way |
|--|---|--|
| 1. Parameter writing is abnormal 2. Parameter reading is abnormal | ◆ After changing a parameter, power on again to check whether the parameter value is saved. | It is not saved, and the fault still occurs after multiple power-on. The drive needs to be replaced. |
| | | |

6) FU.120: Product matching failure

Production mechanism:

- The motor and driver do not match or the parameter setting is wrong.

| Reason | Confirmation way | Settlement way |
|--|--|--|
| 1. Product number (motor or drive) does not exist | Internal fault code P0B45=0120 or 1120 ◆ Check whether the motor nameplate is matched by our company. According to the motor nameplate, confirm whether the setting of P00-00 is correct. | Reset P00-00 (motor number) according to the motor nameplate or replace with a matching motor. |
| | Internal fault code P0B45=2120 ◆ Check the drive model (P01-02) to see if this is this drive model. | The drive number does not exist. Set the correct drive model according to the drive nameplate. |
| 2. The power level of the motor and the drive do not match | Internal fault code P0B45=3120 ◆ Check the drive model (P01-02) whether it matches with the bus motor model (P00-05). | Replace the product that does not match |

7) FU.121: Servo ON command invalid fault

Production mechanism:

- When using some auxiliary functions, a redundant servo enable signal is given

| Reason | Confirmation way | Settlement way |
|--|--|---|
| 1. When internally enabled, external Servo enable signal (S-ON) is valid | ◆ Confirm whether to use auxiliary functions: P0D-02, P0D-03, P0D-12, and DI function 1 (FunIN.1: S-ON, servo enable signal) is valid. | Set DI function 1 (including hardware DI and virtual DI) signals to be invalid. |

8) FU.122: Absolute position mode product matching failure

Production mechanism:

- Absolute position mode motor does not match or the motor number is set incorrectly

| Reason | Confirmation way | Settlement way |
|---|--|--|
| In the absolute position mode, the detected motor does not match or the motor number is set incorrectly | ◆ Check whether the motor nameplate is a multi-turn absolute encoder motor. ◆ Check whether P00-00 (motor number) is correct. | Reset P00-00 (motor number) according to the motor nameplate or replace with a matching motor. |

9) FU.130: DI Duplicate function assignment

Production mechanism:

- The same DI function is allocated repeatedly, including hardware DI and virtual DI.
- DI the function number exceeds the number of DI functions.

| Reason | Confirmation way | Settlement way |
|--|---|--|
| 1. When DI function is allocated, the same function is repeatedly allocated to multiple DI terminals | ◆ Check whether P03-02/P03-04...P03-20, P17-00/P17-02...P17-30 are set with the same non-zero DI function number. | Re-assign the parameters of group P03 and P17 assigned the same non-zero function number to different function numbers, and then power on again to make the changes take effect, or turn off the servo enable signal first and give a "reset signal" "To make the changes take effect. |
| 2. DI function number exceeds the number of DI functions | ◆ Has the MCU program been updated? | After the system parameters are restored and initialized (P02-31=1), power on again. |

10) FU.131: DO Function allocation exceeds limit

Production mechanism:

- DO The function number exceeds the number of DO functions.

| Reason | Confirmation way | Settlement way |
|--|-------------------------------------|--|
| 1. The function number exceeds the number of DO functions. | ◆ Has the MCU program been updated? | After the system parameters are restored and initialized (P02-31=1), power on again. |

11) FU.136: The data in the motor encoder ROM is checked incorrectly or parameters are not stored

Production mechanism:

- When the drive reads the parameters of the encoder ROM area, it is found that the parameters are not stored, or the parameters are inconsistent with the agreed values.

| Reason | Confirmation way | Settlement way |
|--|--|---|
| 1. The drive and motor type do not match | ◆ According to motor brand and motor model type , ensure P00-00 setting correct ◆ For this series of drives and 17bit servo motors (-U2***), check whether P00-00 (motor number) is 14130. | Replace with a matching drive and motor, and power on again. ■ When using our driver and 17bit servo motor, make sure that P00-00= 14130. |
| 2.The parameter verification error in the ROM of the bus type incremental encoder or the parameter is not stored | ◆ Check whether the encoder cable provided by our company is used. The cable has no broken skin or disconnection, and there is no bad contact between the terminals on both sides and reliable connection. ◆ Measure the signals at both ends of the encoder cable: PS+, PS-, +5V, GND, and observe whether the signals on both sides are consistent. Signal definition refers to hardware wiring | Use our standard encoder cable, ensure a tight connection between the terminals at the motor end, tighten the screws at the driver end, and replace with a new encoder cable if necessary. Encoder cables and power cables (L1, L2, L3, U, V, W) must not be bundled, they should be routed separately. |
| 3. Drive failure | ◆ The fault is still reported after power-on again. | Replace the servo drive |

12) FU.201: over current 2

Production mechanism:

- Overcurrent detected by hardware

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|---|---|--|
| 1. The input command is synchronized with the servo on or the input command is too fast | ◆ Check whether the command has been input before the servo panel displays "Rdy". | Command sequence: After the servo panel displays "Rdy", turn on the servo enable signal (S-ON) first, and then input the command. If allowed, add the command filter time constant or increase the acceleration/deceleration time. |
| 4. Braking resistance is too small or short circuited | ◆ If using the built-in braking resistor (P02-25=0), confirm whether B2 and B3 are reliably connected by wires. If yes, measure the resistance between B1/+ and B3; ◆ If using an external braking resistor (P02-25=1/2), measure the resistance of the external braking resistor between B1/+ and B2. ◆ Please refer to Chapter 1 for brake resistor specifications. | If the built-in braking resistor is used and the resistance value is "0", then adjust to use an external braking resistor (P02-25=1/2), and remove the wire between B2 and B3. The resistance value and power can be selected as the internal. The specifications of the braking resistors are the same; if an external braking resistor is used, the resistance value is less than P02-21, refer to Chapter 1 "Specifications of braking resistors", replace with a new resistor, and reconnect between B1/+ and B2. Be sure to set P02-26 (power of external braking resistor) and P02-27 (resistance value of external braking resistor) consistent with the actual parameters of external braking resistor. |
| 3. Poor contact of the motor cable | ◆ Check whether the connections between the two ends of the drive power cable and the U V W side of the drive in the motor cable are loose. | Tighten loose or detached wiring. |
| 4. Ground the motor cable | ◆ After ensuring that the drive power cable and motor cable are tightly connected, respectively measure whether the insulation resistance between the UVW end of the drive and the ground wire (PE) is a megohm ($M\Omega$) value. | Replace the motor when the insulation is poor. |
| 5. Short circuit of motor U V W cable | ◆ Unplug the motor cable and check whether there is a short circuit between the motor cable U V W and whether there are burrs in the wiring. | Connect the motor cables correctly. |
| 6. Motor burns out | ◆ Unplug the motor cable and measure whether the resistance of the motor cable U V W is balanced. | If unbalanced, replace the motor. |
| 7. Unreasonable gain setting, motor oscillation | ◆ Check whether the motor vibrates or has a sharp sound during the startup and operation of the motor. You can also use the drive debugging platform to view the "current feedback". | Make gain adjustments. |
| 8. Encoder wiring error, aging and corrosion, encoder plug loose | ◆ Check whether the standard encoder cable of our company is used, and whether the cable is aging, corroded, or the connector is loose. ◆ Turn off the servo enable signal, turn the motor shaft by hand, and check whether P0B-10 changes with the rotation of the motor shaft. | Re-solder, plug tightly or replace the encoder cable. |
| 9. Drive failure | ◆ Unplug the motor cable and power on again, the fault is still reported. | Replace the servo drive. |

13) FU.207: D/Q Shaft current overflow fault

Production mechanism:

- Abnormal current feedback causes the internal registers of the driver to overflow;
- Abnormal encoder feedback causes the internal registers of the drive to malfunction.

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|-----------------------------|---|--------------------------|
| 1.DQ Shaft current overflow | ◆ When the fault is reported after turning on the power several times, the servo drive has a fault. | Replace the servo drive. |
|-----------------------------|---|--------------------------|

14) FU.208: FPGA System sampling operation timeout

Production mechanism:

- When FU.208 occurs, please use the internal fault code (P0B-45) to query the cause of the fault.

| Reason | Confirmation way | Settlement way |
|---|--|--|
| 1.MCU Communication timeout | ◆ Internal fault code P0B-45=1208: Internal chip is damaged | Replace the servo drive. |
| 5. Encoder communication timeout | Internal fault code P0B-45=2208: ◆ Encoder wiring error ◆ The encoder cable is loose ◆ Encoder cable is too long ◆ Encoder communication is disturbed ◆ Encoder failure | ◆ The cables are given priority to use our standard cables. If the cables are non-standard, check whether the cables meet the specifications and use twisted-pair shielded cables; ◆ Check whether the plugs at both ends of the encoder are in good contact, and whether the needles are retracted, etc.; ◆ Please contact the manufacturer; ◆ Separate the strong and weak currents as far as possible, the motor cables and encoder cables should not be bundled, and the grounding of the motor and driver should be well released; ◆ Replace the servo motor. |
| 3. Current sampling timeout | Internal fault code P0B-45=3208: ◆ Check whether there is interference from large-scale equipment on site, or whether there are multiple sources of interference such as multiple power supply and frequency conversion equipment in the cabinet; ◆ The internal current sampling chip is damaged. | ◆ Separate the strong and weak currents as far as possible and do not bundle the wires on site; ◆ Replace the servo driver. |
| 4. High precision AD conversion timeout | Internal fault code P0B-45=4208: ◆ There is interference in the high-precision AI channel wiring. Refer to the correct wiring diagram to check the AI channel wiring. | Use twisted-pair shielded wire to re-wire to shorten the line length. |
| 5. FPGA operation timeout | Internal fault code P0B-45=0208: ◆ Check the cause according to the reason 1/2/3/4. | Check the cause according to the reason 1/2/3/4. |

15) FU.210: Output short circuit to ground

Production mechanism:

- During the drive power-on self-test, abnormal motor phase current or bus voltage is detected.

| Reason | Confirmation way | Settlement way |
|---|--|---|
| 1. Drive power cable (U V W) is short-circuited to ground | ◆ Unplug the motor cable and measure whether the drive power cable U V W is short-circuited to the ground (PE). | Rewire or replace the drive power cable |
| 2. Motor short circuit to ground | ◆ After ensuring that the drive power cable and motor cable are tightly connected, respectively measure whether the insulation resistance between the U V W end of the drive and the grounding wire (PE) is a megaohm ($M\Omega$) value. | Replace motor |
| 3. Drive failure | ◆ The drive power cable is removed from the servo drive and the fault is still reported after turning on the power several times. | Replace servo drive |

16) FU.220: Phase sequence error

Production mechanism:

- The drive performs angle identification, and it is recognized that the phase sequence of the drive UVW and the motor UVW do not match.

| Reason | Confirmation way | Settlement way |
|--|---|--|
| The drive U V W and the motor UVW phase sequence do not correspond | ◆ After repeated power-on, the angle recognition still reports FU.220 fault | Re-wire and perform angle recognition again. |

17) FU.234: Speed car

Production mechanism:

- In torque control mode, the direction of torque command is opposite to the direction of speed feedback;
- In position or speed control mode, the speed feedback and speed command direction are opposite.

| Reason | Confirmation way | Settlement way |
|---|---|---|
| 1. U V W phase sequence wiring error | ◆ Check whether the connections between the two ends of the drive power cable and the U V W end of the motor cable and the U V W end of the drive correspond one by one. | Wire in the correct U V W phase sequence. |
| 2. When the power is turned on, the interference signal causes the initial phase detection error of the motor rotor | ◆ U V W phase sequence is correct, but the servo drive is enabled, it will report FU.234. | Power on again. |
| 3. Wrong encoder model or wrong wiring | ◆ According to the drive and motor nameplate, confirm that P00-00 (motor number) is set correctly. | Replace with matching drivers and motors. Reconfirm P00-00 (motor number), encoder wiring |
| 4. Encoder wiring error, aging and corrosion, encoder plug loose | ◆ Check whether the standard encoder cable of our company is used, and whether the cable is aging, corroded, or the connector is loose. ◆ Turn off the servo enable signal, turn the motor shaft by hand, and check whether P0B-10 changes with the rotation of the motor shaft. | Re-solder, plug tightly or replace the encoder cable. |
| 5. Under the condition of vertical axis, the gravity load is too large | ◆ Check whether the load of the vertical axis is too large, adjust the brake parameters of P02-09 ~ P02-12, and whether the fault can be eliminated | Reduce the vertical shaft load, or increase the rigidity, or shield the fault without affecting safety and use. |

Note: ■ Please set P0A-12=0 to shield the running fault under the condition of being towed and vertical axis.

18) FU.400: Mechanism of electrical overvoltage in the main circuit:

- B1/⊕、⊖1 Between the DC bus voltage exceeds the fault value:

220V servo drive: Normal value: 310V, fault value: 420V;

380V servo drive: Normal value: 540V, fault value: 760V.

| Reason | Confirmation way | Settlement way |
|---|---|---|
| 1. The main circuit input voltage is too high | ◆ Check the drive input power specification, and measure whether the input voltage of the main circuit cable drive side (L1 L2 L3) meets the following specifications: 220V drive: Effective value: 220V-240V Allowable deviation: -10%~+10% (198V~264V) | Replace or adjust the power supply according to the specifications on the left. |

| | | |
|---|--|--|
| | 380V driver: Effective value: 380V-440V Allowable deviation: -10%~+10% (342V~484V) | |
| 2. The power supply is in an unstable state or is affected by a lightning strike | ◆ Monitor whether the input power of the drive is affected by lightning, and measure whether the input power is stable and meet the above specifications. | After connecting the surge suppressor, connect the control power and the main circuit power again. If the fault still occurs, replace the servo drive. |
| 3.Braking resistor failure | ◆ If using the built-in braking resistor (P02-25=0), confirm whether B2 and B3 are reliably connected by wires. If so, measure the resistance between B1/+ and B3; ◆ If using an external braking resistor (P02-25=1/2), measure the resistance of the external braking resistor between B1/+ and B2. ◆ Please refer to Chapter 1 for brake resistor specifications. | If the resistance value is "∞" (infinity), the internal brake resistor is disconnected: If the built-in braking resistor is used, adjust to use an external braking resistor (P02-25=1/2), and remove the wire between B2 and B3. The resistance value and power can be selected to be consistent with the built-in braking resistor; If an external braking resistor is used, replace it with a new resistor and reconnect it between B1/+ and B2. Be sure to set P02-26 (power of external braking resistor) and P02-27 (resistance value of external braking resistor) to be consistent with the actual parameters of external braking resistor. |
| 4. The resistance of the external braking resistor is too large, and the maximum braking energy cannot be completely absorbed | ◆ Measure the resistance of the external braking resistor between B1/+ and B2 and compare it with the recommended value. | Change the resistance of the external braking resistor to the recommended value and reconnect it between B1/+ and B2. Be sure to set P02-26 (power of external braking resistor) and P02-27 (resistance value of external braking resistor) to be consistent with the actual parameters of external braking resistor. |
| 5. When the motor is running in rapid acceleration and deceleration, the maximum braking energy exceeds the absorbable value | ◆ Confirm the acceleration and deceleration time during operation, measure the DC bus voltage between B1/+ and 1, and confirm whether the voltage exceeds the fault value during the deceleration stage. | First, ensure that the input voltage of the main circuit is within the specification range, and then increase the acceleration and deceleration time when allowed |
| 6. The bus voltage sampling value has a large deviation | ◆ Observe whether the parameter P0B-26 (bus voltage value) is in the following range: 220V driver: P0B-26 > 420V 380V driver: P0B-26 > 760V Measure whether the DC bus voltage between B1/+ and 1 is at a normal value and is less than P0B-26. | Consult our technical support. |
| 7. Servo drive failure | ◆ After several power-offs, the main circuit is reconnected, and the fault is still reported. | Replace the servo drive. |

19) FU.410: Main circuit undervoltage

Production mechanism:

- B1/+、 ⊖1 DC bus voltage is lower than the fault value:

220V servo drive: Normal value: 310V, Fault value: 200V;

380V servo drive: Normal value: 540V, Fault value: 380V。

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|---|---|---|
| 1. The main circuit power supply is unstable or out of power | ◆ Check the drive input power specifications, and measure whether the input voltage of the main circuit cable on the non-drive side and the drive side (L1 L2 L3) meets the following specifications: 220V drive: Effective value: 220V-240V Allowable deviation: -10% ~ +10% (198V~264V) 380V driver: Effective value: 380V-440V Allowable deviation: -10% ~ +10% (342V~484V) All three phases need to be measured. | |
| 2. Momentary power outage | | Increase power supply capacity. |
| 3. Power supply voltage drops during operation | ◆ Monitor the input power supply voltage of the drive to check whether the power supply of the same main circuit is turned on too much and other settings cause insufficient power supply capacity and voltage drop. | |
| 4. If there is a phase loss, the drive that should be operated with a 3-phase power supply actually runs with a single-phase power supply | ◆ Check whether the main circuit wiring is correct and reliable, and check whether the parameter P0A-00 phase failure detection is shielded. | Replace the cable and connect the main loop power cord correctly: Three phase: L1 L2 L3; single phase: L1 L2 |
| 5. Servo drive failure | ◆ Observe whether the parameter P0B-26 (bus voltage value) is in the following range: 220V Servo drive: P0B-26 < 200V 380V Servo drive: P0B-26 < 380V After multiple power-offs, the main circuit power (L1, L2, L3) is reconnected to still report the fault. | Replace the servo drive. |

20) FU.420: Main circuit lack of phase

Production mechanism:

- The three-phase drive lacks 1 or 2 phases。

| Reason | Confirmation way | Settlement way |
|---|---|--|
| 1. Poor wiring of three-phase input wire | ◆ Check whether the cables between the non-drive side and the main circuit input terminals (L1, L2, L3) of the drive are in good condition and connect tightly | Replace the cable and connect the main loop power cord correctly |
| 2. Three-phase drives run under single-phase power | ◆ Check the drive input power specification, check the actual input voltage specification, and measure whether the main circuit input voltage meets the following specifications: 220V drive: Effective value: 220V-240V Allowable deviation: -10% ~ +10% (198V~264V) 380V driver: Effective value: 380V-440V Allowable deviation: -10% ~ +10% (342V~484V) All three phases need to be measured. | For a 0.75kW three-phase drive (drive model P01-02=5), it is allowed to run under single-phase power supply. If the input voltage meets the specifications on the left, you can set P0A-00=2 (prohibit the failure and warning of power input phase loss protection); In other cases, if the input voltage does not meet the specifications on the left, please replace or adjust the power supply according to the specifications on the left. |
| 3. The three-phase power supply is unbalanced or the three-phase voltage is too low | | |
| 4. Servo drive failure | ◆ After multiple power-offs, the main circuit power (L1, L2, L3) is reconnected to still report the fault. | Replace the servo drive. |

21) FU.430: Control voltage undervoltage

Production mechanism:

- 220V servo drive: Normal value: 310V, Fault value: 190V;
- 380V servo drive: Normal value: 540V, Fault value: 350V.

| Reason | Confirmation way | Settlement way |
|--|---|---|
| 1. The control power supply is unstable or power failure | <ul style="list-style-type: none"> ◆ Confirm whether it is in the process of cutting off the control power (L1C L2C) or momentary power failure occurs | Re-power on, if abnormal power failure occurs, ensure that the power supply is stable. |
| 2. Poor contact of control cable | <ul style="list-style-type: none"> ◆ Measure whether the input voltage of the control cable meets the following specifications: 220V servo drive: Effective value: 220V-240V Allowable deviation: -10% ~ +10% (198V~264V) 380V driver: Effective value: 380V-440V Allowable deviation: -10% ~ +10% (342V~484V) | Increase power supply capacity. <ul style="list-style-type: none"> ◆ Detect whether the cable is connected, and measure whether the voltage on the driver side (L1C, L2C) of the control electric cable meets the above requirements. |

22) FU.500: over speed

Production mechanism:

- The actual speed of the servo motor exceeds the overspeed fault threshold

| Reason | Confirmation way | Settlement way |
|--|--|---|
| 1. Motor cable U V W phase sequence error | <ul style="list-style-type: none"> ◆ Check whether the connections between the two ends of the drive power cable and the U V W end of the motor cable and the U V W end of the drive correspond one by one. | Wire in the correct U V W phase sequence. |
| 2.P0A-08 parameter setting error | <ul style="list-style-type: none"> ◆ Check whether the over-speed fault threshold is less than the maximum motor speed required for actual operation: Over-speed fault threshold=1.2 times the maximum motor speed (P0A-08=0); over-speed fault threshold=P0A-08 (P0A-08 ≠ 0, and P0A-08 <1.2 times the maximum motor speed). | Reset the over-speed fault threshold according to the mechanical requirements. |
| 3. The input command exceeds the overspeed fault threshold | <ul style="list-style-type: none"> ◆ Confirm whether the motor speed corresponding to the input command exceeds the overspeed fault threshold. Position control mode, when the command source is pulse command: Motor speed (rpm)= (Input pulse frequency (HZ))/encoder resolution×electronic gear ratio×60 For this drive, Encoder resolution = 1048576(P/r) | Position control mode: When the position command source is a pulse command: under the premise of ensuring the accuracy of the final positioning, reduce the pulse command frequency or reduce the electronic gear ratio when the operating speed allows; Speed control mode: Check the input speed command value or speed limit value (P06-06 ~ P06-09), and confirm that they are all within the over-speed fault threshold; Torque control mode: Set the speed limit threshold within the overspeed fault threshold. |

| | | |
|--------------------------|---|--|
| 4. Motor speed overshoot | ◆ Use the drive debugging platform to check whether the "speed feedback" exceeds the overspeed fault threshold. | Perform gain adjustment or adjust the mechanical operating conditions. |
| 5. Servo drive failure | ◆ After power on again, the fault still occurs. | Rewire or replace the cable. |

23) FU.510: Pulse output overspeed

Production mechanism:

- When using the pulse output function (P05-38=0 or 1), the output pulse frequency exceeds the upper limit of the frequency allowed by the hardware (2MHz).

| Reason | Confirmation way | Settlement way |
|--|--|--|
| The output pulse frequency exceeds the upper limit of the frequency allowed by the hardware (2MHz) | <p>◆ When P05-38=0 (encoder frequency division output), calculate the output pulse frequency corresponding to the motor speed when the fault occurs, and confirm whether it exceeds the limit. $\text{Output pulse frequency (Hz)} = \frac{\text{Motor speed(rpm)}}{60} \times \text{P05 - 17}$</p> <p>◆ When P05-38=1 (pulse command synchronous output), the input pulse frequency exceeds 2MHz or the pulse input pin has interference. Low-speed pulse input pin: Differential input terminals: PULSE+, PULSE-, SIGN+, SIGN-, the maximum pulse frequency is 500kpps. Open collector input terminals: PULLHI, PULSE+, PULSE-, SIGN+, SIGN-, the maximum pulse frequency is 200kpps. High-speed pulse input pin: Differential input terminals: HPULSE+, HPULSE-, HSIGN+, HSIGN-, maximum pulse frequency: 2Mpps.</p> | <p>Reduce P05-17 (encoder frequency division pulse number), so that in the entire speed range required by the machine, the output pulse frequency is less than the upper limit of the frequency allowed by the hardware.</p> <p>Reduce the input pulse frequency to the upper limit of the frequency allowed by the hardware. Please note: At this time, if the electronic gear ratio is not modified, the motor speed will decrease. If the input pulse frequency itself is high, but does not exceed the upper limit of the frequency allowed by the hardware, anti-interference measures should be taken (pulse input wiring uses twisted-pair shielded wire, set the pin filter parameter P0A-24 or P0A-30) to prevent interference. The pulse is superimposed on the real pulse command, causing a false alarm.</p> |

24) FU.602: Angle recognition failed

25) FU.610: servo drive over speed

Production mechanism:

- The accumulated heat of the drive is too high and reaches the fault threshold

26) FU.620: Motor over load

Production mechanism:

- The accumulated heat of the motor is too high and reaches the fault threshold

| Reason | Confirmation way | Settlement way |
|--|--|--|
| 1. Motor wiring and encoder wiring are wrong or bad | ◆ Compare the correct "wiring diagram" and check the lines between the motor, driver, and encoder. | Connect the cables according to the correct wiring diagram; Preferentially use our standard cables; When using self-made cables, please make and connect them according to the hardware wiring instructions. |
| 2. The load is too heavy, the effective torque of the motor output exceeds the rated torque, and it continues to run for a long time | <p>◆ Confirm the overload characteristics of the motor or drive;</p> <p>◆ Check whether the drive average load rate (P0B-12) is greater than 100.0% for a long time.</p> | Replace the large-capacity drive and matching motor; or reduce the load, increase the acceleration and deceleration time. |

| | | |
|---|--|--|
| 3.Acceleration and deceleration are too frequent or the load inertia is large | ◆ Calculate the mechanical inertia ratio or perform inertia identification, check the inertia ratio P08-15; ◆ Confirm the single operation cycle of the servo motor in cyclic operation. | Increase the acceleration and deceleration time in a single operation. |
| 4.Improper gain adjustment or too rigid | ◆ Observe whether the motor vibrates or the sound is abnormal during operation. | Re-adjust the gain. |
| 5. Wrong drive or motor model setting | ◆ For this series of products: Check the bus motor model P00-05 and the drive model P01-02. | Check the drive nameplate, set the correct drive model (P01-02) and motor model to update to a matching model. |
| 6. The motor is blocked due to mechanical factors, resulting in excessive load during operation | ◆ Displayed by the drive debugging platform or panel, confirm the running command and motor speed (P0B-00): Running command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) Running command in torque mode: P0B-02 (Internal torque command) Check whether the running command is not 0 and the motor speed is 0 in the corresponding mode. | Exclude mechanical factors. |
| 7. Servo drive failure | ◆ After power off, power on again, the fault is still reported. | Replace the servo drive. |

Note: ■ The fault can be cleared or the power can be restarted 30s after the overload.

27) FU.625: Brake closed abnormally

Production mechanism:

- After the brake protection is turned on, the brake output signal is valid and the input command is zero for the first 100 to 500 ms, the output torque is less than 70% of the gravity load detection value.

| Reason | Confirmation way | Settlement way |
|-------------------------|---|---|
| Motor brake is not open | ◆ Confirm whether the motor brake terminal signal is valid and whether the motor brake switch is damaged. | Re-wire according to correct wiring or replace the motor. |

28) FU.626: Brake opened abnormally

Production mechanism:

- After the brake protection is turned on, the output signal of the brake is invalid, but it is detected that the motor has rotated more than two revolutions at this time.

| Reason | Confirmation way | Settlement way |
|------------------------------|--|---|
| Motor brake opens abnormally | ◆ Make sure whether the signal at the motor brake terminal is valid and whether the motor brake switch is damaged. | Re-wire according to correct wiring or replace the motor. |

29) FU.630: Locked-rotor motor overheat protection

Production mechanism:

- The actual speed of the motor is lower than 10rpm, but the torque command reaches the limit value and the duration reaches the set value of P0A-32.

| Reason | Confirmation way | Settlement way |
|--|---|---|
| 1.Drive U V W output phase loss or phase sequence is connected wrong | ◆ Carry out a test run of the motor under no load and check the wiring. | Re-wire according to correct wiring or replace the cable. |

| | | |
|--|---|---|
| | | |
| 2. Drive U V W output disconnection or encoder disconnection | ◆ Check cable wire | Re-wire according to correct wiring or replace the cable. |
| 3. The motor is blocked due to mechanical factors | ◆ Displayed by the drive debugging platform or panel, confirm the running command and motor speed (P0B-00): Running command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) In torque mode Run command: P0B-02 (Internal torque command) Check whether the running command is not 0 and the motor speed is 0 in the corresponding mode. | Troubleshoot mechanical factors. |

30) FU.650: Radiator overheated

Production mechanism:

- The temperature of the drive power module is higher than the over-temperature protection point.

| Reason | Confirmation way | Settlement way |
|--|---|--|
| 1. The ambient temperature is too high | ◆ Measure the ambient temperature | Improve the cooling conditions of the servo drive and lower the ambient temperature. |
| 2. After overload, reset the overload fault by turning off the power, and repeat it many times | ◆ Check the fault record (set P0B-33, check P0B-34), whether there is an overload fault or warning (FU.610, FU.620, FU.630, FU.650, FU.909, FU.920, FU).922). | Change the fault reset method, wait 30s after overload, and then reset. Increase the drive and motor capacity, increase the acceleration and deceleration time, and reduce the load. |
| 3. The fan is broken | ◆ Whether the fan is running during operation. | Replace the servo drive. |
| 4. The installation direction of the servo drive and the interval with other servo drives are unreasonable | ◆ Confirm whether the installation of the servo drive is reasonable. | Install according to the installation standard of the servo drive. |
| 5. Servo drive failure | ◆ The fault will still be reported after 5 minutes of power failure. | Replace the servo drive. |

31) FU.731: Encoder battery failure

Production mechanism:

- The encoder battery voltage of the multi-turn absolute encoder is too low or the battery is not connected.

| Reason | Confirmation way | Settlement way |
|---|--|---|
| During power failure, the battery was not connected | ◆ Confirm whether it is connected during power failure | Set P0D-20=1 to clear the fault |
| Encoder battery voltage is too low | ◆ Measure battery voltage | Replace with a new battery that matches the voltage |

Note: ■ This fault only occurs when the multi-turn absolute position function is enabled (P0201=1 or 2).

32) FU.733: Encoder multi-turn counting error.

Production mechanism:

- Encoder multi-turn counting error.

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|-----------------|--|-------------------|
| Encoder failure | ◆ Setting P0D-20=1 Clear the fault, FU.733 still occurs after power-on again | Replace the motor |
|-----------------|--|-------------------|

33) FU.735: Encoder multi-turn counting overflow

Production mechanism:

- Detection of encoder multi-turn counting overflow.

| Reason | Confirmation way | Settlement way |
|--|------------------|--|
| When P02-01=1, detect encoder multi-turn counting overflow | - | Set P0D-20=1 to clear the fault and power on again |

34) FU.740: Encoder interference

Production mechanism:

- The Z signal of the encoder is interfered, causing the electrical angle corresponding to the Z signal to change too much.

| Reason | Confirmation way | Settlement way |
|-----------------------------------|--|---|
| 1. Encoder wiring error | ◆ Check the encoder wiring. | Re-wiring according to the correct wiring diagram |
| 2. The encoder cable is loose | ◆ Check whether the on-site vibration is too large, causing the encoder cable to loosen, or even vibration to the encoder. | Re-wire and ensure that the encoder terminal is tightly connected. |
| 3. Encoder Z signal is interfered | ◆ Check the wiring on site: Whether there is interference from large-scale equipment around, or whether there are multiple sources of interference such as multiple power supply frequency conversion equipment in the cabinet. ◆ Put the servo in the "Rdy" state, manually rotate the motor shaft counterclockwise to monitor whether P0B-10 (electrical angle) increases or decreases smoothly, and one circle corresponds to 5 0-360°. (Refer to Z series motor, if it is X series motor, 4 0-360°). If there is an abnormal sudden change in P0B-10 during rotation, the encoder itself has a serious problem. If there is no alarm during rotation, but the alarm occurs during servo operation, the possibility of interference is high. | The cables are given priority to use our standard cables; If the wiring is not standard, check whether the cable meets the specifications and whether it uses twisted-pair shielded wire. Separate the strong and weak currents as much as possible, and do not bundle the motor cables and encoder cables. The ground contact between the motor and the driver is good. Check whether the plugs at both ends of the encoder are in good contact, and whether the needles are retracted. |
| 4. Encoder failure | ◆ Replace the encoder cable that can be used normally. If the failure no longer occurs after replacement, the original encoder cable is damaged. ◆ Put the motor at the same position, power on several times and check P0B-10, the electrical angle deviation should be within ±30°. | Replace the encoder cable that can be used normally. If not, the encoder itself has a serious problem and the servo motor needs to be replaced. |

35) FU.834: AD Sampling overvoltage fault

Production mechanism:

- AI the sampled value is greater than 11.5V.

| Reason | Confirmation way | Settlement way |
|---|---------------------------------------|---|
| 1. AI channel input voltage is too high | ◆ Measure the input voltage of the AI | Check the sampled voltage while adjusting the input voltage until the sampled voltage |

| | | |
|--|---|---|
| | channel and check whether the actual sampled voltage (P0B-21 or P0B-22) is greater than 11.5V | does not exceed 11.5V. |
| 2. AI channel wiring error or interference | ◆ Refer to the correct wiring diagram to check the AI channel wiring | Re-wiring with twisted-pair shielded wire to shorten the line length Increase the AI channel filter time constant: AI1 filter time constant: P03-51 AI2 filter time constant: P03-56 |

36) FU.835: High-precision AD sampling failure

Production mechanism:

- High-precision AD circuit is interfered

| Reason | Confirmation way | Settlement way |
|--|--|--|
| 1. High-precision AI channel wiring has interference | ◆ Refer to the correct wiring diagram to check the AI channel wiring | Re-wiring with twisted-pair shielded wire to shorten the line length |

37) FU.A33: Encoder data is abnormal

Production mechanism:

- The internal parameters of the encoder are abnormal.

| Reason | Confirmation way | Settlement way |
|--|---|---|
| 1. The cable of the bus-type incremental encoder is broken or loose | ◆ Check cable wire | Check whether the encoder cable is incorrectly connected, or if the wire is broken or the contact is poor. If the motor cable and the encoder cable are bundled together, please separate the wiring. |
| 2. The parameter reading and writing of the bus type incremental encoder is abnormal | ◆ If the fault is still reported after turning on the power several times, the encoder has a fault. | Replace the motor |

38) FU.B00: Position deviation is too large

Production mechanism:

- In position control mode, the position deviation is greater than the set value of P0A-10.

| Reason | Confirmation way | Settlement way |
|---|--|--|
| 1. Drive U V W output phase loss or phase sequence is connected wrong | ◆ Carry out a test run of the motor under no load and check the wiring. | Re-wire according to correct wiring or replace the cable. |
| 2. Drive U V W output disconnection or encoder disconnection | ◆ Check cable wire | Re-wiring, the servo motor power cable and the drive power cable UVW must correspond one-to-one. If necessary, replace with a new cable and ensure its reliable connection. |
| 3. The motor is blocked due to mechanical factors | ◆ Displayed by the drive debugging platform or panel, confirm the running command and motor speed (P0B-00); Running command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (speed command) Running command in torque mode: P0B-02 (internal torque command) Check whether the running command is not 0 and the motor speed is 0 in the corresponding mode. | Troubleshoot mechanical factors. |

| | | |
|--|---|--|
| 4. Servo drive gain is low | <ul style="list-style-type: none"> ◆ Check the position loop gain and speed loop gain of the servo drive: The first gain: P08-00~P08-02 Second gain: P08-03~P08-05 | Perform manual gain adjustment or automatic gain adjustment. |
| 5. High input pulse frequency | <ul style="list-style-type: none"> ◆ When the position command source is pulse command, whether the input pulse frequency is too high. ◆ The acceleration/deceleration time is 0 or too small. | Reduce the position command frequency or reduce the electronic gear ratio. When using the host computer to output position pulses, a certain acceleration time can be set in the host computer; If the host computer cannot set the acceleration and deceleration time, increase the position command smoothing parameters P05-04 and P05-06. |
| 6. Relative to the operating conditions, the fault value (POA-10) is too small | <ul style="list-style-type: none"> ◆ Confirm whether the position deviation fault value (POA-10) is set too small. | Increase the set value of P0A-10. |
| 7. Servo drive /servo motor error | <ul style="list-style-type: none"> ◆ Monitor the running waveform through the oscilloscope function of the drive debugging platform: Position command, position feedback, speed command, torque command. | If the position command is not zero and the position feedback is always zero, please replace the servo driver/motor. |

39) FU.B01: Pulse input abnormal

Production mechanism:

- The input pulse frequency is greater than the maximum position pulse frequency (P0A-09).

| Reason | Confirmation way | Settlement way |
|--|--|---|
| 1. The input pulse frequency is greater than the set maximum position pulse frequency (P0A-09) | <ul style="list-style-type: none"> ◆ Check whether P0A-09 (maximum position pulse frequency) is less than the maximum input pulse frequency required when the machine is running normally. | Reset P0A-09 according to the maximum position pulse frequency required during normal operation of the machine. If the output pulse frequency of the upper computer is greater than 4MHz, the output pulse frequency of the upper computer must be reduced. |
| 2. Input pulse interference | <ul style="list-style-type: none"> ◆ First, use the oscilloscope function of the drive debugging platform software to check whether there is a sudden increase in the position command, or check whether the servo drive input position command counter (POB-13) is greater than the number of pulses output by the host computer. ◆ Then, check the grounding of the circuit. | First of all, the pulse input cable must use twisted-pair shielded cable and be routed separately from the drive power cable. Secondly, use the low-speed pulse input port (P05-01=0), when the differential input is selected, the “ground” of the host computer must be reliably connected to the “GND” of the driver; When selecting open-collector input, the “ground” of the host computer must be reliably connected to the “COM” of the driver; Use high-speed pulse input port (P05-01=1), only differential input can be used, and the “ground” of the host computer must be reliably connected to the “GND” of the driver. Finally, according to the selected hardware input terminal, increase the pin filter time P0A-24 or P0A-30 of the pulse input terminal. |

40) FU.B02: Full closed loop position deviation is too large

Production mechanism:

- The absolute value of the full closed loop position deviation exceeds P0F-08 (full closed loop position deviation too large threshold).

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|--|--|---|
| 1. Drive U V W output phase loss or phase sequence is connected wrong | ◆ Carry out a test run of the motor under no load and check the wiring. | Re-wire according to correct wiring or replace the cable. |
| 2. Drive U V W output disconnection or internal/external encoder disconnection | ◆ Check cable wire | Re-wiring, the servo motor power cable and the drive power cable UVW must correspond one-to-one. If necessary, replace with a new cable and ensure its reliable connection. |
| 3. The motor is blocked due to mechanical factors | ◆ Displayed by the drive debugging platform or panel, confirm the running command and motor speed (P0B-00): Running command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) Running command in torque mode: P0B-02 (Internal torque command) Check whether the running command is not 0 and the motor speed is 0 in the corresponding mode. | Troubleshoot mechanical factors. |
| 4. Servo drive gain is low | ◆ Check the position loop gain and speed loop gain of the servo drive: The first gain: P08-00~P08-02 Second gain: P08-03~P08-05 | Perform manual gain adjustment or automatic gain adjustment |
| 5. High input pulse frequency | ◆ When the position command source is pulse command, whether the input pulse frequency is too high. ◆ The acceleration/deceleration time is 0 or too small. | Reduce the position command frequency or reduce the electronic gear ratio. When using the host computer to output position pulses, a certain acceleration time can be set in the host computer; If the host computer cannot set the acceleration and deceleration time, increase the position command smoothing parameters P05-04 and P05-06. |
| 6. Relative to operating conditions, the fault value (P0F-08) is too small | Confirm the fault threshold of the full closed loop position deviation is too large (P0F-08) Is the setting too small | Increase P0F-08 setting value |
| 7. Servo drive / Motor failure | ◆ Monitor the running waveform through the oscilloscope function of the drive debugging platform: Position command, position feedback, speed command, torque command. | If the position command is not zero and the position feedback is always zero, please replace the servo drive/motor. |

41) FU.B03: Electronic gear setting over run

Production mechanism:

- Any group of electronic gear ratio exceeds the limit value:
($0.001 \times \text{encoder resolution}/10000, 4000 \times \text{encoder resolution}/10000$).

| Reason | Confirmation way | Settlement way |
|---|--|--|
| The electronic gear ratio setting value exceeds the above range | ◆ If P05-02=0, determine the ratio of parameters P05-07/P05-09 and P05-11/P05-13 ◆ If P05-02>0, confirm: encoder resolution / ratio of P05-02, P05-07/P05-09, P05-11/P05-13 | Encoder resolution /P05-02, P05-07/P05-09, P05-11/P05-13 The ratio is set within the above range. |

| | | |
|--------------------------------|---|--|
| Parameter change order problem | <ul style="list-style-type: none"> ◆ Change related parameters of electronic gear ratio: For P05-02, P05-07/P05-09, P05-11/P05-13, the electronic gear ratio exceeds the limit due to the unreasonable change sequence during the transition process of calculating the electronic gear ratio. | Use the fault reset function or re-power on. |
|--------------------------------|---|--|

42) FU.B04: Full closed loop function parameter setting error

Production mechanism:

- When the full closed loop function is used and the position command source is an internal position command, the internal and external loop switching function is used.

| Reason | Confirmation way | Settlement way |
|---|--|---|
| In the fully closed loop position mode, the position command source is the internal position command, but the internal and external loop switching mode is used | <ul style="list-style-type: none"> ◆ Check if P0F-00 is 2; ◆ Confirm whether the source of position command is internal position command: multi-segment position command, interrupt fixed length function. | When the full-closed loop function is used and the position command source is an internal position command, only the external encoder feedback mode can be used, that is, P0F-00 can only be 1. |

43) FU.D03: CAN Communication connection is interrupted

Production mechanism:

- CAN Communication timed out.

| Reason | Confirmation way | Settlement way |
|---|--|--|
| CAN Communication connection interrupted: slave station dropped | <ul style="list-style-type: none"> ◆ Check the status of the main station PLC CAN communication card light: The ERR light of the master PLC flashes at a frequency of 1 Hz, and some of the ERR lights of the slave PLCs are on (when using the PLC background software, you can monitor D78xx in the component monitoring table of the master. xx represents the station number, decimal, part The corresponding D78xx of the configured station is 5, which means that the slave station is faulty) | Check the connection of the communication cable between the slave station with the ERR light on and the master station; Check the communication baud rate P0C-08 of the slave station with the ERR light on and adjust it to be consistent with the master station. |
| CAN Communication connection is interrupted: the master station drops | <ul style="list-style-type: none"> ◆ Check the status of the main station PLC CAN communication card light: The ERR lights of all slave PLCs are always on (when using the PLC background software, D78xx can be monitored in the component monitoring table of the master station, xx represents the station number, in decimal, all D78xx corresponding to all configured stations are all 5 indicating that the master station has occurred malfunction). | Check the cable connection of the master station. |

7.2.3 How to deal with warnings

1) FU.110: Frequency division pulse output setting failure

Production mechanism:

- When using the encoder frequency division output function (P05-38=0), the set encoder frequency division pulse number does not meet the threshold determined by the encoder specification

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|---|--|--|
| Encoder frequency division pulse number does not meet the range | <ul style="list-style-type: none"> ◆ Incremental code disc: the frequency division pulse number of the encoder cannot exceed the resolution of the encoder; 17bit bus type incremental encoder, resolution 1048576 (P/r); 2500 line incremental encoder, resolution 10000 (P/r); ◆ Absolute code disc: The number of pulses of the encoder frequency division cannot exceed 1/4 of the encoder resolution. | Reset the encoder frequency division pulse number (P05-17) so that it meets the specified range. |
|---|--|--|

2) FU.601: Back to origin timeout failure

Production mechanism:

- When using the origin return function (P05-30=1~5), the origin is not found within the time set by P05-35.

| Reason | Confirmation way | Settlement way |
|---|--|--|
| 1. Origin switch failure | <ul style="list-style-type: none"> ◆ When returning to origin, it is always searching at high speed without low speed searching process. ◆ After the origin return high-speed search, it has been in the reverse low-speed search process. | If you are using hardware DI, confirm that the DI function 31 has been set in group P03, and then check the DI terminal wiring. When the DI terminal logic is changed manually, monitor whether the driver receives the corresponding DI level change through P0B-03. If not, It means that the DI switch wiring is wrong; if it is, it means there is an error in the home return operation. Please refer to section 6.2.8 to operate this function correctly. If you are using virtual DI, refer to 10.4 to check whether the VDI use process is correct. |
| 2. Limit the time to find the origin is too short | <ul style="list-style-type: none"> ◆ Check whether the time set in P05-35 is too short | Increase P05-35 |
| 3. The speed of the high-speed search origin switch signal is too low | <ul style="list-style-type: none"> ◆ Check the distance between the home position and the origin switch to determine whether the speed value set by P05-32 is too small, resulting in too long time to find the origin switch | Increase P05-32 |

3) FU.730: Encoder battery warning

Production mechanism:

- The encoder battery voltage of the multi-turn absolute encoder is too low or the battery is not connected.

| Reason | Confirmation way | Settlement way |
|---|--|---|
| During power failure, the battery was not connected | <ul style="list-style-type: none"> ◆ Confirm whether it is connected during power failure | Replace with a new battery that matches the voltage |
| Encoder battery voltage is too low | <ul style="list-style-type: none"> ◆ Measure battery voltage | |

Notes: ■ This fault only occurs when the multi-turn absolute position function is enabled (P0201=1 or 2).

4) FU.831: AI Zero drift is too large

Production mechanism:

- AI(includes AI1 and AI2) when the terminal input voltage is 0V, the voltage sampled by the driver is greater than 500mV.

| Reason | Confirmation way | Settlement way |
|--------|------------------|----------------|
|--------|------------------|----------------|

| | | |
|---------------------------------|---|--|
| 1. Wiring error or interference | ◆ Check the wiring with reference to the correct wiring diagram. | Use twisted-pair shielded wire to re-wire to shorten the line length. Increase the AI channel filter time constant: AI1 filter time constant: P03-51 AI2 filter time constant: P03-56 |
| 2. Servo drive error | ◆ Remove the external wiring of the AI terminal (input is 0), and check whether the AI sampling value of group P0B exceeds 500mV. | If it exceeds, replace the drive. |

5) FU.900: DI Urgent brake

Production mechanism:

- DI function 34(FunIN.34: brake, Emergency) The corresponding DI terminal logic is valid (including hardware DI and virtual DI).

| Reason | Confirmation way | Settlement way |
|-------------------------------------|--|---|
| DI function 34: brake, is triggered | ◆ Check DI function 34: Emergency Stop brake, and whether its corresponding DI terminal logic is set to valid. | Check the operating mode, and on the premise of confirming safety, release the DI brake valid signal. |

6) FU.909: Motor overload warning

Production mechanism:

- 60Z series 200W and 400W motor, the accumulated heat of the motor is too high and reaches the warning value.

| Reason | Confirmation way | Settlement way |
|--|--|--|
| 1. Wrong or bad motor wiring and encoder wiring | ◆ Compare the correct wiring diagram and check the wiring between the motor, driver, and encoder. | Connect the cables according to the correct wiring diagram; Preferentially use our standard cables; When using self-made cables, please make and connect them according to the hardware wiring instructions. |
| 2. The load is too heavy, the effective torque of the motor output exceeds the rated torque, and it continues to run for a long time | ◆ Confirm the overload characteristics of the motor or drive; ◆ Check whether the drive average load rate (P0B-12) is greater than 100.0% for a long time. | Replace the large-capacity drive and matching motor; Or reduce the load and increase the acceleration and deceleration time. |
| 3. Acceleration and deceleration are too frequent or the load inertia is too large | ◆ Check the mechanical inertia ratio or perform inertia identification, and check the inertia ratio P08-15. ◆ Confirm the single operation cycle of the servo motor in cyclic operation. | Increase the acceleration and deceleration time. |
| 4. Improper gain adjustment or excessive rigidity | ◆ Observe whether the motor vibrates or the sound is abnormal during operation. | Re-adjust the gain. |
| 5. Wrong drive or motor model setting | ◆ For this series of products: Check the bus motor model P00-05 and the drive model P01-02. | Check the drive nameplate, set the correct drive model (P01-02) and update the motor model to a matching model. |
| 6. The motor is blocked due to mechanical factors, resulting in excessive load during operation | ◆ Use the drive debugging platform or panel to view the running command and motor speed (P0B-00): Running command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) Running command in torque mode: P0B-02 (Internal torque command) Check whether the running command is | Exclude mechanical factors. |

| | | |
|------------------------|--|---|
| | not 0 or very large in the corresponding mode, and the motor speed is 0. | |
| 7. Servo drive failure | ◆ After power off, power on again. | Please replace the servo drive if the fault is reported after power-on again. |

7) FU.920 :Braking resistor overload alarm

Production mechanism:

- The cumulative heat of the braking resistor is greater than the set value

| Reason | Confirmation way | Settlement way |
|---|---|--|
| 1. The connection of the external brake resistor is bad, dropped or broken | <ul style="list-style-type: none"> ◆ Remove the external braking resistor, and directly measure whether the resistance value is "∞" (infinity); ◆ Measure whether the resistance between B1/⊕ and B2 is "∞" (infinity). | <p>Replace with a new external braking resistor. After the measured resistance value is consistent with the nominal value, connect it between B1/⊕ and B2.</p> <p>Choose a good cable and connect both ends of the external braking resistor between B1/⊕ and B2.</p> |
| 2. When using the built-in braking resistor, the cable between the power terminals B2 and B3 is short or disconnected | <ul style="list-style-type: none"> ◆ Measure whether the resistance between B2 and B3 is "∞" (infinity). | Connect B2 and B3 directly with a good cable. |
| 3. When using an external braking resistor, the selection of P02-25 (brake resistor setting) is wrong | <ul style="list-style-type: none"> ◆ View the parameter value of P02-25; ◆ Measure the resistance value of the external resistor between B1/⊕ and B2 actually selected, and compare it with the brake resistor specification table to see if it is too large; | <p>Setting correct P02-25: P02-25=1 (use external resistor, natural cooling) P02-25=2 (Use external resistor, forced air cooling)</p> <p>Refer to the braking resistor specification table and select the resistor with the proper resistance value correctly.</p> |
| 4. When using an external braking resistor, the actually selected external braking resistor resistance is too large | <ul style="list-style-type: none"> ◆ Check whether the parameter value of P02-27 is greater than the resistance value of the external resistance between B1/⊕ and B2 actually selected. | |
| 5.P02-27 (resistance value of external braking resistor) is greater than the actual resistance value of external braking resistor | <ul style="list-style-type: none"> ◆ Measure whether the input voltage of the main circuit cable driver side meets the following specifications: 220V drive: Effective value: 220V~240V Allowable deviation: -10% ~ +10% (198V~264V) 380V driver: Effective value: 380V~440 Allowable deviation: -10%~+10% (342V~484V) | Set P02-27 to be consistent with the actual selection of external resistance. |
| 6. The input voltage of the main circuit exceeds the specification range | <ul style="list-style-type: none"> ◆ Measure whether the input voltage of the main circuit cable driver side meets the following specifications: 220V drive: Effective value: 220V~240V Allowable deviation: -10% ~ +10% (198V~264V) 380V driver: Effective value: 380V~440 Allowable deviation: -10%~+10% (342V~484V) | Adjust or replace the power supply according to the specifications on the left. |
| 7. The load moment of inertia ratio is too large | <ul style="list-style-type: none"> ◆ Identify the moment of inertia; or manually calculate the total moment of inertia according to the mechanical parameters; ◆ Whether the actual load inertia ratio exceeds 30. | <p>Select a large-capacity external braking resistor, and set P02-26 to be consistent with the actual value; Use large-capacity servo driver; If allowed, reduce the load; If allowed, increase the acceleration and</p> |

| | | |
|---|--|---|
| 8. The motor speed is too high, the deceleration process is not completed within the set deceleration time, and it is in continuous deceleration state during periodic movement | ◆ View the speed curve of the motor during periodic movement, and check whether the motor is decelerating for a long time. | deceleration time; If allowed, increase the motor running cycle. |
| 9. The capacity of the servo drive or the capacity of the braking resistor is insufficient | ◆ Check the single cycle speed curve of the motor and calculate whether the maximum braking energy can be completely absorbed. | |
| 10. Servo drive failure | - | Replace the drive. |

8) FU.922: External braking resistor is too small

Production mechanism:

- P02-27(External braking resistor)< P02-21(The drive allows the minimum value of external braking resistor)

| Reason | Confirmation way | Settlement way |
|--|--|--|
| When using an external braking resistor (P02-25=1 or 2), the resistance of the external braking resistor is less than the minimum value allowed by the drive | ◆ Measure the resistance of the external braking resistor between B1/⊕ and B2 to confirm whether it is less than P02-21. | If it is, replace it with an external braking resistor that matches the driver. After setting P02-27 to the selected resistor value, connect both ends of the resistor between B1/⊕ and B2; If not, set P02-27 to the actual resistance value of the external braking resistor. |

9) FU.939: Motor power line is broken

Production mechanism:

- The actual phase current of the motor is less than 10% of the rated current, and the actual speed is low, but the internal torque command is large.

| Reason | Confirmation way | Settlement way |
|----------------------------|---|--|
| Motor power line is broken | ◆ Check whether the phase current effective value (P0B-24) and the internal torque command (P0B-02) are more than 5 times different, and the actual motor speed (P0B-00) is less than 1/4 of the motor rated speed. | Check the wiring of the motor power cable, reconnect it, and replace the cable if necessary. |

10) FU.941: Change parameters need to be re-powered to take effect

Production mechanism:

- When the "effective time" of the function code attribute of the servo drive is "power on again", after the parameter value of the function code is changed, the drive reminds the user to power on again.

| Reason | Confirmation way | Settlement way |
|--|---|-----------------|
| Change the function code that will take effect after powering on again | ◆ Confirm whether the function code whose "effective time" is "re-power on" is changed. | Power on again. |

11) FU.942: Frequent parameter storage

Production mechanism:

- The number of function codes modified at the same time exceeds 200

| Reason | Confirmation way | Settlement way |
|---|---|--|
| Very frequently and a large number of function code parameters are modified and stored in EEPROM (P0C-13=1) | Check whether the host computer system frequently and quickly modify the function code. | Check the operating mode. For parameters that do not need to be stored in the EEPROM, set P0C-13 to 0 before the host computer writes. |

12) FU.950: Forward overtravel warning

Production mechanism:

- DI function 14(FunIN.14: P-OT, Forward overtravel switch) The corresponding DI terminal logic is valid.

| Reason | Confirmation way | Settlement way |
|---|--|---|
| DI function 14: Prohibit forward drive, terminal logic is valid | <ul style="list-style-type: none"> ◆ Check whether the DI terminal of group P03 is set to DI function 14; ◆ Check whether the DI terminal logic of the corresponding bit of the input signal monitoring (P0B-03) is valid. | Check the operating mode, and on the premise of ensuring safety, give a negative command or rotate the motor to make the "positive overtravel switch" terminal logic invalid. |

13) FU.952: Reverse overtravel warning

Production mechanism:

- DI function 15(FunIN.15: N-OT, Reverse overtravel switch) the corresponding DI terminal logic is valid.

| Reason | Confirmation way | Settlement way |
|--|---|--|
| DI function 15 : Reverse drive is prohibited, and the terminal logic is valid. | <ul style="list-style-type: none"> ◆ Check whether DI function 15 is set for the DI terminal of group P03; ◆ Check whether the DI terminal logic of the corresponding bit of the input signal monitoring (P0B-03) is valid. | Check the operating mode, and if it is safe, give a negative command or rotate the motor to make the "reverse overtravel switch" terminal logic invalid. |

14) FU.980: Encoder internal fault

Production mechanism:

- The encoder algorithm is incorrect.

| Reason | Confirmation way | Settlement way |
|------------------------|---|--------------------|
| Encoder internal fault | <ul style="list-style-type: none"> ◆ When the fault is reported after turning on the power several times, the encoder has a fault. | Replace the drive. |

15) FU.990: Input phase loss warning

Production mechanism:

- The drives below 1kW are allowed to operate in single phase, but the power input phase loss fault and warning (P0A-00) are enabled.

| Reason | Confirmation way | Settlement way |
|---|--|--|
| P0A-00=1 (Power input phase loss protection selection: enable fault and warning), for a 0.75kW three-phase drive (drive model P01-02=5), it is allowed to run under single-phase power, and a warning will be reported when single-phase power is connected. | <ul style="list-style-type: none"> ◆ Confirm whether it is a three-phase drive that allows single-phase operation | If it is actually a three-phase drive, and the main circuit power line is connected to a three-phase power supply, it still reports a warning, then proceed as FU.420; If it is actually a three-phase specification drive and single-phase operation is allowed, and the main circuit power line is connected to a single-phase power supply, a warning is still reported, set P0A-00 to 0. |

16) FU.994: CAN Address conflict

| Reason | Confirmation way | Settlement way |
|--------------------------|---|--|
| CANlink Address conflict | ◆ Confirm whether there is duplicate allocation among slave stations POC-00 | Assign each slave address to ensure that POC-00 is not repeated. |

7.2.4 Inner fault

Please contact our technicians when the following failures occur.

FU.602: Angle recognition failed;

FU.220: phase sequence error;

FU.A40: Parameter identification failed;

FU.111: Servo internal parameters are abnormal

Chapter 8 Motor and drive model comparison table

P00-00 corresponding motor code setting definition:

1. Absolute encoder: 14130

2.The naming rule of incremental line-saving encoder:

220V Grade provincial line motor code and definition:

| P00-00 Setting value | Rated power (kW) | Rated torque (Nm) | Rated rotate (rpm) | Motor frame number | Servo drive model | Servo drive model (P01-02) |
|----------------------------|------------------------|-------------------------|--------------------------|--------------------------|-------------------------|----------------------------------|
| | | | | | LCDA630PS***I AC220V | |
| 24044 | 0.4 | 1.3 | 3000 | 60 | 2R8 | 00003 |
| 24074 | 0.75 | 2.4 | 3000 | 80 | 5R5 | 00005 |
| 24102 | 1.0 | 4.78 | 2000 | 130 | 7R6 | 00006 |
| 24103 | 1.0 | 3.8 | 2500 | 130 | 7R6 | 00006 |
| 24104 | 1.0 | 3.3 | 3000 | 130 | 7R6 | 00006 |
| 24124 | 1.2 | 4.0 | 3000 | 130 | 012 | 00007 |
| 24151 | 1.5 | 9.55 | 1500 | 130 | 012 | 00007 |
| 24154 | 1.5 | 4.78 | 3000 | 130 | 012 | 00007 |
| 24202 | 2.0 | 9.55 | 2000 | 130 | 018 | 00008 |
| 24231 | 2.3 | 15.0 | 1500 | 130 | 018 | 00008 |
| 24301 | 3.0 | 19.6 | 1500 | 180 | 018 | 00008 |

1) Code and definition of 380V provincial line motor:

| P00-00 Setting value | Rated power (kW) | Rated torque (Nm) | Rated rotate (rpm) | Motor frame number | Servo drive model | Servo drive model (P01-02) |
|----------------------------|------------------------|-------------------------|--------------------------|--------------------------|-------------------------|----------------------------------|
| | | | | | LCDA630PT***I AC380V | |

| | | | | | | |
|-------|-----|------|------|-----|-----|-------|
| 34101 | 1.0 | 6.4 | 1500 | 130 | 8R4 | 10003 |
| 34104 | 1.0 | 3.2 | 3000 | 130 | 8R4 | 10003 |
| 34150 | 1.5 | 14.3 | 1000 | 130 | 8R4 | 10003 |
| 34151 | 1.5 | 9.55 | 1500 | 130 | 8R4 | 10003 |
| 34152 | 1.5 | 7.0 | 2000 | 130 | 8R4 | 10003 |
| 34154 | 1.5 | 4.78 | 3000 | 130 | 8R4 | 10003 |
| 34300 | 3.0 | 28.5 | 1000 | 130 | 012 | 10004 |
| 34301 | 3.0 | 19.0 | 1500 | 180 | 012 | 10004 |
| 34302 | 3.0 | 14.3 | 2000 | 130 | 012 | 10004 |
| 34304 | 3.0 | 9.55 | 3000 | 130 | 012 | 10004 |
| 34401 | 4.0 | 25.5 | 1500 | 180 | 017 | 10005 |
| 34451 | 4.5 | 28.5 | 1500 | 180 | 017 | 10005 |
| 34551 | 5.5 | 35.0 | 1500 | 180 | 021 | 10006 |
| 34751 | 7.5 | 48.0 | 1500 | 180 | 026 | 10007 |
| 34116 | 11 | 70.0 | 1500 | 200 | 026 | 10007 |
| 34117 | 11 | 52.5 | 2000 | 200 | 026 | 10007 |

Note: If the FU.120 product matching failure is reported, it means that there is no such motor parameter, and you need to contact the manufacturer for configuration.

Quality Assurance and Product Warranty Regulation

1. This regulation is a protocol between the manufacturer who produces the product (here in after referred to as manufacturer) and the user who uses the product (here in after referred to as user). Any user whoever purchases and uses the product provided by the manufacturer is regarded as knowing and agreeing with the protocol.

About Product Quality and Warranty

1.1 The manufacturer provides complete and available product.

1.2 The manufacturer is not responsible for the problems and losses due to the following reasons:

- 1) All operations not according to the specification and incorrect operation and

installation; problems and losses caused by self-maintenance which is not permitted by the manufacturer.

- 2) Expired for the warranty period locked in this regulation.
- 3) Problems and losses due to artificial or natural irresistible reasons after the purchase.
- 4) Problems and losses due to the installation and the use of the product not under product required environment by the user.

2. Contents of Warranty on Product Made by Manufacturer

2.1 For domestic use:

- 1) Change, repair and return are guaranteed within 1 week since the delivery.
- 2) Change and repair are guaranteed within 1 month since the delivery.
- 3) Repair is guaranteed within 12 months since the delivery.
- 4) For those expired for the warranty period or warranty scope, we have to charge the cost.

2.2 For products exported over seas, repair is guaranteed within 3 months since the delivery.

2.3 The user can enjoy life time paid services when ever and wherever using products of our brand.

2.4 All sales organizations, productive facilities and agencies of our company across the country can provide after-sale services for our product.

2.5 For products out of order, our company has the right to authorize others to be responsible for affairs of warranty, etc.

3. Rights Reserved by Manufacturer and Immunity Affairs

3.1 The manufacturer is not liable for compensation for all direct and

indirect problems and losses caused by the installation and the use of the user of our product.

3.2 All rights for the product are reserved by the manufacturer. The product may be changed without further notification. Please make the object as the standard.

3.3 The manufacturer has the final power of interpretation on the product.

3.4 The regulations are available to other products of the manufacturer.

3.5 The terms above will be executed since January 10th, 2024

Shenzhen Xinlichuan Electric Co., LTD

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