LCDA630P series

Servo Drive Design & Maintenance Manual

Foreword

First of all, thank you for purchasing LCDA630P series servo drives!

LCDA630P series servo drives products are high-performance AC servo drives with small and medium power developed by technology. The power range of this series of products is 100W~37kW. It supports MODBUS and CANopen communication protocols. It uses corresponding communication interfaces and cooperates with the host computer to realize networking running of multiple servo drives. The rigidity meter setting, inertia identification and vibration suppression functions are provided to make the servo drives simple and easy to use. Cooperate with high-response servo motor including small inertia and medium inertia (the motor is equipped with 17-bit encoder or multiplexed line /non-multiplexed line 2500) to ensure quiet and stable running and more accurate positioning control. It is applicable to automatic equipment such as semiconductor manufacturing equipment, chip mounter, printed circuit board puncher, handling machinery, food processing machinery, machine tool, transmission machinery, etc., to realize fast and accurate position control, speed control and torque control.

This manual is a comprehensive user manual for LCDA630P servo drives, providing product safety information, mechanical and electrical installation instructions, commissioning application and maintenance instructions. For the first time users, please read this manual carefully. If you have doubts about some functions and performance, please consult our technical support personnel for help.

As we are committed to the continuous improvement of servo drives, the information provided by our company is subject to change without notice.

The following is the list of servo drives functions. For details of each function, please refer to the specific description in each chapter.

Functions	Content
Position control mode	The servo drive works in position control mode.
Speed control mode	The servo drive works in speed control mode.
Torque control mode	The servo drive works in torque control mode.
Position/speed control switching mode	The position control and speed control modes can be switched through external input signals.
Speed/torque control switching mode	The speed control and torque control modes can be switched through external input signals.
Torque/position control switching mode	The torque control and position control modes can be switched through external input signals.
Torque/speed/position switching mode	The torque control, speed control and position mode can be switched through external input signals.
High resolution encoder	High-performance encoder with resolution of 1048576P/r is used.
Mechanical characteristic analysis function	When using a personal computer equipped with a drive debugging platform, the resonance frequency and characteristics of the mechanical system can be analyzed.
Automatic gain adjustment	Only one parameter needs to be set, that is, a set of gain parameters suitable for the current working condition will be automatically matched.
Gain switching function	Different gain can be used when the servo motor is running and shut down,

	or the gain can be switched during running through external terminals.
Torque disturbance observation function	The disturbance torque of the system is automatically estimated and compensated to reduce the vibration.
Resonance suppression	It refers to that after the servo drive detects the resonance point of the machine, it automatically sets the filter characteristics to suppress the vibration of the mechanical system.
Torque command filtering	Suppress the mechanical resonance that may occur when the response speed of the servo drive is too high.
Electronic gear	Input pulse can be reduced or amplified by 0.001 × Encoder resolution~4000 × Encoder resolution.
Position ramp function	It can realize smooth acceleration in response to position command.
Position first-order low-pass filtering function	It can achieve smooth acceleration and deceleration.
Home return function	The drive automatically searches for the mechanical Home and locates the relative position between the mechanical home and the mechanical home.
Fixed length running function	The drive interrupts the current position command and performs the set displacement.
Zero fixed function	In the speed mode, keep the position locked when the speed value of the motor is lower than a certain value.
Torque limit	Limit the output torque of the servo motor.
Speed limit	Limit the speed of the servo motor.
Command pulse selection	Four pulse string input types can be selected.
External braking resistor	It is used when the braking capacity of the built-in braking resistor of the servo drive is insufficient.
Input signal selection	Input functions such as servo ON can be defined to corresponding pins
Alarm record	The last 10 alarms can be recorded and the alarm history can be cleared.
Status display	The status of the servo drive can be displayed on the 5-bit 7-segment LED.
External I/O display	Displays the ON/OFF status of the external I/O signal.
Output signal forced output	Realize the forced output of signals independent of the status of servo drive, which can be used to detect the wiring of output signals.
Commissioning mode	The servo motor can be operated directly through the servo drive panel without input of start signal.
Analog output	Output servo status through analog voltage.
Drive debugging platform	With personal computer, you can set parameters, test run, display status and other runnings.
Alarm code output	When an alarm occurs, an alarm code with a length of 3 bits is output.

Catalogue

Chapter I Safety Reminder

For the safety content of this manual, use the following signs. The contents of safety signs are very important and must be observed.

⚠ Danger.Serious injury or even death may occur due to the danger caused by fault to operate as required.

⚠ Caution. The danger caused by fault to operate as required may result in moderate or minor injury and equipment damage.

1.1 Safety precautions

This section describes the important matters that users must comply with, such as product confirmation, storage, handling, installation, wiring, running, inspection and disposal.

⚠Danger
◆ After the power supply is OFF for more than 5 minutes, confirm the voltage between B1/⊕ and 1 with a multimeter after the power indicator is off, and then disassemble the drive. Otherwise, electric shock may be caused by residual voltage. ◆ Please use TN/TT power grid for servo drive power supply, not IT power grid, otherwise electric shock may occur. ◆ Please never touch the inside of the servo drive, otherwise it may cause electric shock. ◆ Please insulate the connection part of the power terminal, otherwise it may cause electric shock. ◆ The grounding terminal of servo drive must be grounded (type D grounding), otherwise it may cause electric shock. ◆ Do not damage or pull the cable with force, and do not make the cable bear too much force, put it under the weight or clip it up. Otherwise, electric shock may occur, resulting in the product stopping or burning. ◆ Do not set, disassemble and repair unless you are a designated person, otherwise electric shock or injury may occur. ◆ Do not remove the cover, cable, connector and optional parts under power-on status, otherwise electric shock may occur. ◆ Please carry out the test run according to the steps required in this manual. ◆ In the state of servo motor and mechanical connection, if the running error occurs, it will not only cause mechanical damage, but also sometimes may cause personal accidents. ◆ Do not change the maximum speed value (P00-15) except for special purposes. If it is not changed carefully, it may damage the machinery or cause injury. ◆ During power-on and for a period of time after the power supply is cut off, the temperature of heat sink of the servo drive, external brake resistor, servo motor, etc. may be high, please do not touch, otherwise it may cause scald. In order to prevent the contact of hands or parts (such as cables, etc.) caused by negligence, please take safety measures such as installing the shell. ◆ When the servo motor is running, please never touch its rotating part, or you may be injured. ◆ When installing on the supporting machinery to start running, please put the servo motor in the state of

Emergency shutdown at any time in advance, otherwise it may be injured.

- ◆ Please set a stop device on the mechanical side to ensure safety.
- ◆ The band brake of servo motor with band brake is not a stop device to ensure safety. If the stop device is not set, it may cause injury.
- ◆ If the power supply is restored after an instant power fault during running, the machine may suddenly restart, so please do not approach the machine.
- ◆ Please take measures to ensure that personal safety will not be endangered during restarting, otherwise it may cause injury.
- ◆ Please never modify this product, otherwise it may cause injury or mechanical damage.
- ◆ Please install the servo drive, servo motor and external braking resistor on the non-combustible material, otherwise it may cause fire.
- ◆ Between the power supply and the main circuit power supply of the servo drive (single-phase L1, L2, three-phase L1, L2, L3), be sure to connect the electromagnetic contactor and the non-fuse circuit breaker. Otherwise, in case of servo drive fault, the large current cannot be cut off, thus causing fire.
- ◆ Do not mix flammable foreign matters such as oil and grease and conductive foreign matters such as screws and metal sheets in the servo drive and servo motor, otherwise it may cause fire.

1.2 Precautions when confirming the arrival of products

Confirm items	Notes
Does the delivered product match the product model you ordered?	The box contains the simple user manual for the LCDA630P servo drive of the machine you ordered. Please confirm through the nameplate model of servo motor servo drive.
Is there any damage to the product?	Please check the appearance of the whole machine and whether the product is damaged during transportation. If any omission or damage is found, please contact our company or your supplier immediately.
Is the servo motor rotating shaft running smoothly?	It is normal to be able to turn slightly by hand. Servo motor with brake is an exception.

1.3 Precautions during storage and handling

⚠Caution

- ◆ Do not store or place in the following environment, otherwise it will cause fire, electric shock or machine damage.

(In places with direct sunlight, places with ambient temperature exceeding safekeeping - placing temperature conditions, places with relative humidity exceeding safekeeping - placing humidity conditions, places with large temperature difference and condensation, places close to corrosive gas and combustible gas, places with lots of dust, dust, salt and metal dust, places with water, oil and drugs dripping, places where vibration or impact can be transmitted to the main body, please do not hold the cable or motor shaft to carry Otherwise, it may cause injury or fault.)

- Do not put this product together too much, otherwise it will cause injury or fault.

1.4 Precautions during installation

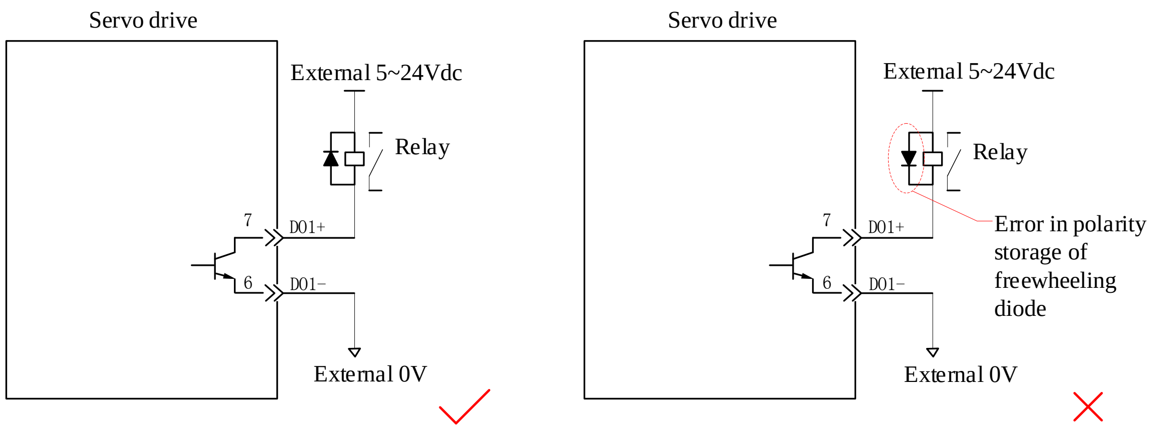
Caution

- Do not install this product in a place that will splash water or in an environment prone to corrosion.
- Do not use this product near flammable gases and combustibles, otherwise there is a risk of electric shock or fire.
- Do not sit on this product or place heavy objects on it, otherwise it may cause injury.
- Please install this product in the installation cabinet that can provide fire protection and electrical protection, otherwise it may cause fire.
- Do not block the suction port and exhaust port, and do not let foreign matter enter the product, otherwise it may cause fault and fire due to aging of internal components.
- Be sure to comply with the requirements of installation direction, otherwise it may cause fault.
- When setting, please ensure that the servo drive and the internal surface of the electric cabinet as well as other machines maintain the specified separation distance, otherwise it will cause fire or fault.
- Do not exert excessive impact, otherwise it may cause fault.

1.5 Precautions during wiring

Caution

- Do not connect the three-phase power supply on the output terminals U, V and W of the servo drive, otherwise it will cause injury or fire.
- Please connect the output U, V, W of the servo drive and the U, V, W of the servo motor directly. Do not use the electromagnetic contactor during the connection, otherwise it may cause abnormal running and fault.
- When the DO output is connected to the relay, please pay attention to the polarity of the freewheeling diode, otherwise the drive will be damaged and the signal cannot be output normally.



- Please firmly connect the power terminal and the motor terminal, otherwise it may cause fire.
- Please do not pass the power line and signal line through the same pipe or bundle them together. When wiring, the power line and signal line should be more than 30cm away.
- Signal cable and encoder cable should use twisted pair shielded cable, and the shielding layer should be grounded at both ends.

- The maximum wiring length of the command input line is 3m, and the maximum wiring length of the encoder is 20m.
- Even if the power supply is OFF, there may still be high voltage left inside the servo drive, so please do not touch the power terminal temporarily (within 5 minutes).
- Please check after confirming that the CHARGE indicator is off.
- Do not turn on/off the power supply frequently. When the ON/OFF power supply needs to be continuously switched on repeatedly, please control it below 1 time in 1 minute.
- When wiring the main circuit connector, please observe the following precautions:

① When wiring, please remove the connector from the servo drive.

② Only one wire can be inserted into one wire socket of the connector can. When inserting wires, do not short circuit the core wire with adjacent wires.

③ Do not connect the 220V servo drive directly to the 380V power supply, otherwise the servo drive will be damaged.

④ Please conduct the wiring correctly and reliably, otherwise the motor may be out of control, injured or faulty.

⑤ Please use the specified power supply voltage, otherwise the machine may be burnt out.

⑥ When using under the condition of poor power supply, please ensure that the input power supply is supplied within the specified voltage variation range, otherwise the machine may be damaged.

⑦ Please set safety devices such as circuit breakers to prevent short circuit of external wiring, otherwise it may cause fire.

- In the following places, please take adequate shielding measures, otherwise the machine may be damaged:

① When interference is caused by static electricity;

② Places producing strong electric field or strong magnetic field;

③ Places with possible radiation;

④ Places with power lines nearby.

1.6 Precautions during running

⚠Caution
◆ During the test run, in order to prevent accidents, please carry out no-load (not connected to the transmission shaft) test run for the servo motor, otherwise it may cause injury.

- ◆ When installing on the supporting machine and starting running, please preset the user parameters that are consistent with the machine. If the machine starts to operate without parameter setting, it may cause mechanical overspeed or fault.
- ◆ When resetting the home, the signals of the forward over-travel switch (P-OT) and the reverse over-travel switch (N-OT) are inactive.
- ◆ When using the servo motor on the vertical axis, please set the safety device to prevent the workpiece from falling under the alarm, overtravel and other conditions. In addition, please set the stop of servo locking when overtravel occurs, otherwise the workpiece may fall under the overtravel state.
- ◆ When online automatic tuning is not used, be sure to set the correct moment of inertia ratio, otherwise it may cause vibration.
- ◆ When the power is turned on or just cut off, the heat sink, external brake resistor, motor, etc. of the servo drive may be in a high temperature state. Please do not touch it, otherwise it may cause burns.
- ◆ Because extreme user parameter adjustment and setting change will cause the servo system action to become unstable, please do not set it, otherwise it may cause injury.
- ◆ When an alarm occurs, please reset the alarm and restart the running after removing the cause and ensuring safety, otherwise it may cause injury.
- ◆ Do not use the band brake of the band brake motor for normal braking, otherwise it may cause fault.

1.7 Precautions during maintenance and inspection

⚠Caution

- ◆ The power supply shall be switched on and off by professional operators.
- ◆ When testing the insulation resistance of the drive, please cut off all connections with the drive first, otherwise the drive will fail.
- ◆ Do not use gasoline, thinner, alcohol, acid and alkaline detergent to avoid discoloration or damage of the shell.
- ◆ When replacing the servo drive, please transfer the user parameters of the servo drive to be replaced to the new servo drive, and then restart the running, otherwise the machine may be damaged.
- ◆ Do not change the wiring when it is powered on, otherwise it may cause electric shock or injury.
- ◆ Do not disassemble the servo motor, otherwise it may cause electric shock or injury.

1.8 Inspection items and period

1.8.1 Normal service conditions

Environment condition refers to the annual average ambient temperature: 30 ℃, average load rate below 80%, and daily running time below 20 hours.

Daily inspection and regular inspection shall be carried out according to the following points:

Types	Inspection cycle	Inspection items

Daily inspection	Daily	Confirm ambient temperature, humidity, dust, foreign matter, etc
		Whether there is abnormal vibration and noise
		Whether the power supply voltage is normal
		Whether there is odor
		Whether the air vent is stuck with fiber thread
		The cleanliness of the front end and connector of the drive
		Whether there is foreign matter entering the load end
Regular inspection	1 year	Whether the fastening parts are loose
		Is there any sign of overheating
		Whether the terminal block is damaged
		Whether the fastening part of terminal block is loose

1.8.2 Inhibited matters

Do not carry out disassembly and repair work except for our company.

The electrical and electronic components inside the servo unit will have mechanical wear and aging. In order to prevent and maintain the servo drive and motor, please replace them according to the standards in the following table. When replacing, please contact our company or our agent. We will determine whether to replace parts after investigation.

Target	Types	Standard replacement cycle	Notes
Drive	Bus filter capacitance	About 5 years	The standard replacement cycle is for reference only. Even if the standard replacement cycle is not full, it needs to be replaced in case of abnormality.
	Cooling fan	2-3 years (10000 to 30000 hours)	
	Aluminum electrolytic capacitor of circuit board	About 5 years	
	Energized buffer relay	About 100000 times (service life varies according to service conditions)	
	Buffer resistor	About 20000 times (service life varies according to service conditions)	
Motor	Bearing	3-5 years (20000 to 30000 hours)	
	Oil seal	5000 hours	
	Encoder	3-5 years (20000 to 30000 hours)	
	Battery for absolute encoder	The service life varies according to the service conditions. Please refer to the operating instructions attached with the battery for the absolute encoder	

1.8.3 Precautions when scrapping

⚠Caution
◆ When the product needs to be disposed of as waste after normal use, please comply with the laws and

regulations of relevant departments for the recycling and reuse of electronic information products.

1.9 General precautions

⚠ Caution

- This product is a general industrial product, and is not intended for use of machines and systems related to human life.
- Please invite personnel with professional knowledge to conduct wiring, running, maintenance, inspection and other runnings.
- When selecting the tightening torque of the screw for the installation of this product, please consider the strength of the screw and the material of the mounting part, and select it correctly within the scope of non-relaxation and non-damage.
- If it is used for devices that may cause major accidents or losses due to the fault of this product, please provide safety devices.
- If it is used in special environment such as atomic energy control, aerospace equipment, transportation equipment, medical equipment, various safety devices, equipment requiring high cleanliness, please contact our company.
- Although this product has made every effort in quality management, due to unexpected external noise, static electricity, input power supply, wiring, parts and other factors, in case of fault, it may cause unexpected actions. Please give full consideration to the mechanical safety measures to ensure the safety within the range of possible actions in the use site.
- When the motor shaft is running without grounding, according to the actual machinery and installation environment, the motor bearing may have electric corrosion and the bearing noise may become loud. Please confirm and verify by yourself.
- According to the fault phenomenon of this product, about one cigarette may burn smoke. Please pay attention if it is used in the environment such as purification workshop.
- If it is applied to the environment with high concentration of sulfur or sulfurized gas, please note that the chip resistance may be broken or the contact may be poor due to sulfuration.
- If the input voltage is far beyond the rated range of the power supply of this product, smoke and fire may occur due to the damage of internal components. Please pay full attention to the input voltage.
- The matching with the structure, size, service life, characteristics, laws and regulations of the installation machine and parts, as well as the matching with the change of the installation machine specifications, is finally decided by the user.
- Please note that this product cannot be used beyond the product specification.
- The company is committed to continuous improvement of products and may change some parts.

Chapter II Product Information

1.10 Drive Introduction

1.10.1 Nameplate and model description

LCDA630 P S 5R5 I ★★

Logo	Serial Number
LCDA630	Servo drive

Logo	Product type
P	Pulse type

Logo	Product type
S	220V
T	380V

Logo	1R6	2R8	3R5	5R4	5R5	7R6
Rated output current	1.6A	2.8A	3.5A	5.4A	5.5A	7.6A
	8R4	012	015	017	018	021
	8.4A	12A	15A	17A	18A	21A
	025	026	032	037	045	060
	25A	26A	32A	37A	45A	60A
	075					
	75A					

Logo	Installation method
I	Base plate installation (standard)

Logo	Non standard specifications
Vacancy	Standard machine

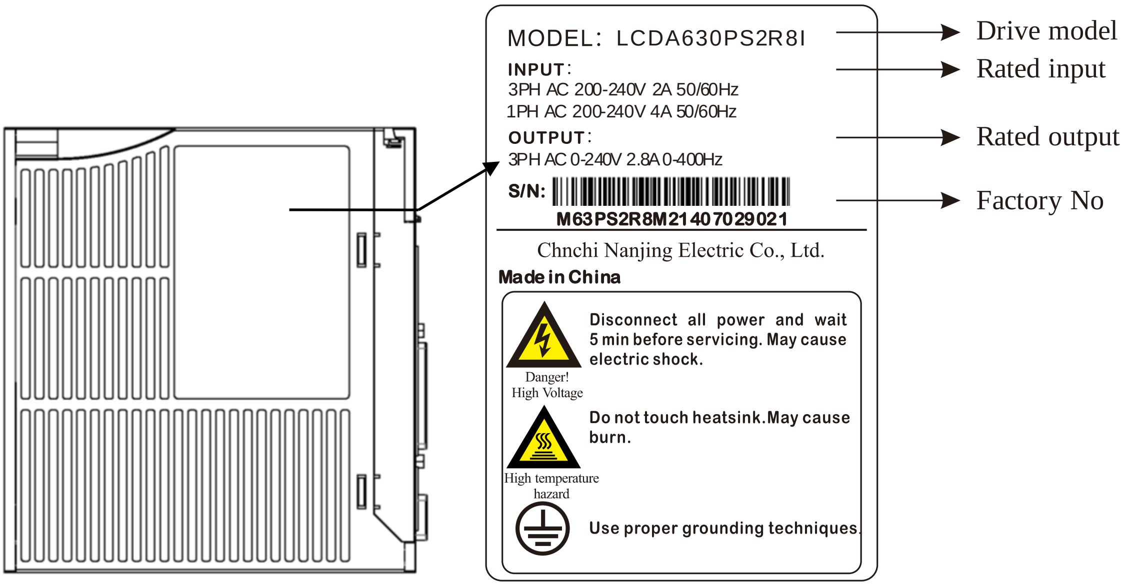


Figure 2-1 Drive naming and rules

1.10.2 Servo drive composition

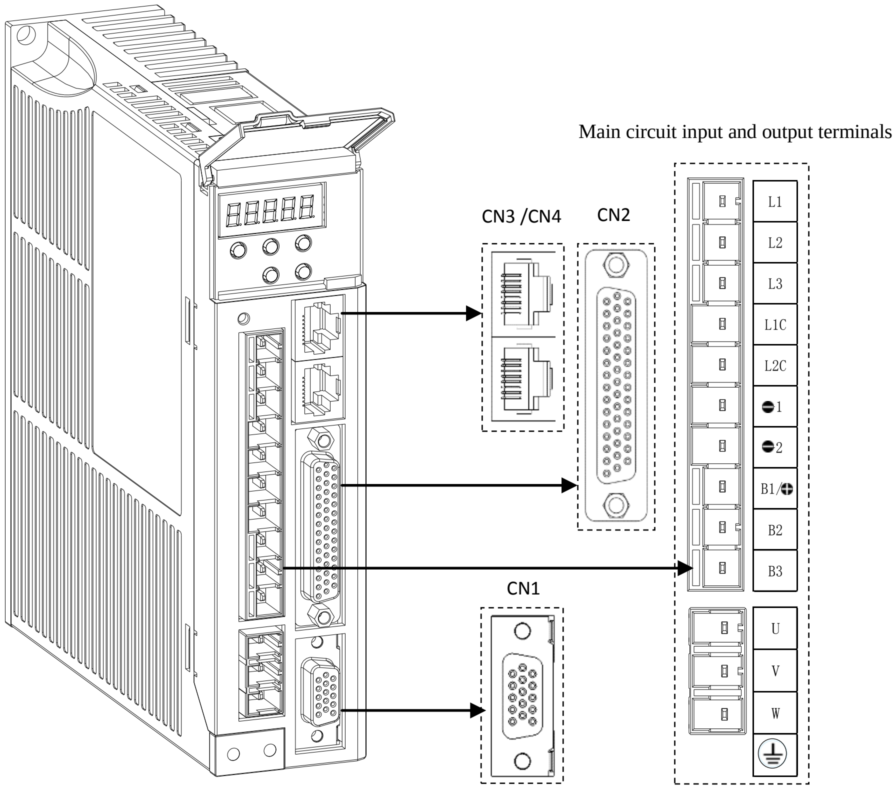
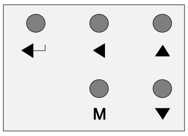


Figure 2-2 Servo drive composition

Items	Specifications
Digital tube display	5-bit 7-segment LED digital tube is used to display the running status and parameter setting of the servo.
Key operator	 ↵ : 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); ◀ : SHIFT key. Press this key to move the selected digit (the decimal point of the digit flashes) to the left by one digit; ▲: UP key. The set value can be added to act as the forward start key when JOG is running in auxiliary function mode; M : MODE key. Switch basic modes: Status display, auxiliary functions, parameter setting and monitoring; ▼: DOWN key. The set value can be reduced as the reverse start key when JOG is running in auxiliary function mode.
CHARGE bus voltage indicator	It is used to indicate that the bus capacitance is in a charged state. When the indicator light is on, even if the main circuit power is OFF, the internal capacitor of the servo unit may still have charge. Therefore, do not touch the power terminal when the light is on to avoid electric shock.
L1, L2, L3 main power terminals	Three-phase AC200V-240V, - 15% ～ 10%, 50/60Hz or three-phase AC380V-440V, - 15% ～ 10%, 50/60Hz.
L1C, L2C control power	Single-phase AC200V-240V, - 15% ～ 10%, 50/60Hz or single-phase

terminals	AC380V-440V, - 15% ～ 10%, 50/60Hz.
1. 2 (empty foot)	⊖ 1: Bus N; 2: Empty pin.
B1/⊕, B2, B3 braking resistor terminals	When using external braking resistor, connect braking resistor between B1/⊕ and B2; When using the internal braking resistor, short circuit B2 and B3 (B2 and B3 have been short-circuited at the factory).
U、V、W、	It must correspond to the motor UVW terminal one by one.
Motor power terminal and grounding terminals	Note the terminal definition.
CN1 motor encoder terminals	Note the terminal definition.
CN2 input and output terminals	Internal parallel connection with RS-232, RS-485 and Canopen communication command devices.

1.10.3 Servo drive specification

Items		Specifications											
Model name LCDA630PS□□□		1R6	2R8	5R5	7R6	012	015	018	025	032	045	060	075
Overall dimension	W(mm)	148		148	186				215		215	215	
	H(mm)	160		160	160				258		368	463	
	D(mm)	42		56	65				110		206	224	
	Weight (kg)	0.8		1.0	1.5				5.1		8.3	12	
	Input power supply	Single-phase or three-phase AC200V-240V,-15%～10%，50/60Hz			Three-phase AC200V-240V,-15%～10%，50/60Hz								
Model name LCDA630PT□□□		3R5	5R4	8R4	012	017	021	026	032	037	045	060	075
Overall dimension	W(mm)	177		204			215			215		215	
	H(mm)	174		203			258			368		463	
	D(mm)	60		92			110			206		224	
	Weight (kg)	1.3		2.7			5.1			8.3		12	
	Input power supply	Three-phase AC380V-440V，-15%～10%，50/60Hz											

Basic specifications	Environmental specifi	Temperature	Operating ambient temperature	0~+55 ℃ (the ambient temperature is 45 ℃~55 ℃, and the average load rate should not exceed 80%) (not frozen)
			Storage ambient temperature	-20～65℃
		Humidity	Operating ambient humidity	Below 20~85% RH (no condensation)
			Storage environment humidity	Below 20~85% RH (no condensation)

Items				Specifications
	cations	Use storage ambient temperature		Indoor (no direct sunlight), no corrosive gas, flammable gas, oil mist, dust
		Altitude		Below 1000m above sea level
		Vibration		5.8m/s ² (0.6G) below 10~60Hz (can not be used continuously at resonance frequency)
	Dielectric Strength			AC1500V between primary and FG for 1 minute
	control mode			Sine wave drive of three-phase PWM converter
	Encoder feedback			1：Multiplexed/Non- multiplexed line 2500 lines 2：17/23 bit (used as the function of multi-turn absolute encoder after adding battery)
	Control signal	Input		9-way input (DC24V optocoupler isolation) switches according to control mode function
		Output		5-way output (DC24V optocoupler isolation, open collector output) are switched according to the control mode function
	Pulse signal	Input		2-way input (optocoupler isolation, RS-422 differential, open collector output)
		Output		4-way output (A/B/Z-phase RS-422 differential; Z-phase collector open-circuit output)
	Communication function	RS232		For PC communication (for "Servostudio" connection)
		RS-485		For upper remote control communication (1: n)
		CAN		CANOPEN bus communication
	Control mode			6 control modes: speed control, position control, torque control, torque/speed control, speed/position control, torque/position, torque/speed/position hybrid control
Function	Control input			Alarm reset, proportional action switch, zero position fixed function enabled, disable forward drive, disable reverse drive, forward external torque limit, reverse external torque limit, forward jog, reverse jog, forward reset switch, reverse reset switch, home switch, Emergency shutdown, servo enabled, gain switch
	Control output			Servo ready, motor rotating, zero speed signal, speed arrival, position arrival, positioning near signal, torque limit, speed limit, brake output, warning, servo fault, alarm code (3 bit output)
	Position control	pulse input	Maximum command pulse frequency	Differential input: high-speed maximum 4Mpps, pulse width not less than 0.125 μ s Maximum 500Kpps at low speed, pulse width not less than 1 μ s Open collector: maximum 200Kpps, pulse width not less than 2.5 μ s
			Input pulse signal form	Differential input; Open collector
			Input pulse signal mode	Pulse+direction, right-angle phase difference (phase A+phase B), CW+CCW pulse
			Command pulse frequency division and multiplication (Electronic gear ratio setting)	0.1048576＜B/A＜419430.4

Items				Specifications
			Command filter	Smoothing filter, FIR filter
		Pulse output	Output pulse shape	Phase A, phase B: differential output Phase Z: differential output or open collector output
			Frequency division ratio	Arbitrary frequency division
			Output pulse function	Encoder position pulse and position pulse command (settable)
	Speed control	Control input		Servo ON, alarm reset, speed command reverse, zero speed clamping, 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 external torque limit input, Emergency shutdown
		Control output		Alarm status, servo preparation, brake release, output in torque limit, output speed in speed limit reached, speed consistent, motor rotation output, zero speed signal output
	Torque control	Control input		Servo ON, alarm reset, torque command reverse, zero speed clamping
		Control output		Alarm status, servo preparation, brake release, torque limit in progress, speed limit output, Emergency shutdown
		Torque command input		(Factory default setting, range can be set by function code)
		Speed limit function		Forward and resverse internal speed limit P03.27, P03.28P03.28
	Common	Speed observer function		Applicable
		Damping control function		Applicable
		Adaptive notch filter		Applicable
		Automatic adjustment function		Applicable
		Encoder output frequency division		Applicable
		Internal location planning function		Applicable
		Adjustment/function setting		Use the upper computer setting software "Servostudio" to adjust

Items			Specifications
		Protection function	Overvoltage, power supply abnormality, overcurrent, overload, encoder abnormality, over-speed, position deviation too large, parameter abnormality, others

1.10.4 Relevant specifications of braking resistor

Servo drive model		Specification of built-in braking resistor: Resistance value (Ω)	Specification of built-in braking resistor: Capacity(W)	Minimum allowable resistance value (Ω)	Maximum braking energy absorbed by capacitor (J)
Single phase 220V	1R6	-	-	50	9
	2R8	-	-	45	18
Single/three-phase 220V	5R5	50	50	40	26
Three-phase 220V	7R6	30	60	20	26
	012、015、018			20	47
	025	40	200	12	200
	032			12	250
	045	-	-	8	500
	060	-	-	6	900
	075	-	-	6	1200
Three-phase 380V	3R5	100	80	80	28
	5R4			60	34
	8R4	60	100	45	60
	012			45	90
	017			35	90
	021	40	200	35	122
	026、032			25	200
	037	-	-	20	250
	045	-	-	16	300
	060	-	-	12	450
	075	-	-	12	600

■S1R6, S2R8, S045, S060, S075, T037, T045, T060 and T075 models do not have built-in brake resistors. If you need to use them, please configure the external brake resistors by yourself. Please consult our technical support for the power selection of the external brake resistors.

1.10.5 Wiring of motor

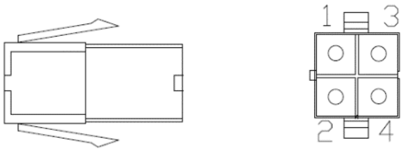
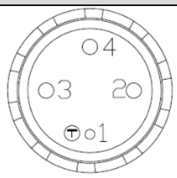
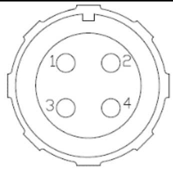
（1）Power socket：

Power line socket (4-core AMP socket) for motors with flange 90 and below

Terminal pin No.	1	2	3	4
Signal name	U	V	W	PE

Power line socket (4-core aviation socket) for motors with flange 110 and above

Terminal pin No.	1	2	3	4
Signal name	PE	U	V	W

4-core AMP socket	4-core curved aviation socket	4-core straight aviation socket
 1-U、2-V、3-W、4-PE	 1-PE、2-U、3-V、4-W	 1-U、2-V、3-W、4-PE

（2）Encoder socket：

Incremental multiplexed encoder (3 rows of 9-core AMP sockets)

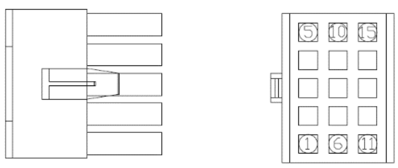
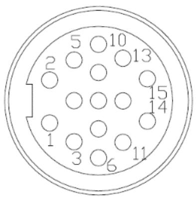
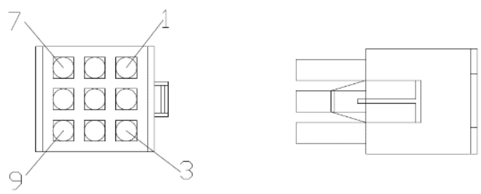
Terminal No.	1	2	3	4	5	6	7	8	9
Signal name	5V	GND	A+	A-	B+	B-	Z+	Z-	PE

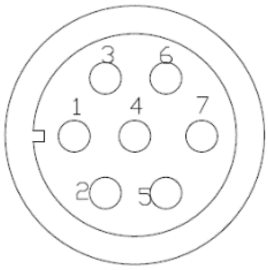
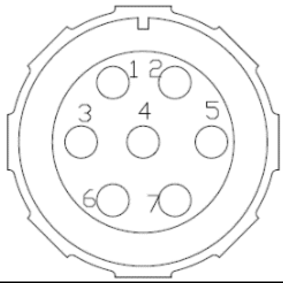
Incremental multiplexed encoder (15-core aviation socket, 10-15-core not connected)

Terminal No.	1	2	3	4	5	6	7	8	9
Signal name	PE	5V	GND	A+	B+	Z+	A-	B-	z-

Absolute value encoder socket (7 cores)

Terminal No.	1	2	3	4	5	6	7
Signal name	PE	E-	E+	SD-	GND	SD+	+5V

3-row 15-core non multiplexed AMP socket	15-core curved/non-multiplexed aviation socket	3-row 9-core multiplexed aviation socket
		

Absolute value encoder	
7-core curved aviation socket	7-core straight aviation socket
	

1.11 Servo system wiring diagram

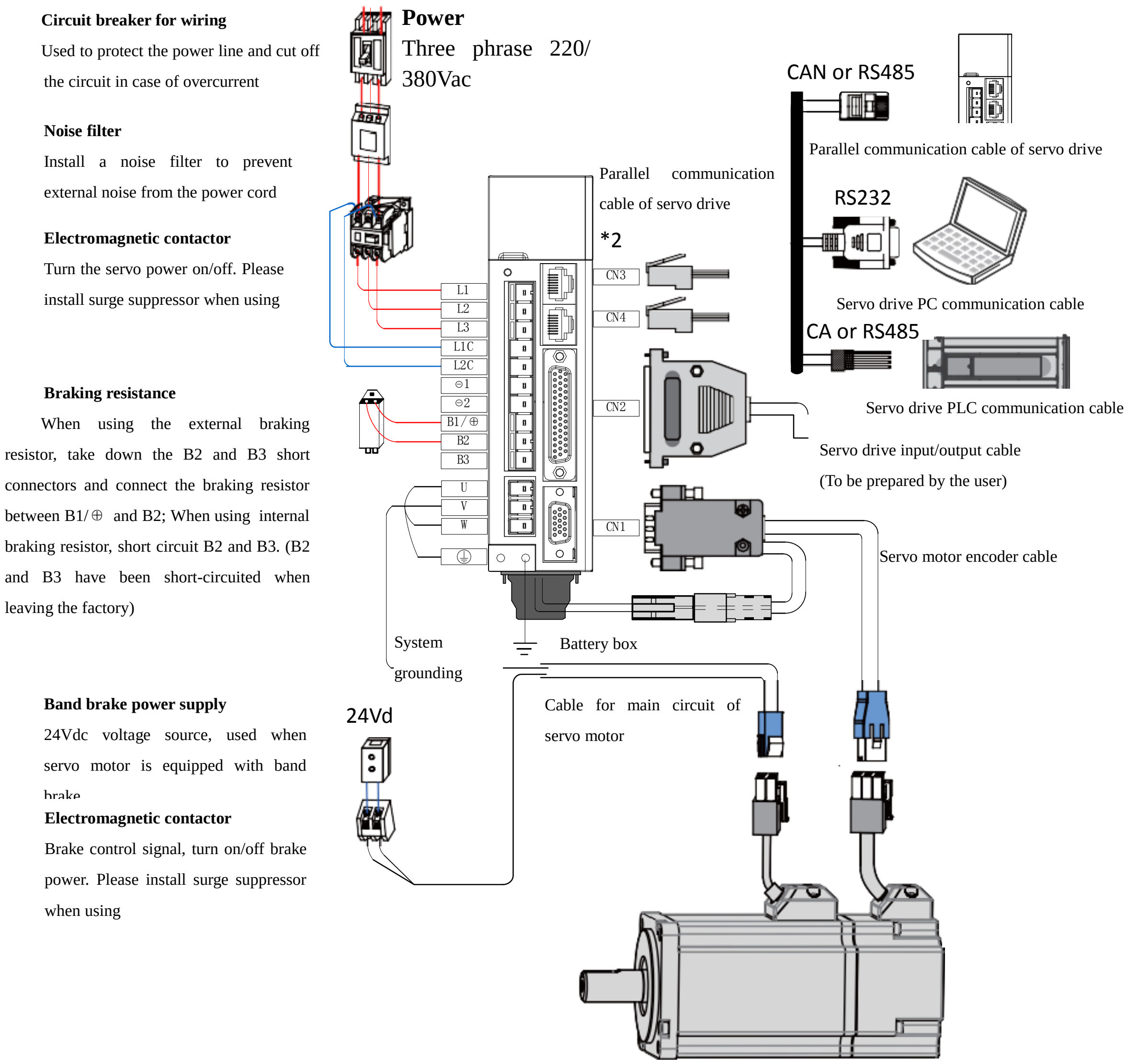


Figure 2-3 Example of system wiring diagram

The servo drive is directly connected to the industrial power supply, and no power isolation such as transformer is used. To prevent cross electric shock accidents in the servo system, please use a fuse or wiring circuit breaker on the input power supply. Since the servo drive has no built-in grounding protection circuit, in order to form a safer system, please use the leakage circuit breaker for overload and short circuit protection or the special leakage circuit breaker for supporting ground wire protection.

It is strictly prohibited to use electromagnetic contactors for motor running and stop running. As the motor is a large inductive component, the instantaneous high voltage generated may break down the contactor.

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

Precautions for system wiring:

a) When connecting the external braking resistor, please remove the short circuit between the terminals B2 and B3 of the servo drive before connecting. Pay attention to modifying internal parameters.
b) CN3 and CN4 define completely identical communication interfaces for the two pins, which can be selected and used at will.
c) In single-phase 220V wiring, the main circuit terminals are L1 and L2. Do not connect the reserved terminals.

Chapter III Installation Instructions

1.12 Installation of servo drive

1.12.1 Installation site

- Please install it in the installation cabinet without sunshine and rain;
- Do not attach to corrosive and flammable gas environment and combustible materials such as hydrogen sulfide, chlorine, ammonia, sulfur, chlorinated gas, acid, alkali, salt, etc
- Please do not install in the environment with high temperature, humidity, dust and metal dust;
- No-vibration place;
- Pollution level of installation site: PD2.

1.12.2 Environment condition

Table 3-1 Installation Environment

Items	Description
Operating ambient temperature	0~+55 ℃ (the ambient temperature is 40 ℃~55 ℃, and the average load rate should not exceed 80%) (not frozen)
Operating ambient humidity	Below 90% RH (no condensation)
Storage temperature	-20~85 ℃ (not frozen)
Storage humidity	Below 90% RH (no condensation)
Vibration	Below 4.9m/s2
Strike	Below 19.6m/s2
Protection grade	IP10
Altitude	Below 1000m

1.12.3 Installation precautions

1) Method

Please ensure that the installation direction is perpendicular to the wall. Use natural convection or fan to cool the servo drive. Fix the servo drive firmly on the mounting surface through 2 to 4 mounting holes (the number of mounting holes varies depending on the capacity).

During installation, please face the front of the servo drive (the actual installation surface of the operator) to the operator and make it perpendicular to the wall.

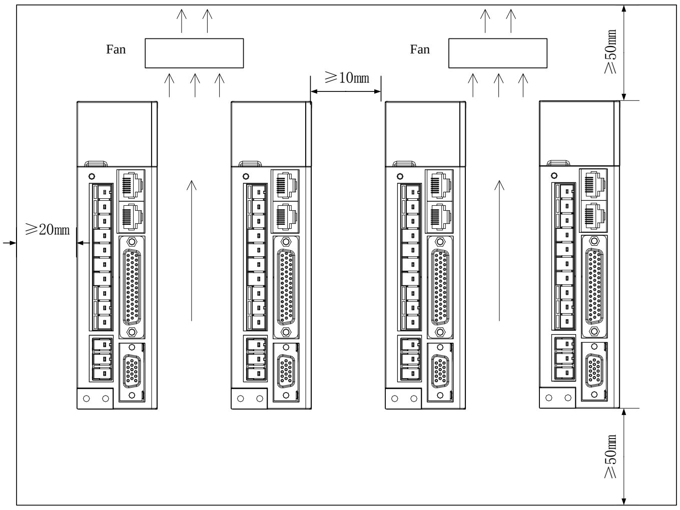


Figure 3-1 Installation diagram of servo drive

2) Cooling

In order to ensure cooling through fans and natural convection, please refer to the above figure and leave enough space around the servo drive. Please install a cooling fan on the upper part of the servo drive. In order to prevent the ambient temperature of the servo drive from being locally too high, it is necessary to keep the temperature in the electric cabinet uniform.

3) Side by side installation

When installing side by side, it is recommended to leave a space of more than 10mm on both horizontal sides (if limited by the installation space, you can choose not to leave a space), and a space of more than 50mm on both longitudinal sides.

4) Grounding

Be sure to ground the grounding terminal, otherwise there may be electric shock or interference and misrunning.

5) Wiring requirements

When wiring the drive, please route the cable downward to avoid liquid flowing into the drive along the line when liquid is attached to the cable on site.

1.13 Installation of servo motor

1.13.1 Installation site

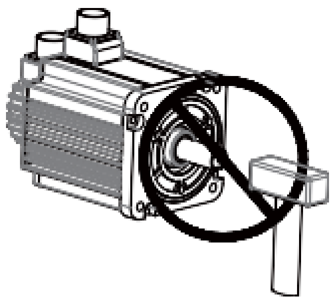
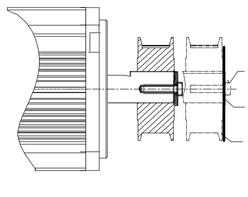
- Do not use this product in the vicinity of corrosive and flammable gas environment such as hydrogen sulfide, chlorine, ammonia, sulfur, chlorinated gas, acid, alkali, salt, and combustible materials;
- In places with grinding fluid, oil mist, iron powder, cutting, etc., please select the model with oil seal;
- Keep away from heat sources such as furnaces;
- Do not use the motor in a closed environment. The enclosed environment will cause high temperature of the motor and shorten the use

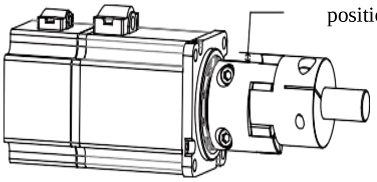
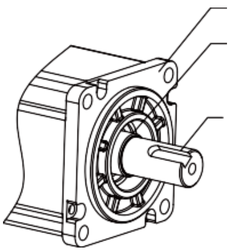
1.13.2 Environment condition

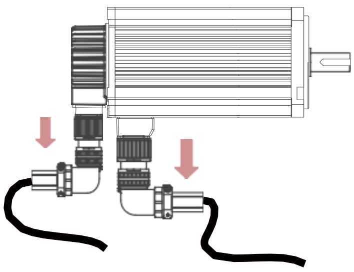
Table 3-2 Installation Environment

Items	Description
Operating ambient temperature	0~40 ℃ (not frozen)
Operating ambient humidity	20%~90% RH (no condensation)
Storage temperature	-20 ℃~60 ℃ (maximum temperature guarantee: 80 ℃ for 72 hours)
Storage humidity	20%~90% RH (no condensation)
Vibration	Below 49m/s2
Strike	Below 490m/s2
Protection grade	IP10
altitude	Below 1000m

Table 3-3 Installation precautions

Items	Description
Antirust treatment	◆ Before installation, please clean the "antirust agent" on the extension end of the servo motor shaft, and then carry out relevant anti-rust treatment.
Notes to encoder	◆ Do not hit the shaft extension end during installation, otherwise the internal encoder will be broken. 
	◆ When installing a pulley on a keyway servo motor shaft, use a screw hole at the shaft end. ◆ To install the pulley, first insert the stud into the screw hole of the shaft, use a washer on the surface of the coupling end, and gradually lock the pulley with a nut.  ◆ For the servo motor shaft with keyway, use the screw hole at the shaft end for installation. ◆ For shafts without keyway, friction coupling or similar methods shall be adopted. ◆ When disassembling the pulley, use the pulley extractor to prevent the shaft from bearing the strong

<table>
<tr><th>Items</th><th>Description</th></tr>
<tr><td></td><td>impact of the load.
◆ To ensure safety, install a protective cover or similar device in the rotating area, such as a pulley installed on the shaft.</td></tr>
<tr><td>Centering</td><td>◆ When connecting with the machine, please use the coupling and keep the axis of the servo motor and the axis of the machine in a straight line. When installing the servo motor, make it meet the centering accuracy requirements shown in the figure below. If the centering is not sufficient, vibration can occur and sometimes damage bearings, encoders, etc.

</td></tr>
<tr><td>Installation direction</td><td>◆ The servo motor can be installed in the horizontal or vertical direction.</td></tr>
<tr><td>Oil water countermeasures</td><td>◆ Do not immerse the motor and cable in oil or water;
◆ When using in places where water drops fall, please use it on the basis of confirming the protection level of servo motor. (except for shaft penetration)


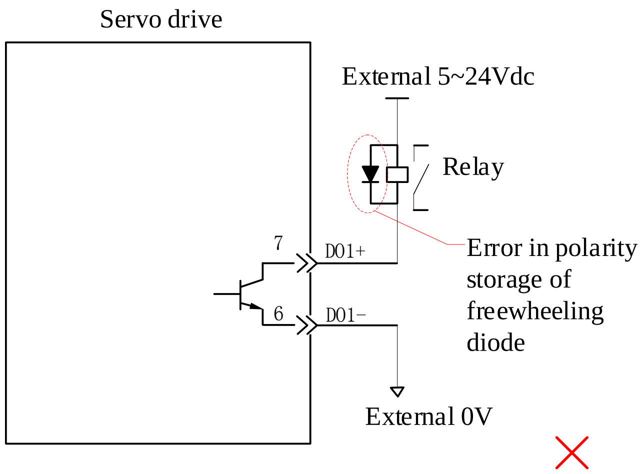
◆ In applications with liquid, please install the motor wiring port downward (as shown in the figure below) to prevent the liquid from flowing to the motor body along the cable;

◆ Please specify the servo motor with oil seal when it is used in places where oil drops will drop onto the shaft penetration.
Service conditions of servo motor with oil seal:
1) When using, ensure that the oil level is lower than the lip of the oil seal;
2) When installing the servo motor vertically, do not allow oil to accumulate on the oil seal lip.</td></tr>
</table>

Items	Description
Stress condition of cable	◆ Do not "bend" the wire or apply "tension" to it, especially the core wire of the signal wire is 0.2mm or 0.3mm, which is very thin, so do not tension it too tightly when wiring (using).
Handling of connector parts	For connectors, please note the following: ◆ When connecting the connector, please make sure that there is no garbage or metal sheet or other foreign matters in the connector. ◆ When connecting the connector to the servo motor, be sure to connect it from the main circuit cable side of the servo motor first, and the ground wire of the main cable must be reliably connected. If one side of the encoder cable is connected first, the encoder may fail due to the potential difference between PEs. ◆ When wiring, please confirm that the pin arrangement is correct. ◆ The connector is made of resin. Do not impact to avoid damaging the connector. ◆ When carrying out handling runnings with the cable connected, be sure to hold the main body of the servo motor. If you only hold the cable for handling, it may damage the connector or pull the cable. ◆ If bent cables are used, full attention should be paid to not stress the connector part during wiring running. If stress is applied to the connector part, the connector may be damaged.

Chapter IV Wiring

⚠Danger
◆ The wiring running shall be carried out by professional technicians. ◆ In order to avoid electric shock, please turn off the power supply for more than 5 minutes, confirm the voltage between B1/⊕ and 1 with a multimeter after the power indicator is off, and then disassemble the drive. ◆ Please conduct wiring after the installation of servo drive and servo motor, otherwise electric shock will be caused. ◆ Do not damage the cable, exert excessive tension on it, hang heavy objects or squeeze it, or electric shock may occur. ◆ To avoid electric shock, please insulate the power terminal connection. ◆ The specification and installation method of external wiring shall meet the requirements of local regulations. ◆ In Table 4-5, the cable material (copper wire) is required, and the ground wire is required to use yellow and green wire. ◆ Be sure to ground the whole system.
⚠Attention

- Please connect the wires correctly and carefully, otherwise the servo motor will not operate normally and may cause injury.
- Do not mistake the terminal connection, otherwise it may cause breakage and damage.
- Please be sure to connect an electromagnetic contactor between the power supply and the main circuit power supply of the servo drive (single-phase L1, L2, three-phase L1, L2, L3), and form a structure that can cut off the power supply on the power side of the servo drive. If the electromagnetic contactor is not connected, it may cause a fire when the servo drive fails and continues to pass a large current.
- Please use ALM (fault signal) to cut off the power supply of the main circuit. When the brake transistor fails, the brake resistor may overheat abnormally and cause fire.
- Please confirm the voltage specification of the servo drive before powering on. Do not add 380V power to the 220V model, otherwise the servo drive will be damaged.
- Do not mistake the direction of the freewheeling diode, otherwise the servo drive will be damaged and the signal cannot be output.
-



- Please use noise filter to reduce the impact of electromagnetic interference, otherwise it will cause interference to the electronic equipment near the servo drive.
- When connecting the power supply and the main circuit, ensure that the servo ON signal is also turned to OFF when the main circuit power supply is cut off after the alarm signal is detected.
- Please connect the output U, V, W of the servo drive and the output U, V, W of the servo motor directly. Do not use the electromagnetic contactor during the connection. Otherwise, it may cause abnormal running and fault.

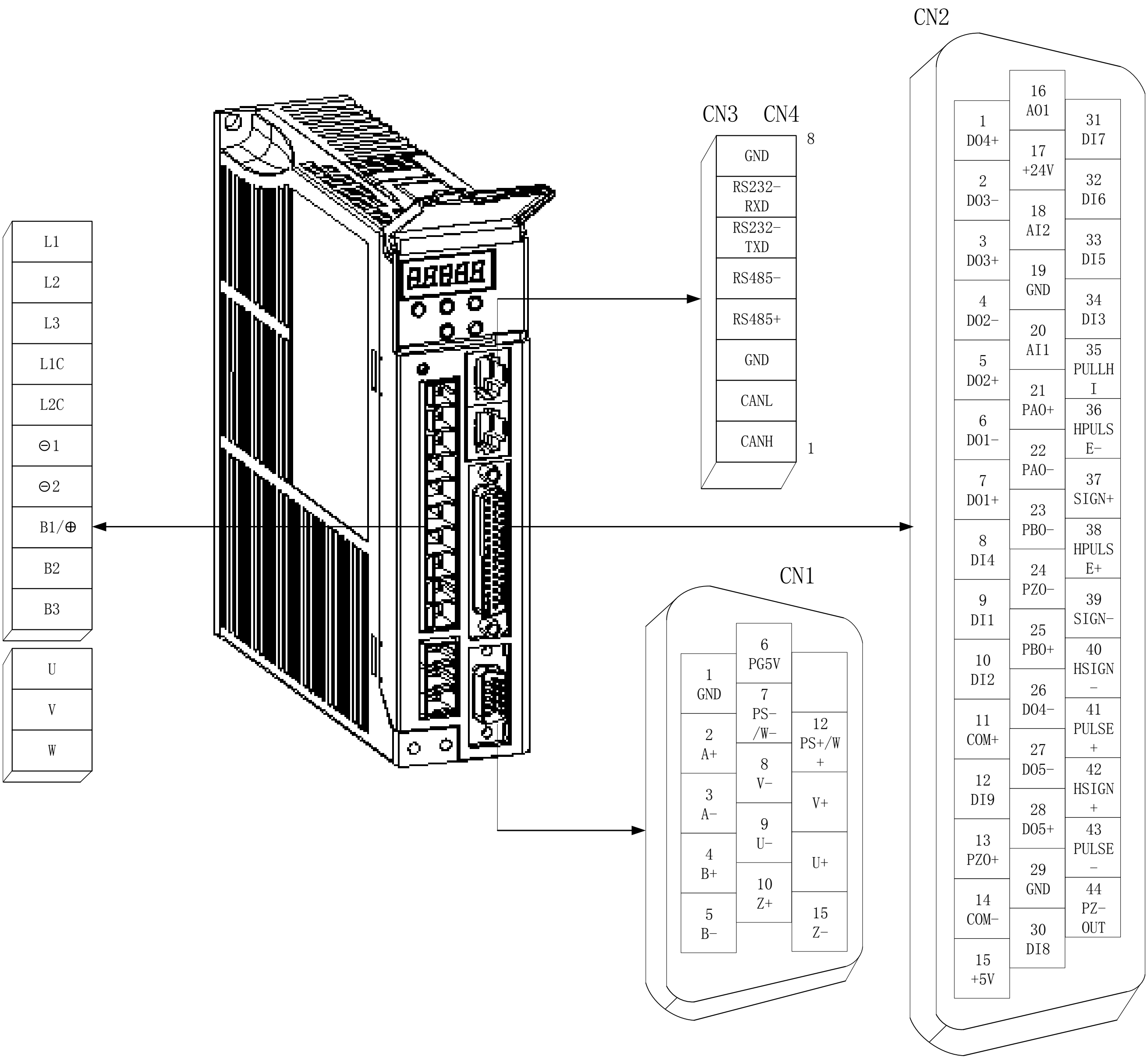


Figure 4-1 Terminal pin distribution of servo drive

NOTE

- The above figure shows the pin layout of the terminals on the drive body.

1.14 Main circuit connection of servo drive

1.14.1 Main circuit terminal introduction

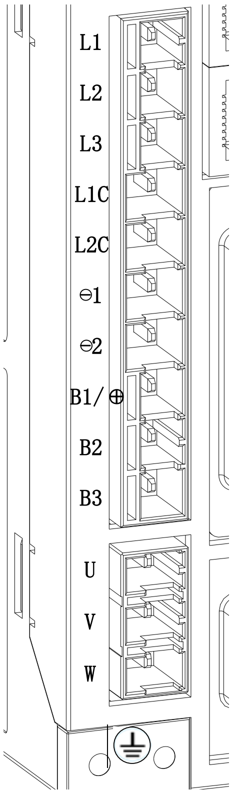


Figure 4-2 Servo drive terminal strip layout

Table 4-1 Name and function of main circuit terminal of servo drive

Items	Specifications
L1，L2，L3 Main power terminal	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 or single-phase AC380V-440V, - 15% ～ 10%, 50/60Hz.
⊖1， ⊖2（empty pin）	⊖1：Bus N; 2: Empty pin.
B1/⊕，B2，B3 Braking resistor terminal	When using external braking resistor, connect braking resistor between B1/⊕ and B2; When using the internal braking resistor, short circuit B2 and B3 (B2 and B3 have been short-circuited at the factory).
U，V，W，⏚ Motor power terminal and grounding terminal	It must correspond to the motor UVW terminal one by one.

1.14.2 Example of brake resistor wiring error

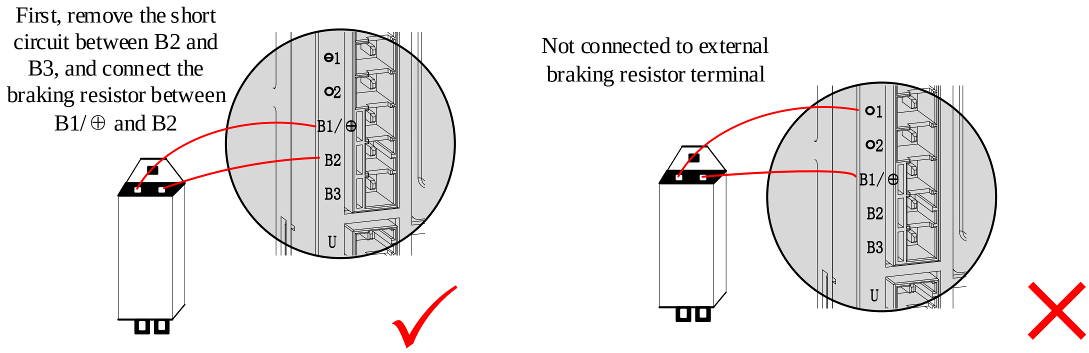


Figure 4-3 Connection diagram of external braking resistor

For the selection and use of braking resistor, please refer to the chapter "[6.1.7 Brake setting]"。

Precautions for braking resistor wiring:

1. Do not connect the external braking resistor directly to the positive and negative terminals B1/⊕ and 1 of the bus, otherwise it will cause explosion and fire;
2. When using the external braking resistor, please remove the short circuit between B2 and B3, otherwise the brake pipe will be damaged by overcurrent;
3. Do not be less than the minimum allowable resistance value, otherwise it will cause 201 alarm or damage the drive;
4. Before using the servo, please confirm that the brake resistor parameters P02-25, P02-26, and P02-27 have been correctly set;
5. Please install the external braking resistor on the metal and other non-combustible materials.

Table 4-2 630P Series Drive Current Specifications

Drive model LCDA630P□□□□	Rated input current (A)	Rated output current (A)	Maximum output current (A)
S1R6	2	1.6	5.8
S2R8	4 (single-phase)/2 (three-phase)	2.8	10.1
S5R5	7.9 (single-phase)/3.7 (three-phase)	5.5	16.9
S7R6	11 (single-phase)/5.5 (three-phase)	7.6	17
S012	8.0	12.0	28
S015	10.0	15.0	28
S018	12.0	18.0	45
S025	33.0	25.0	50
S032	40.0	32.0	64
S045	47.0	45.0	90
S060	62.0	60.0	120
S075	76.0	75.0	150
T3R5	4.5	3.5	8.5
T5R4	6.5	5.4	14
T8R4	10.0	8.4	20
T012	14.0	12.0	23.8
T017	21.0	17.0	42

Drive model LCDA630P□□□□	Rated input current (A)	Rated output current (A)	Maximum output current (A)
T021	24.0	21.0	55
T026	28.0	26.0	65
T032	35.0	32.0	65
T037	39.0	37.0	75
T045	47.0	45.0	90
T060	62.0	60.0	120
T075	76.0	75.0	150

Table 4-3 630P Series Drive Cable Specifications

Drive model LCDA630P□□□□I	L1C，L2C	L1，L2，L3	B1/⊕，B2	U，V，W	PE
S1R6	18AWG (0.82 mm²)	16AWG (1.31 mm²)	16AWG (1.31 mm²)	16AWG (1.31 mm²)	14AWG (2.09 mm²)
S2R8	18AWG (0.82 mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	14AWG (2.09mm²)
S5R5	18AWG (0.82mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	14AWG (2.09mm²)
S7R6	18AWG (0.82mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	14AWG (2.09mm²)
S012	18AWG (0.82mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)
S015	18AWG (0.82mm²)	18AWG (0.82mm²)	18AWG (0.82mm²)	18AWG (0.82mm²)	18AWG (0.82mm²)
S018	18AWG (0.82mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)
S025	18AWG (0.82mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)
S032	18AWG (0.82mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)
S045	-	7AWG (10.55mm²)	7AWG (10.55mm²)	7AWG (10.55mm²)	7AWG (10.55mm²)
S060	-	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)
S075	-	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)
T3R5	18AWG (0.82mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)
T5R4	18AWG (0.82mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)	18AWG (0.82 mm²)
T8R4	18AWG (0.82mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	16AWG (1.31mm²)	14AWG (2.09mm²)
T012	18AWG (0.82mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)	14AWG (2.09mm²)
T017	18AWG (0.82mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)
T021	18AWG (0.82mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)
T026	18AWG (0.82mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)	10AWG (5.27mm²)
T032	18AWG (0.82mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)	9AWG (6.63mm²)
T037	-	8AWG (8.37mm²)	8AWG (8.37mm²)	8AWG (8.37mm²)	8AWG (8.37mm²)
T045	-	7AWG (10.55mm²)	7AWG (10.55mm²)	7AWG (10.55mm²)	7AWG (10.55mm²)
T060	-	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)
T075	-	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)	6AWG (13.30mm²)

1.14.3 Example of power wiring

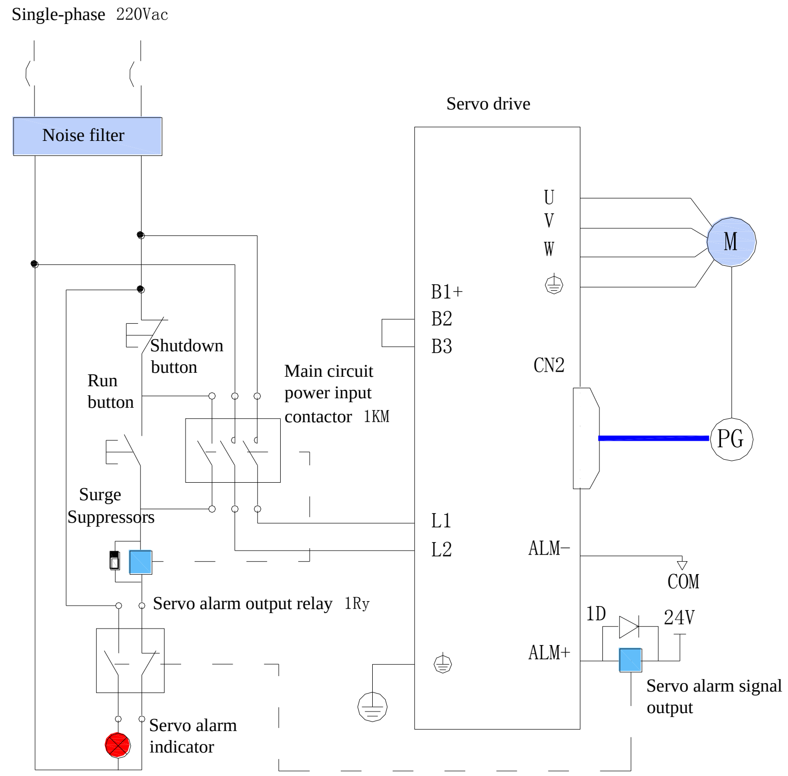


Figure 4-4 Single-phase 220V main circuit wiring

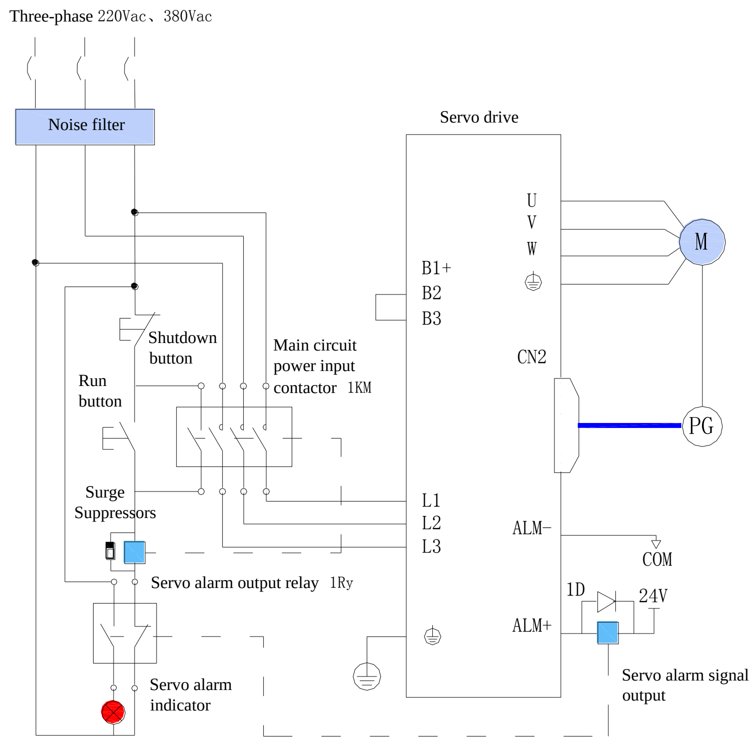


Figure 4-5 Wiring of three-phase 220V and 380V main circuit

- 1KM: electromagnetic contactor; 1Ry: relay; 1D: freewheeling diode.
- Please refer to Figure 4-4 and Figure 4-5 to connect the power supply of the main circuit. DO is set to the alarm output

function (ALM+/-). When the servo drive gives an alarm, the power supply can be automatically cut off and the alarm light is on.

1.14.4 Main circuit wiring precautions

- Do not connect the input power line to the output terminals U, V and W, otherwise the servo drive will be damaged;
- B2 and B3 must be connected when using the built-in braking resistor (they have been connected with a short piece before leaving the factory).
- When the cable is bundled and used in the pipeline, please consider the allowable current reduction rate due to the poor heat dissipation conditions.
- When the temperature in the cabinet is higher than the cable temperature limit, please select the cable with larger cable temperature limit, and it is recommended to select Teflon wire for the cable; Please pay attention to the insulation measures of the cable in the surrounding low temperature environment. Generally, the surface of the cable is easy to harden and crack in the low temperature environment.
- The bending radius of the cable should be more than 10 times of the outer diameter of the cable itself to prevent the internal core of the cable from breaking due to long-term bending.
- Please use cables with rated voltage of more than AC600V and rated temperature of more than 75 ℃. The allowable current density of the conductor of the cable should not exceed 8A/mm when the total current is less than 50A under the ambient temperature of 30 ℃ and normal heat dissipation conditions ^{2}, It shall not exceed 5A/mm when it is above 50A ^{2}。 For high ambient temperature and bundled cables, it is necessary to properly adjust the allowable current density (A/mm ^{2}) It can be calculated by the following formula:

Applicable allowable current density=8 × Reduction coefficient of conductor current-carrying density × Current correction coefficient

$$\text{Current correction coefficient} = \sqrt{(\textit{Nominal maximum allowable temperature of cable} - \textit{ambient temperature}) \div 30}$$

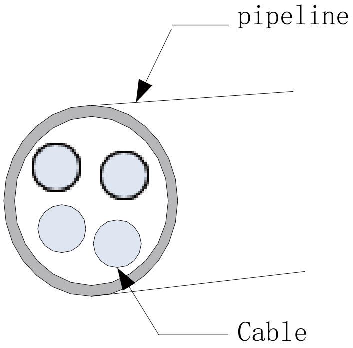


Table 4-4 Reduction Coefficient of Conductor Current Carrying Density

Number of cables in the same pipeline	Current reduction factor
Less than 3	0.7
4	0.63
5～6	0.56
7～15	0.49

- The braking resistor shall not be connected between terminals B1/⊕ and 1 of DC bus, otherwise it may cause fire!
- Do not cross or bind the power line and signal line from the same pipe. To avoid interference, the distance between the two should be more than 30cm;
- Even if the power supply is turned off, high voltage may remain in the servo drive. Do not touch

the power terminal within 5 minutes;

- Please check after confirming that the CHARGE indicator is off;
- Do not turn on/off the power supply frequently. When continuous ON/OFF power supply is required repeatedly, please control it less than once a minute. Because there is a capacitor in the power part of the servo drive, a large charging current will flow when the power is ON (charging time is 0.2 seconds). Frequent ON/OFF of the power supply will cause the performance degradation of the main circuit components inside the servo drive.
- Please use the ground wire with the same cross-sectional area as the main circuit wire, if the cross-sectional area of the main circuit wire is 1.6mm ² Below, please use 2.0mm ² Ground wire;
- Please connect the servo drive to the ground reliably;
- Do not power on when the terminal block screws are loose or the cable is loose, as it may cause a fire.

1.15 Power line connection of servo drive and servo motor

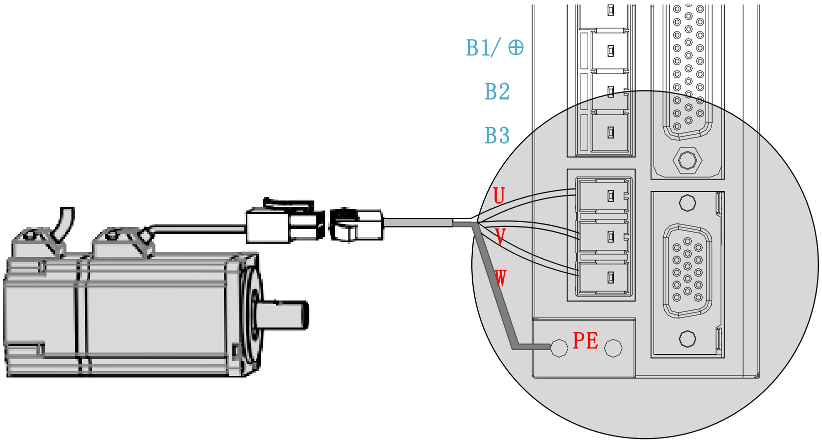


Figure 4-6 Example of connection between servo drive output and servo motor

1.16 Encoder cable connection of servo drive and servo motor

1.16.1 Connection of bus-type incremental encoder

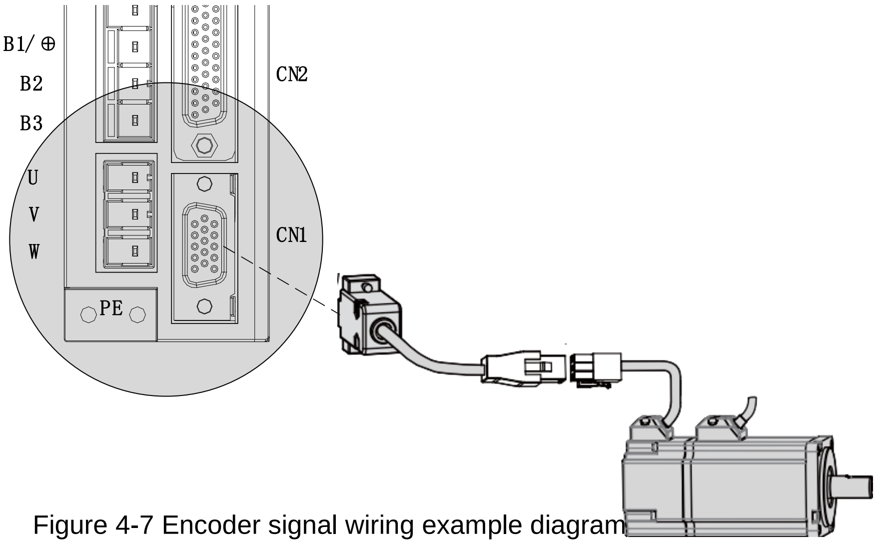


Figure 4-7 Encoder signal wiring example diagram

Precautions for encoder signal wiring:

1. Please make sure that the shield mesh layer at the drive side and motor side is reliably

grounded, otherwise the drive will give false alarm.

2. It is recommended to use 26AWG~16AWG twisted pair shielded cable with wiring length less than 20m.

3. Do not connect the wire to the "reserved" terminal.

4. The encoder cable length should fully consider the voltage drop caused by the cable resistance and the signal attenuation caused by the distributed capacitance. It is recommended to use the UL2464 standard twisted pair shielded cable with the specification of more than 26AWG within the 10m cable length. For the requirement of longer cable, the cable diameter should be appropriately increased, as shown in the following table:

Table 4-5 Recommended Cable Information

Wire diameter size	Ω/km	Allowable cable length (m)
26AWG(0.13mm²)	143	10.0
25AWG(0.15mm²)	89.4	16.0
24AWG(0.21mm²)	79.6	18.0
23AWG(0.26mm²)	68.5	20.9
22AWG(0.32mm²)	54.3	26.4
21AWG(0.41mm²)	42.7	33.5

5. Encoder cable shielding layer shall be reliably grounded; Connect the differential signal to the two cores of the twisted pair.

6. The length of signal cable also needs to fully consider the voltage drop caused by cable resistance, and pay attention to the capacity of power supply during power distribution to ensure that the signal and power supply reach the input side of the drive with sufficient strength. It is recommended to use twisted pair shielded cables with specifications above 26AWG.

7. Encoder cable and power cable must be routed separately with an interval of at least 30 cm.

8. When the encoder cable is not long enough to connect the cable, the shielding layer shall be reliably connected to ensure the reliability of shielding and grounding.

1.17 Servo drive control signal terminal CN2 connection

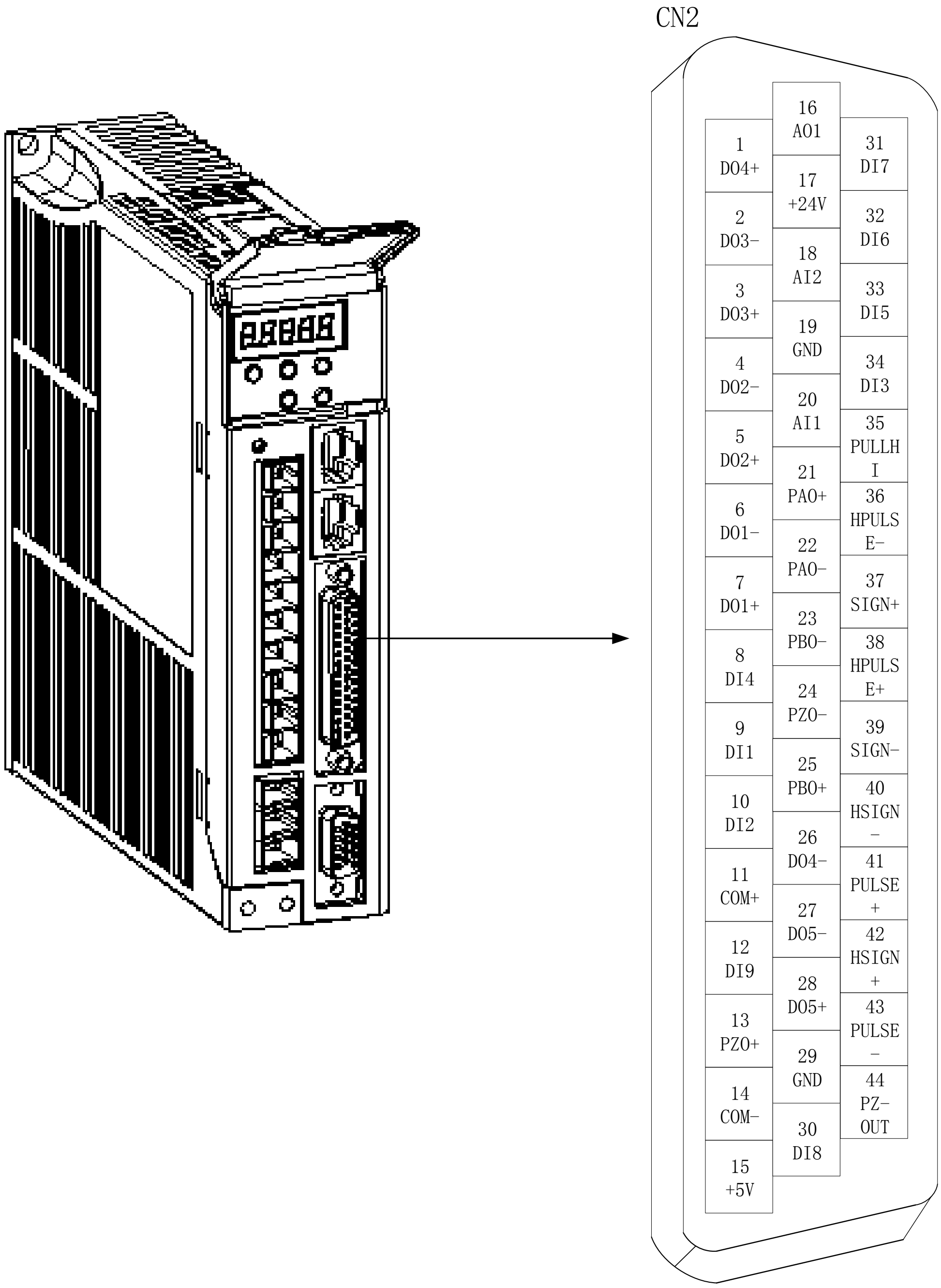


Figure 4-8 Drive control circuit terminal connector pin distribution

NOTE

- For wiring diagrams corresponding to position mode, speed mode and torque mode, see "4.8 Wiring in three control modes".

1.17.1 Position command input signal

The general command pulse input, command symbol input signal and high-speed command pulse input and command symbol input signal terminals of the user interface connector are described below.

Table 4-6 Position command input signal description

Signal name		Pin number	Function	
Position command	PULSE+ PULSE- SIGN+ SIGN-	41 43 37 39	Input mode of low-speed pulse command: Differential drive input Open collector	Input pulse shape: Direction+pulse Phase A and B quadrature pulse CW/CCW pulse
	HPULSE+ HPULSE-	38 36	High-speed input pulse command	
	HSIGN+ HSIGN-	42 40	High speed position command symbol	
	PULLHI	35	External power input interface of command pulse	
	GND	29	Signal ground	

The command pulse and symbol output circuit on the upper device side can be selected from the differential drive output or the open collector output. Its maximum input frequency and minimum pulse width are shown in the following table:

The command pulse and symbol output circuit on the upper device side can be selected from the differential drive output or the open collector output. Its maximum input frequency and minimum pulse width are shown in the following table:

Pulse mode		Maximum frequency (pps)	Minimum pulse width (us)
Common	Differential	500k	1
	Open collector	200k	2.5
High-speed differential		4M	0.125

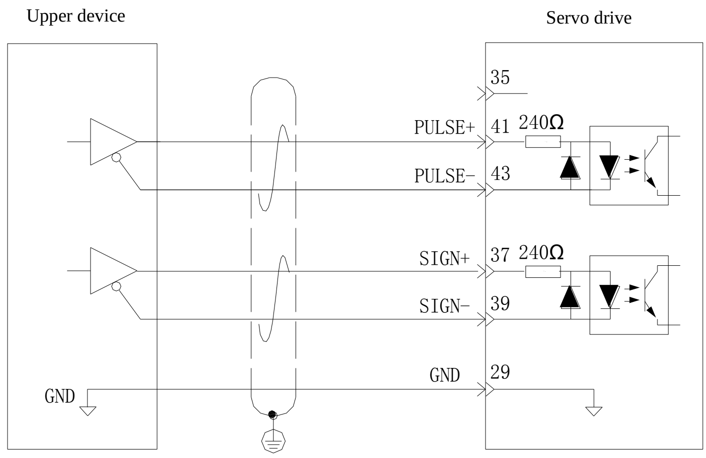
NOTE

- If the output pulse width of the superior device is less than the minimum pulse width value, it will cause the drive to receive pulse errors.

1) Low speed pulse command input

a) When in differential mode

Low speed pulse position command
Maximum input frequency is 500k pps
Minimum pulse width is 1us



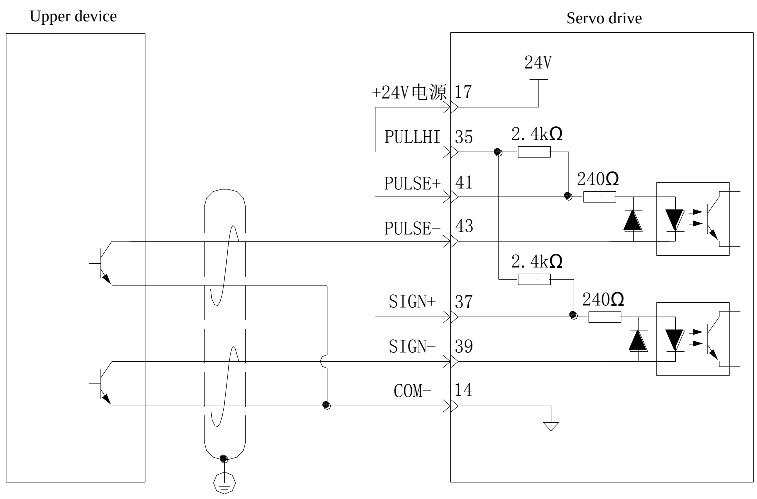
b) When the collector is in open circuit mode

① When using the internal 24V power supply of the servo drive (220V 018 and below without internal 24V power supply, others with):

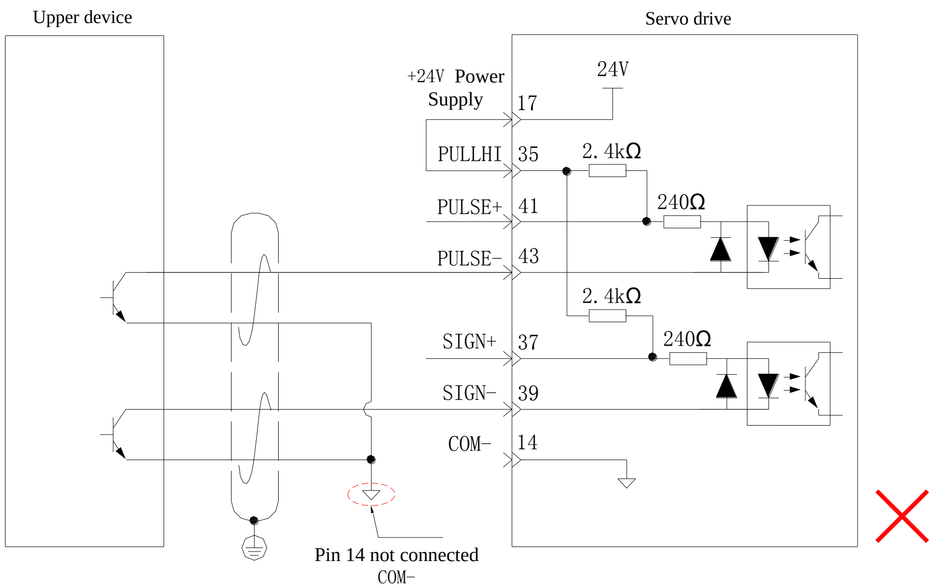
Open collector pulse position command

Maximum input frequency is 200k pps

Minimum pulse width is 2.5us

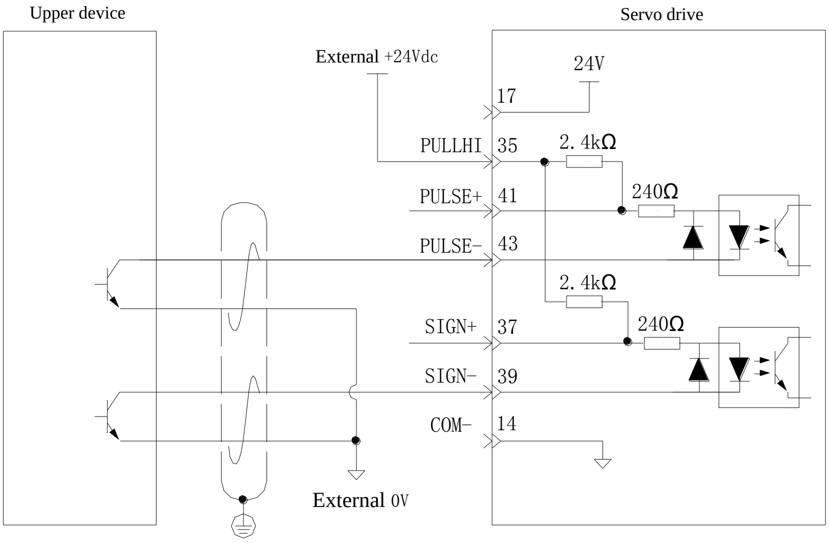


- Error: 14 pin COM - is not connected, unable to form a closed loop



② When using external power supply:

Scheme I: use the internal resistance of the drive (recommended scheme)

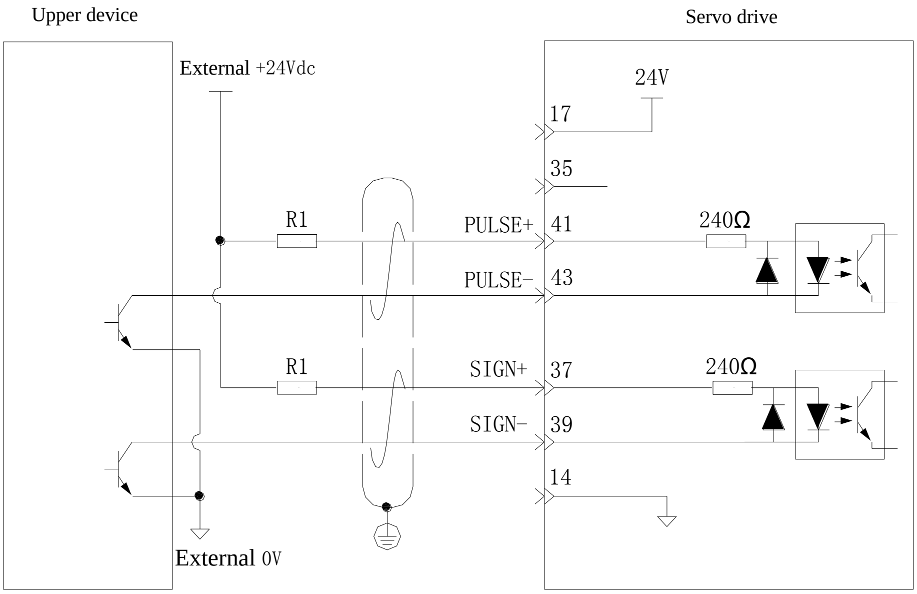


Open collector pulse position command

Maximum input frequency is 200k pps

Minimum pulse width is 2.5us

Scheme 2: Use external resistance



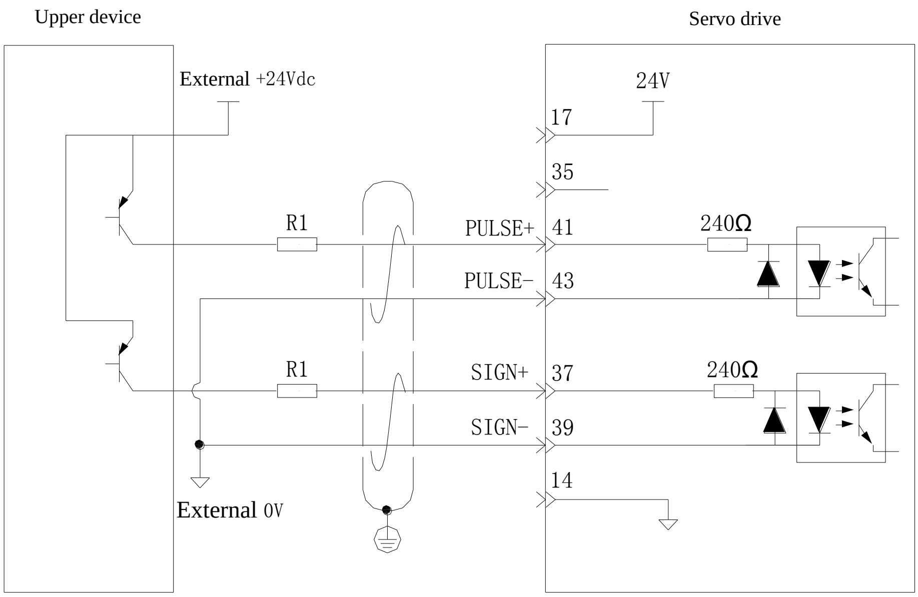


Table 4-8 Recommended R1 resistance value

The selection of resistance R1

VCC voltage	R1 resistance	R1 power

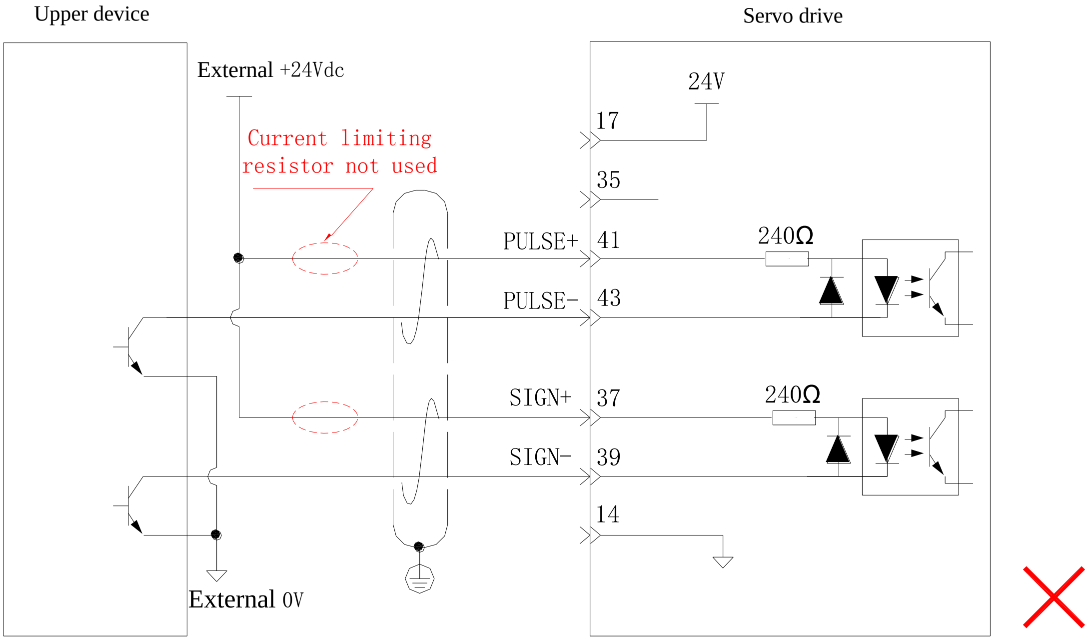
should meet the formula:

$$\frac{V_{CC}-1.5}{R1+200}=10mA$$

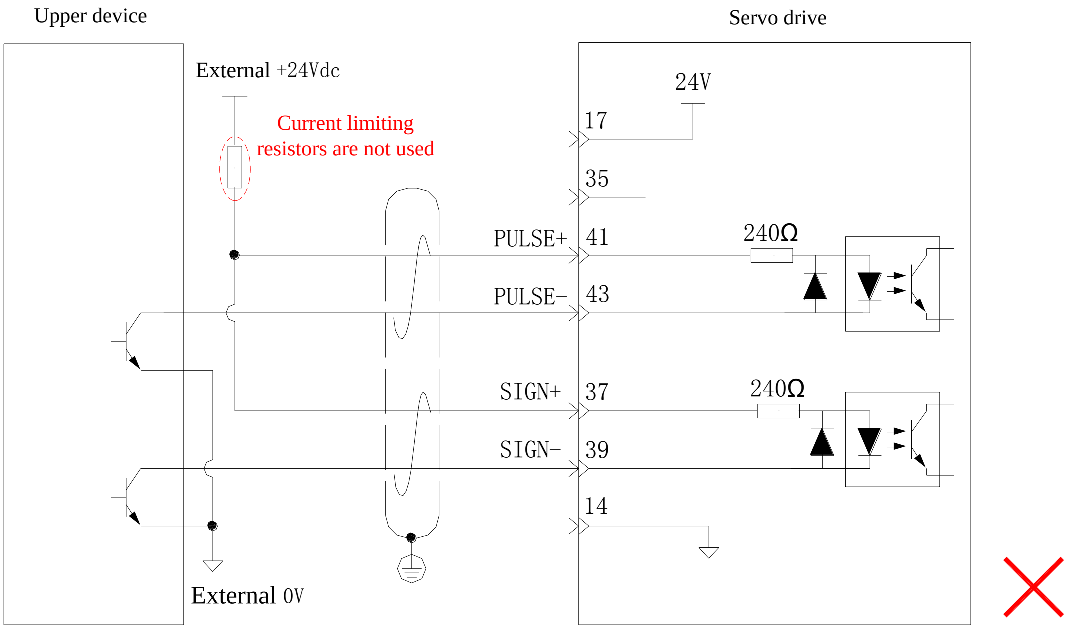
	value	
24V	2.4kΩ	0.5W
12V	1.5kΩ	0.5W

Examples of wiring errors：

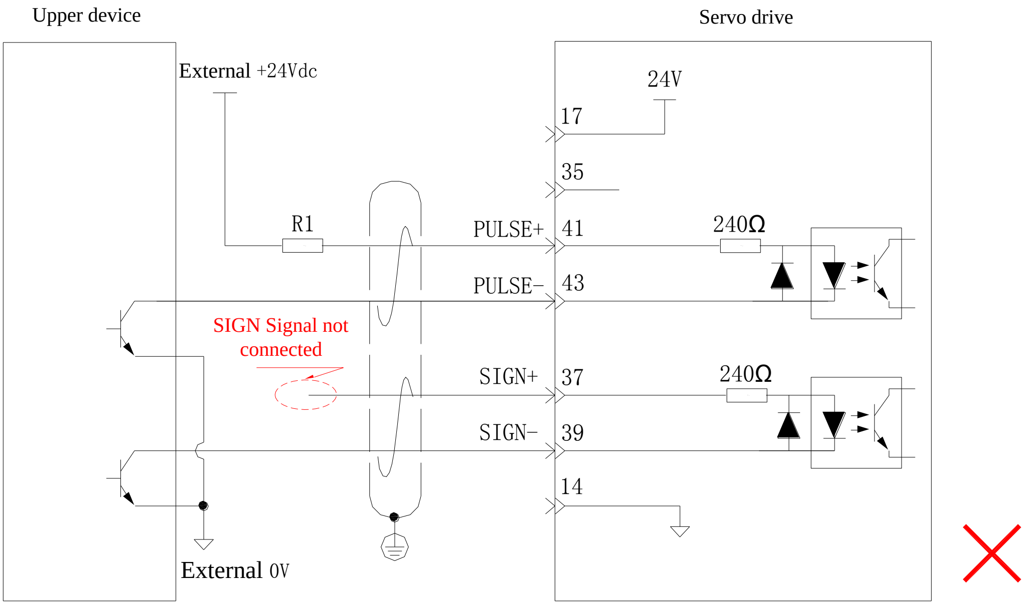
- Error 1: The current limiting resistor is not connected, resulting in port burning



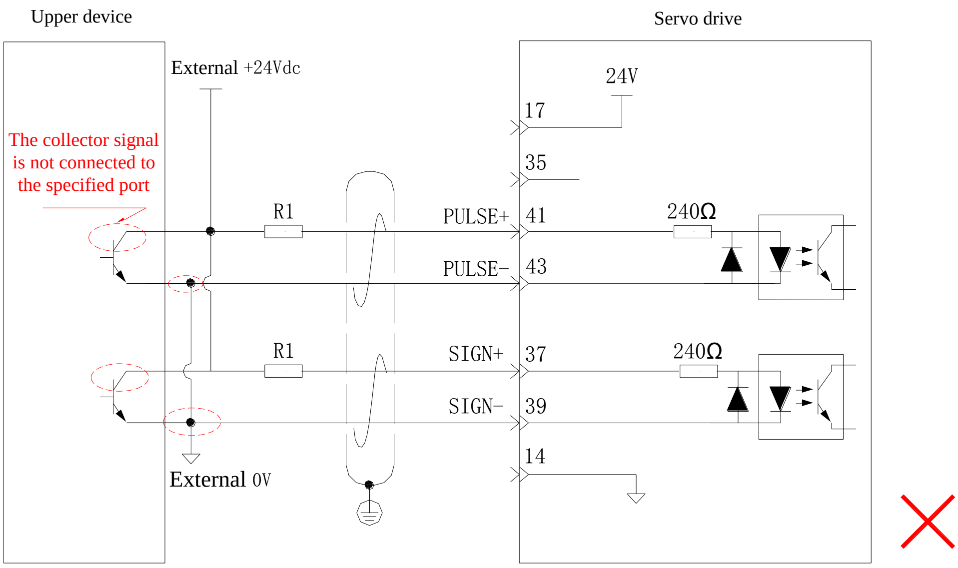
- Error 2: Multiple ports share current limiting resistance, resulting in pulse reception error



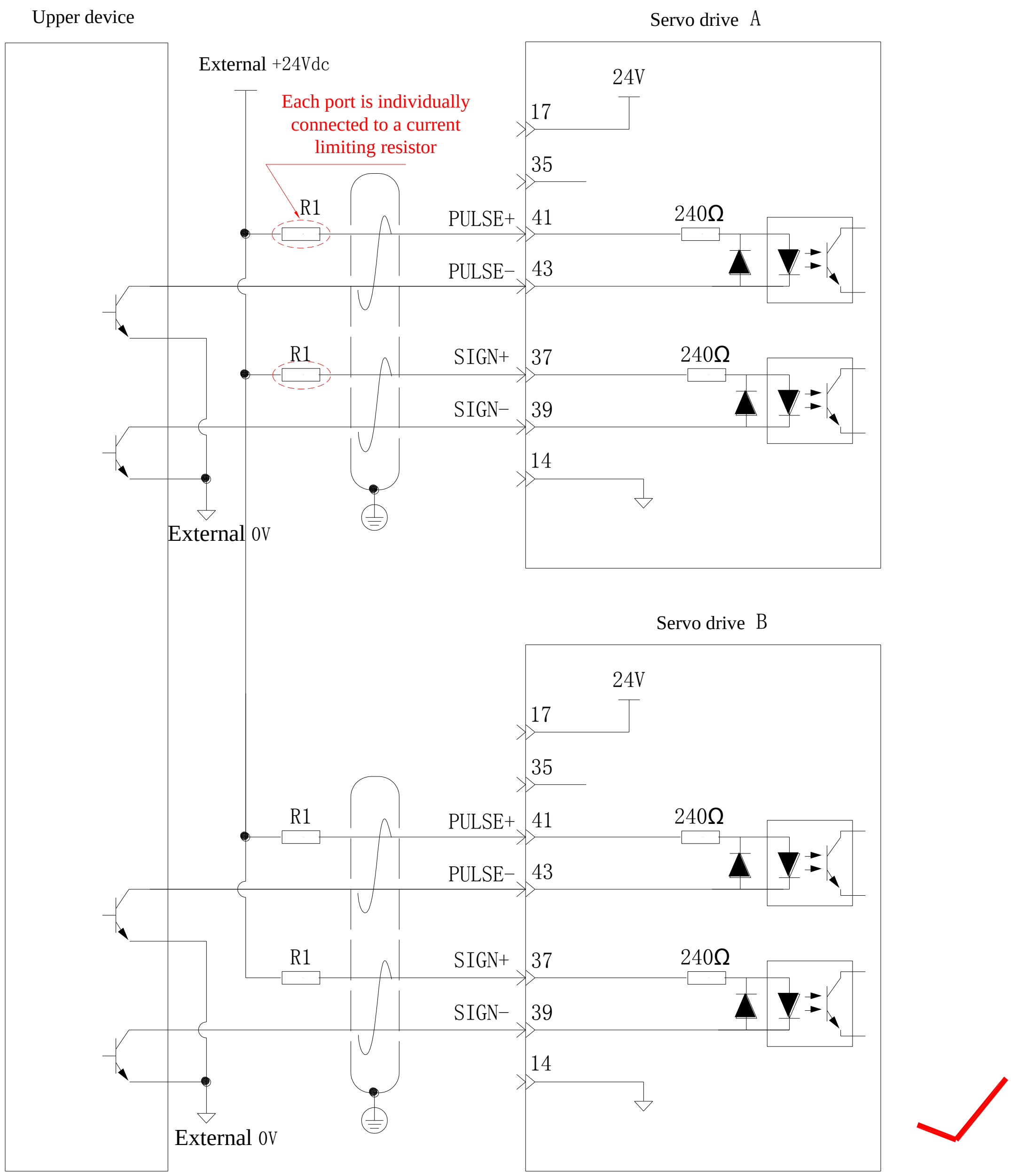
- Error 3: The signal port is not connected, resulting in the two ports not receiving pulses

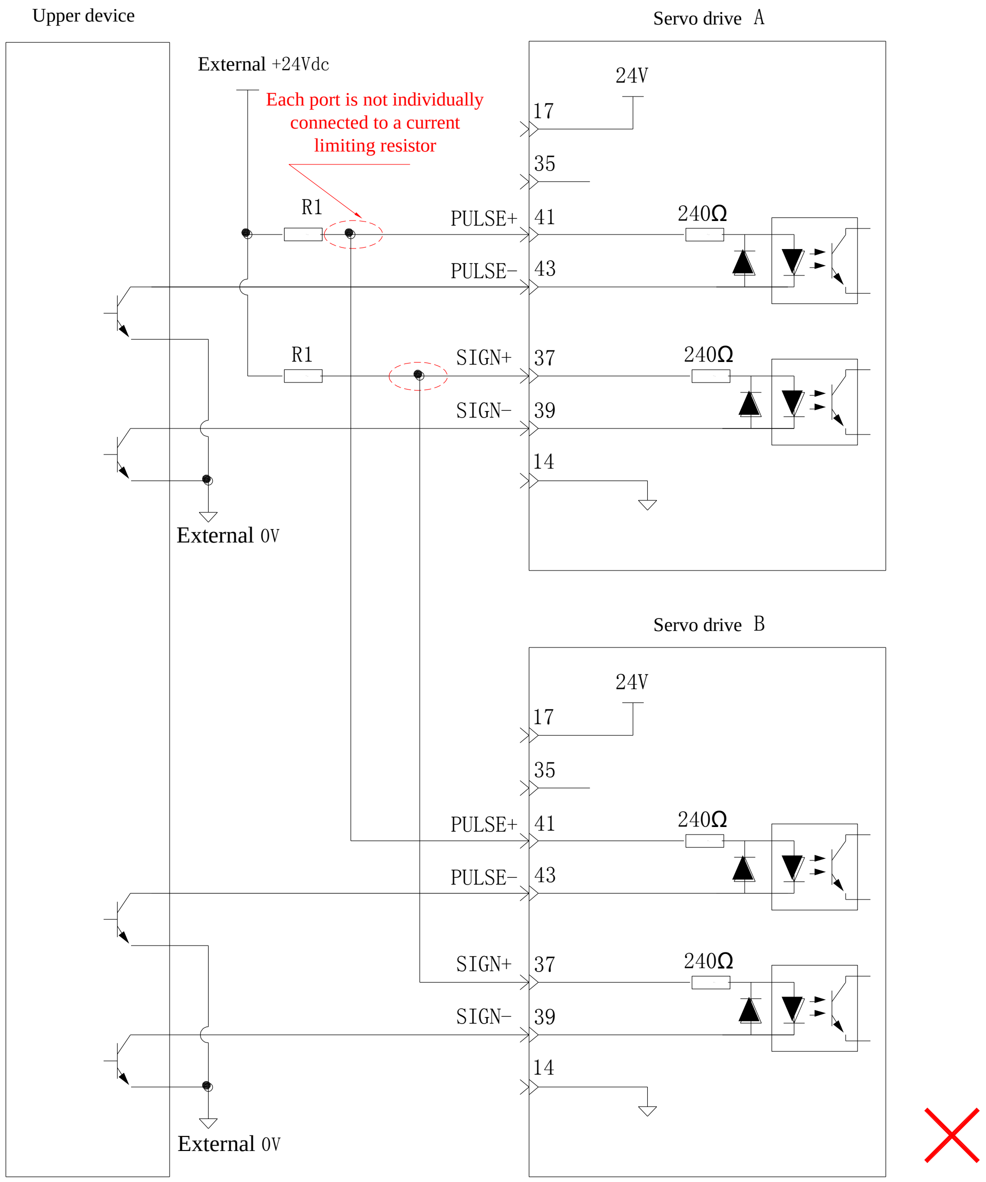


- Error 4: The port is connected incorrectly, resulting in port burning



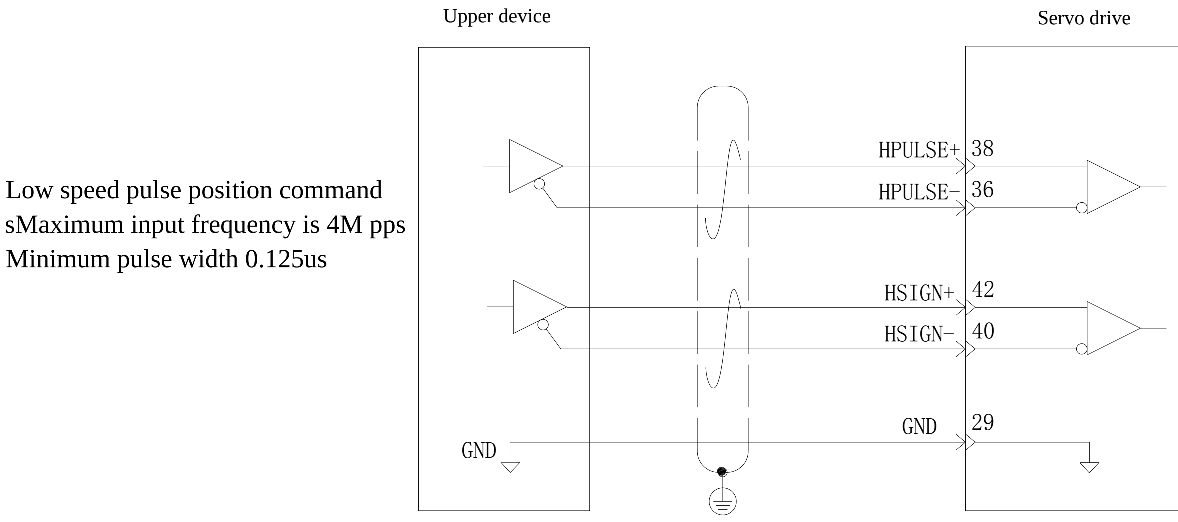
- Error 5: Multiple ports share current limiting resistance, resulting in pulse reception error


Upper device
Servo drive A
External +24Vdc
Each port is individually connected to a current limiting resistor
24V
17
35
R1
PULSE+
41
240Ω
PULSE-
43
R1
SIGN+
37
240Ω
SIGN-
39
14
External 0V
Servo drive B
24V
17
35
R1
PULSE+
41
240Ω
PULSE-
43
R1
SIGN+
37
240Ω
SIGN-
39
14
External 0V



2) High-speed pulse command input

The high-speed command pulse and symbol output circuit on the upper device side can only be output to the servo drive through the differential drive.



⚠Caution：

Please ensure that the differential input is 5V system, otherwise the input pulse of servo drive is unstable. This can result in the following situations:

- When inputting command pulse, pulse loss occurs;
- When the command direction is input, the command reversal occurs.
- Be sure to connect the 5V ground of the upper device to the GND of the drive to reduce noise interference.

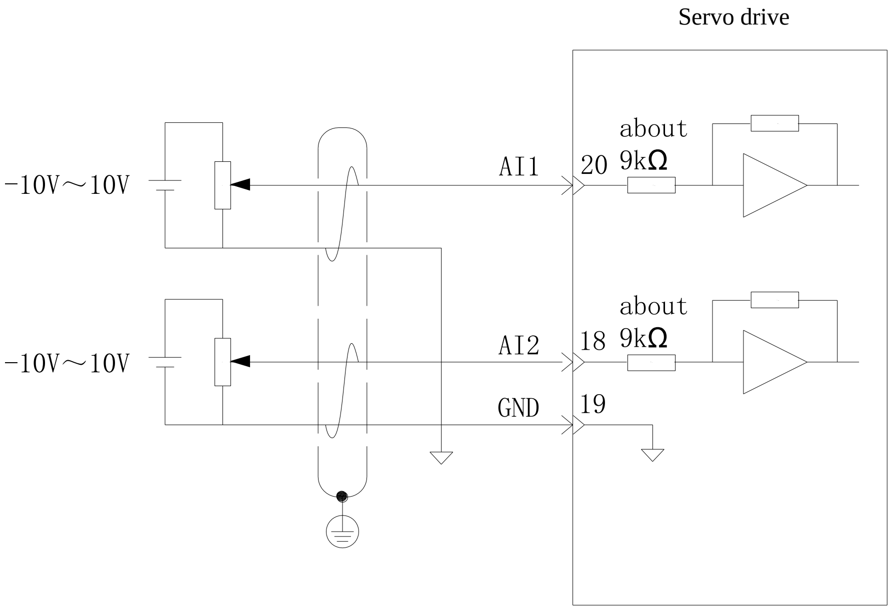
1.17.2 Analog input signal

Table 4-9 Description of Analog input signal

Signal name	Default function	Pin number	Function
Analog quantity	AI2	18	Ordinary Analog input signal, resolution 12 bits, input voltage: ± 12V maximum.
	AI1	20	
	GND	19	Analog input signal ground.

The speed and torque analog signal input ports are AI1 and AI2, the resolution is 12 bits, and the corresponding command of voltage value is set by P03 group.

- Voltage input range: - 10V~+10V;
- Maximum allowable voltage: ± 12V;
- Input impedance is about 9k Ω.



1.17.3 Digital input and output signal

Table 4-10 DI/DO signal description

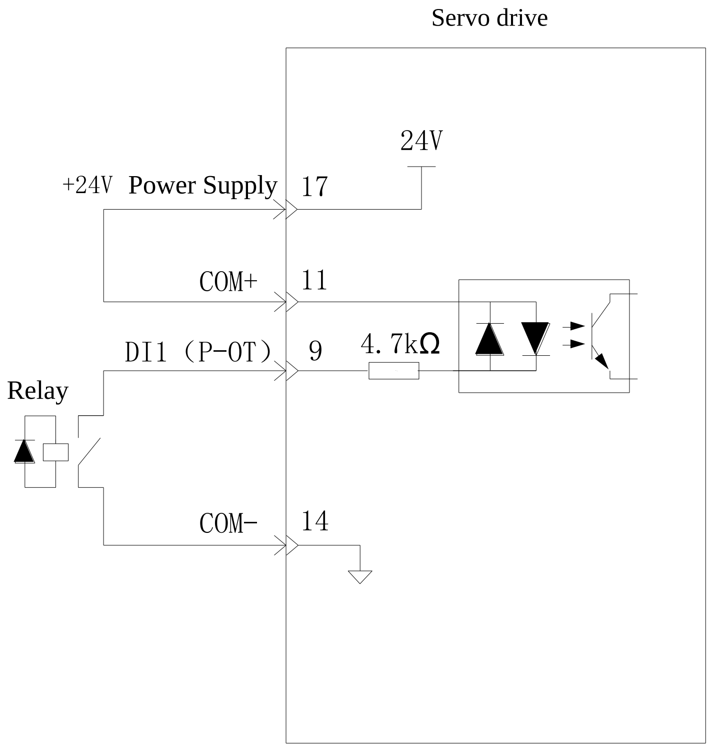
Signal name		Default function	Pin number	Function
General	DI1	P-OT	9	Keep the forward override switch.
	DI2	N-OT	10	Reverse override switch.
	DI3	INHIBIT	34	Pulse suppression.
	DI4	ALM-RST	8	Alarm reset (pulse edge effective function).

Signal name		Default function	Pin number	Function
	DI5	S-ON	33	Servo enabled.
	DI6	ZCLAMP	32	The zero position is fixed.
	DI7	GAIN-SEL	31	Gain switching.
	DI8	HomeSwitch	30	Home switch.
	DI9	Reserved	12	-
	+24V		17	Internal 24V power supply, voltage range+20~28V, maximum output current 100mA. (For 220V 018 and below, this pin is empty pin)
	COM-		14	
	COM+		11	Power input terminal (12V~24V).
	DO1+	S-RDY+	7	The servo is ready.
	DO1-	S-RDY-	6	
	DO2+	COIN+	5	Location complete.
	DO2-	COIN-	4	
	DO3+	ZERO+	3	Zero speed.
	DO3-	ZERO-	2	
	DO4+	ALM+	1	Fault output.
	DO4-	ALM-	26	
	DO5+	HomeAttain+	28	Zero return of the home is completed.
	DO5-	HomeAttain-	27	

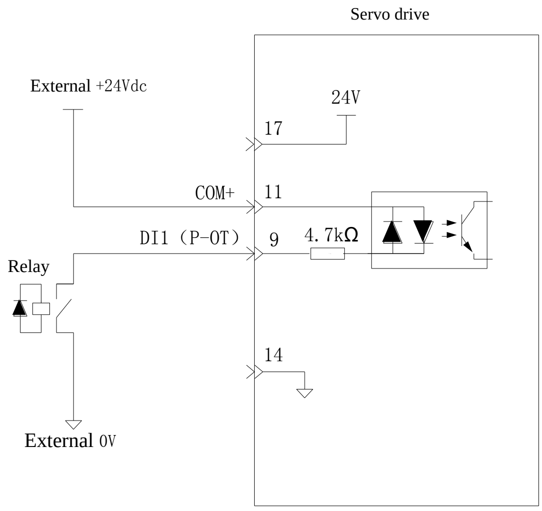
1) Digital input circuit

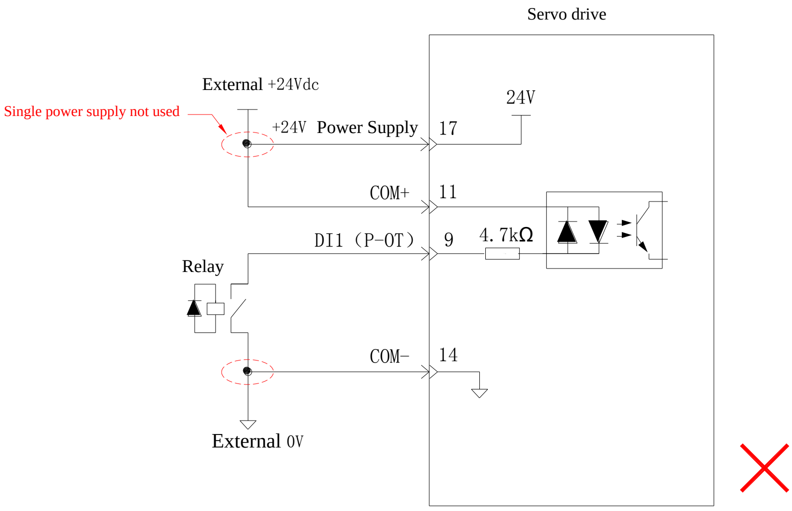
a) Taking DI1 as an example, the interface circuits between DI1 and DI9 are the same.When the upper device is a relay output:

① When using the internal 24V power supply of the servo drive:



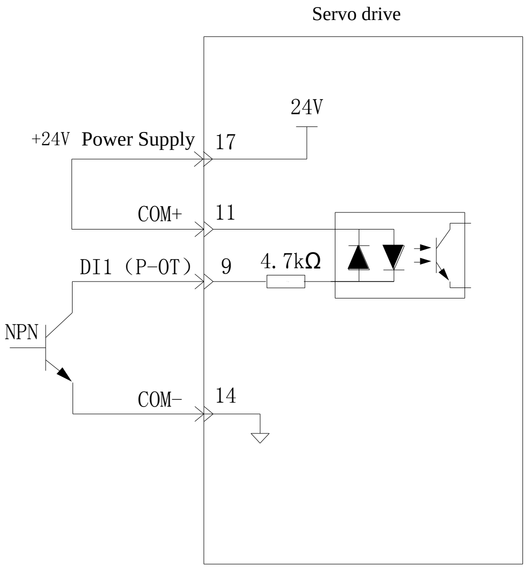
② When using an external power supply:

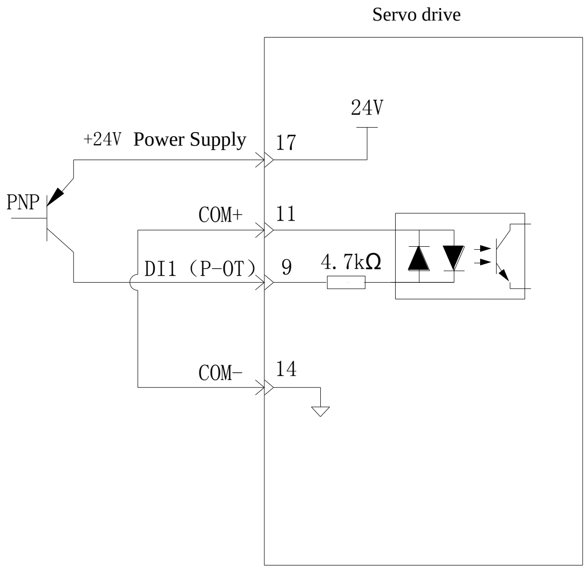




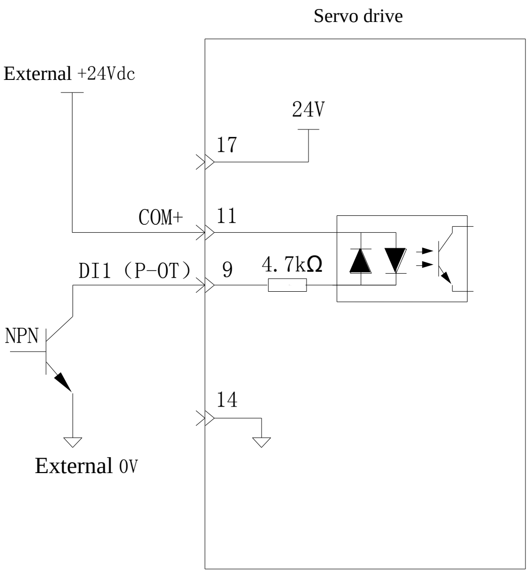
b) When the upper device has an open collector output:

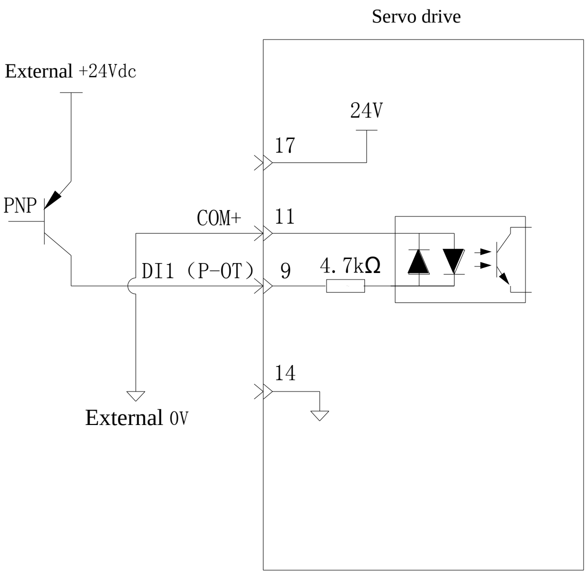
① When using the internal 24V power supply of the servo drive:





② When using an external power supply:



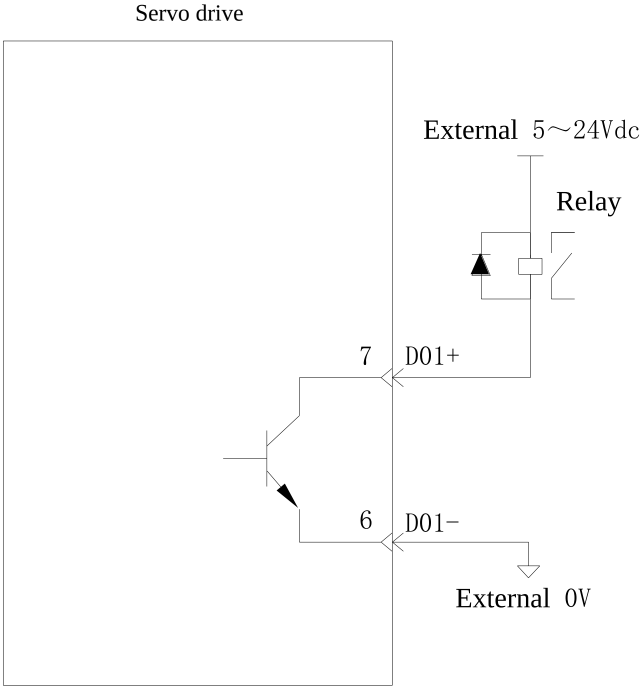


- Mixing PNP and NPN inputs is not supported.

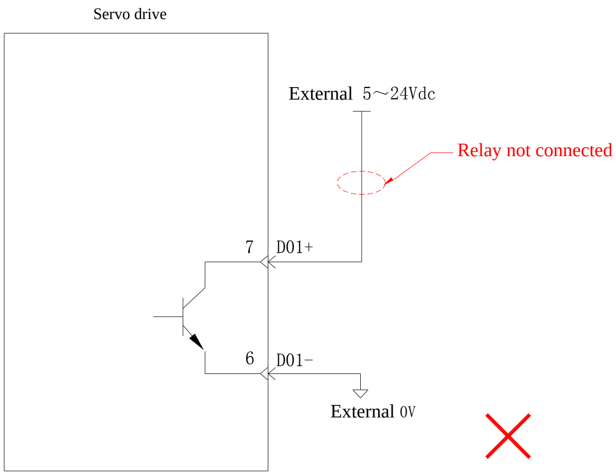
2) Digital output circuit

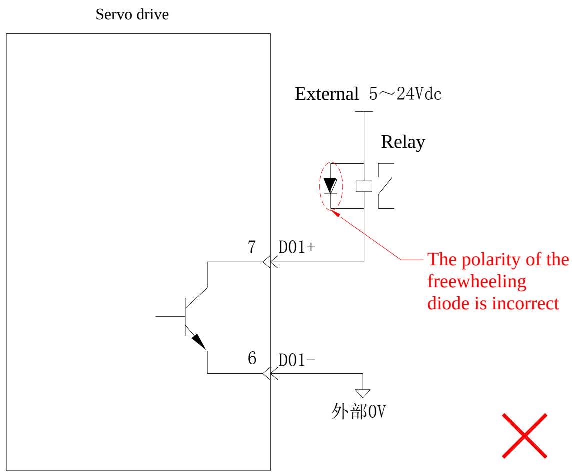
Take DO1 as an example to illustrate that the interface circuits between DO1 and DO5 are the same.

a) When the upper device is a relay input：

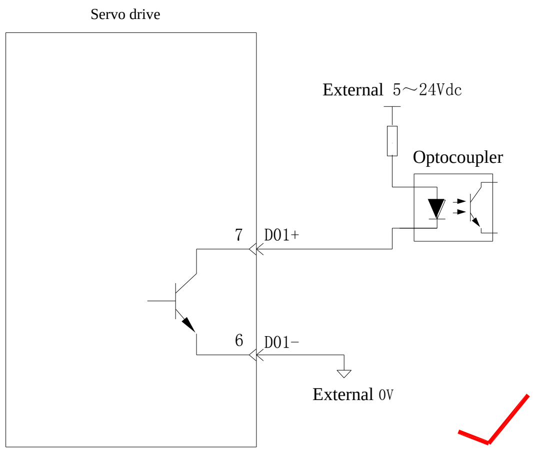


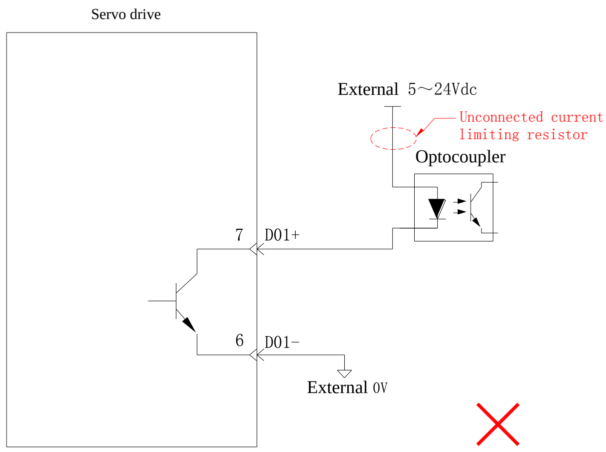
- When the superior device is a relay input, be sure to connect the freewheeling diode, otherwise the DO port may be damaged.





b) When the upper device is an optocoupler input：





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

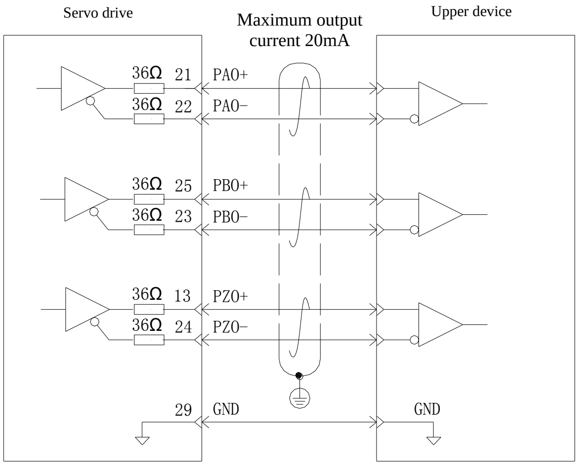
- Voltage: DC30V (maximum)
- Current: DC50mA (maximum)

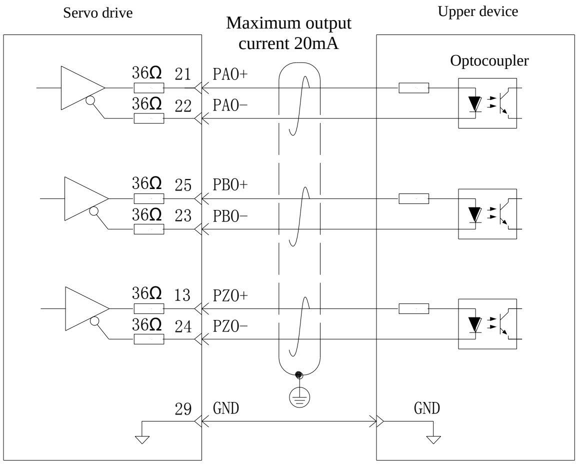
1.17.4 Encoder frequency division output circuit

Table 4-11 Encoder Frequency Division Output Signal Description

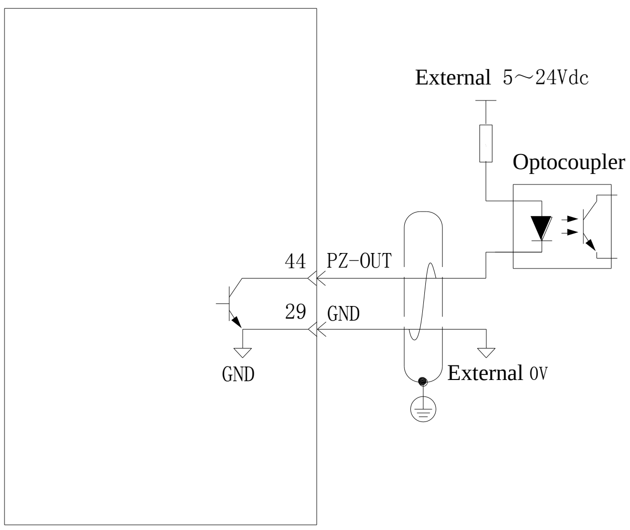
Signal name	Default functions	Pin NO.	Functions	Signal name
General	PAO+ PAO-	21 22	A-phase frequency division output signal	Orthogonal frequency division pulse output signal of A and B
	PBO+ PBO-	25 23	B-phase frequency division output signal	
	PZO+ PZO-	13 24	Z-phase frequency division output signal	Home pulse output signal
	PZ-OUT	44	Z-phase frequency division output signal	Home pulse collector open circuit output signal
	GND	29	Home pulse collector open circuit output signal ground	
	+5V	15	Internal 5V power supply, maximum output current 200mA	
	GND	29		
	PE	Casing	-	

Encoder frequency division output circuit outputs differential signals through a differential drive. Generally, feedback signals are provided when constructing a position control system for the upper device. On the upper device side, please use a differential or optocoupler receiving circuit for reception, with a maximum output current of 20mA.





The encoder Z-phase frequency division output circuit can open a signal through the collector. Generally, feedback signals are provided when constructing a position control system for the upper device. On the upper device side, please use a photocoupler circuit, relay circuit, or bus receiver circuit to receive.



NOTE

- Be sure to connect the 5V ground of the upper device to the GND of the drive, and use twisted pair shielded wires to reduce noise interference.

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

- Voltage: DC30V (maximum)
- Current: DC50mA (maximum)

1.17.5 Brake wiring

Band brake is a mechanism that prevents the servo motor shaft from moving and keeps the motor locked in position when the servo drive is not running, so that the moving part of the machine will not move due to its own weight or external force.

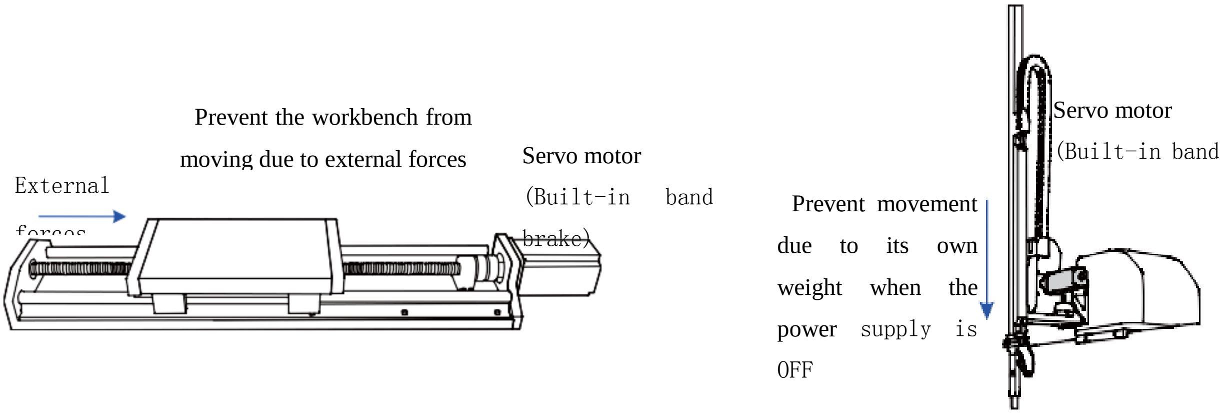


Figure 4-9 Schematic diagram of band brake application

⚠Caution:

- The band brake mechanism built into the servo motor is a fixed special mechanism that is not powered on and cannot be used for braking purposes. It is only used to keep the servo motor in a stopped state.
- The band brake coil has no polarity.
- After the servo motor is stopped, turn off the servo enable (S-ON).
- When the motor with built-in band brake operates, the band brake may emit a clicking sound, which has no functional impact.
- When the brake coil is energized (in the open state of the brake), magnetic flux leakage may occur at the shaft end and other parts. Please pay attention when using instruments such as magnetic sensors near the motor.

Band brake wiring

The connection of the band brake input signal has no polarity and requires the user to prepare a 24V power supply. An example of the standard wiring between the band brake signal BK and the band brake power supply is as follows:

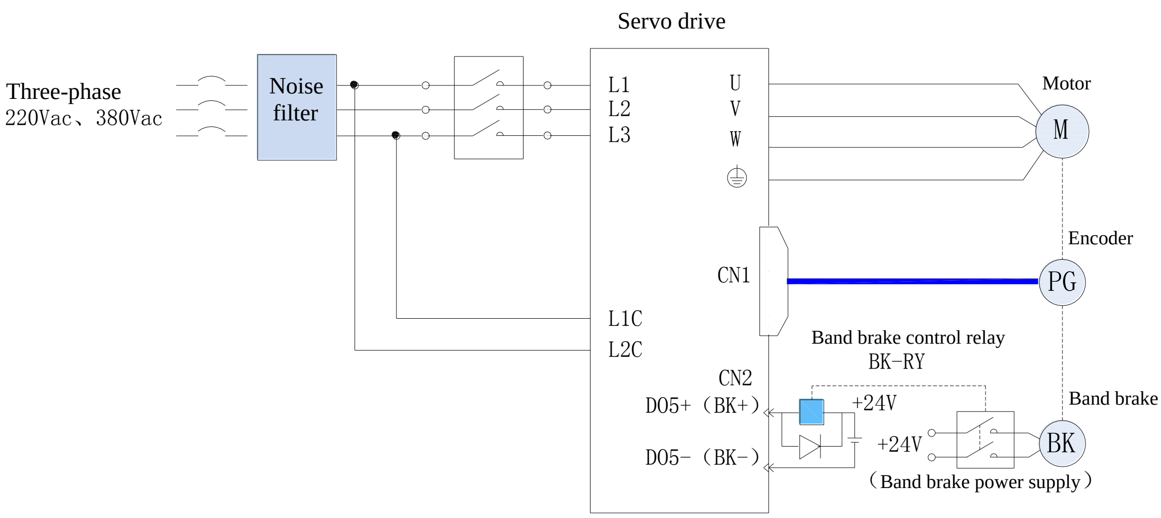


Figure 4-10 Brake wiring diagram

■ Precautions for brake wiring:

- The cable length of the motor band brake needs to fully consider the voltage drop caused by the cable resistance, and the input voltage for the band brake running needs to be guaranteed to be at least 21.6V.
- It is best not to share the power supply with other electrical appliances to prevent the voltage or current from dropping due to the running of other electrical appliances, which ultimately leads to incorrect running of the band brake.
- It is recommended to use cables above0.5mm².

1.18 Communication signal CN3/CN4 wiring

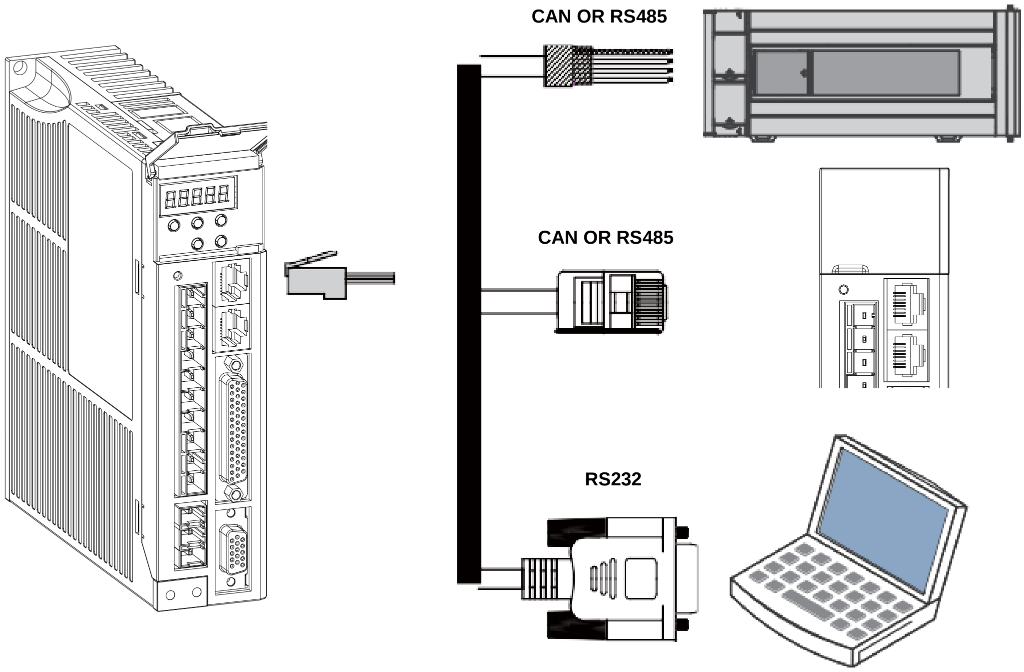
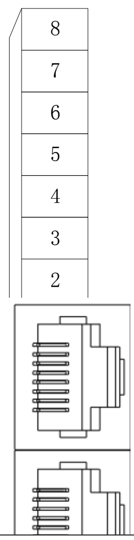


Figure 4-11 Communication Wiring Diagram

The CAN3/CN4 terminal on the drive allows communication connections between the drive and PCs, PLCs, and drives. The terminal pins of CAN3/CN4 are defined as follows：

Table 4-12 Communication Signal Connector Pin Definitions

Pin number	Definition	Description	Terminal pin distribution
1	CANH	CAN communication port	
2	CANL		
3	GND	CAN communication ground	
4	RS485+	RS485 communication port	
5	RS485-		
6	RS232-TXD	RS232 sending end, connected to the receiving end o the upper computer	
7	RS232-RXD	RS232 receiving end, connected to the sending end o the upper computer	
8	GND	Ground	
Hull	PE	Shield	

1.18.1 CAN COMMUNICATION NETWORKING CONNECTION

CAN communication connection with PLC

When using CAN communication networking, the connecting cables between the drive and the PLC are as follows：

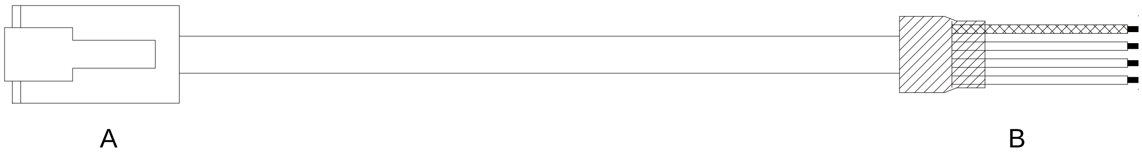


Figure 4-12 Example Appearance of PLC and Servo Communication Cables

Table 4-13 Pin connection relationship between PLC and servo communication cable

Drive side RJ45 (A-end)			Drive side RJ45 (B end)		
Communication type	Signal name	Pin No.	Communication type	Signal name	Pin No.
CAN	CANH	1	CAN	CANH	1
	CANL	2		CANL	2
	CGND	3		CGND	3
-	PE (shielding mesh layer)	Shell	-	PE (shielding mesh layer)	Shell

1) CAN communication connection of multiple machines in parallel

When using CAN communication networking, the connecting cables for parallel connection of multiple drives are as follows：

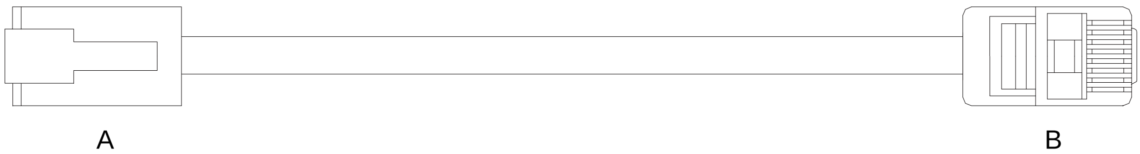


Figure 4-13 Example Appearance of Multiple Parallel Communication Cables

Table 4-14 Pin connection relationship of multiple parallel communication cables

Drive side RJ45 (A-end)			Drive side RJ45 (B end)		
Communication type	Signal name	Pin No.	Communication type	Signal name	Pin No.
CAN	CANH	1	CAN	CANH	1
	CANL	2		CANL	2
	CGND	3		CGND	3
-	PE (shielding mesh layer)	Shell	-	PE (shielding mesh layer)	Shell

2) Precautions for CAN communication grounding

When using CAN communication, note that the CGND terminal of the upper device is connected to the CGND terminal of the servo drive, as shown in the following figure:

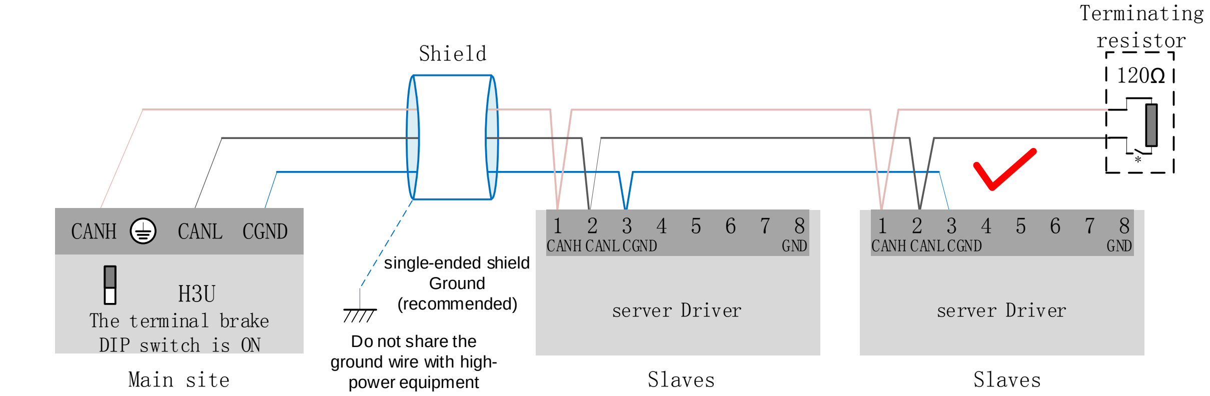


Figure 4-14 Correct CAN connection method

Caution:

- The PLC has a built-in CAN communication terminal resistor, and the corresponding dial switch must be set to ON;
- It is recommended to ground the shielding layer at a single end;
- Do not connect the CGND terminal of the upper device to the GND terminal of the servo drive, otherwise the machine will be damaged.

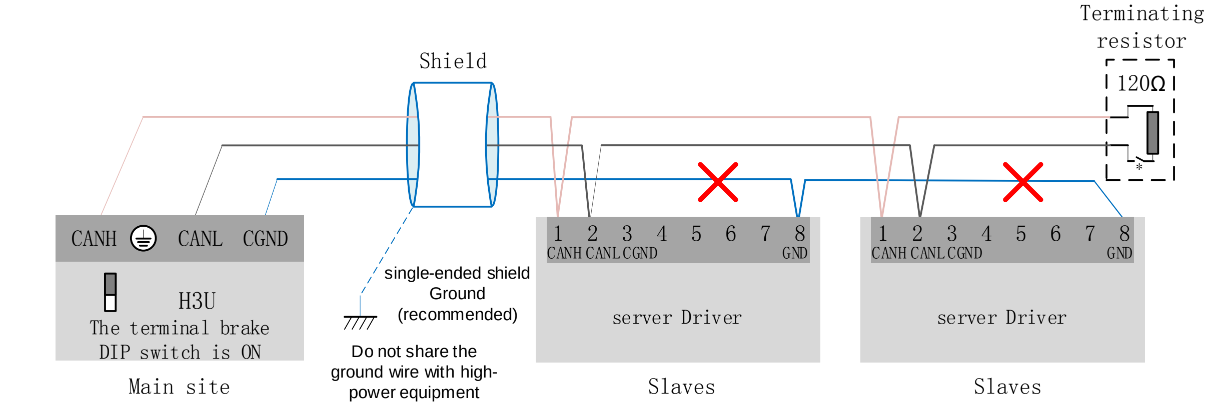


Figure 4-15 Incorrect CAN connection method

1.18.2 485 communication networking connection

1) 485 communication connection with PLC

When using 485 communication networking, the connecting cables between the drive and the PLC are as follows:

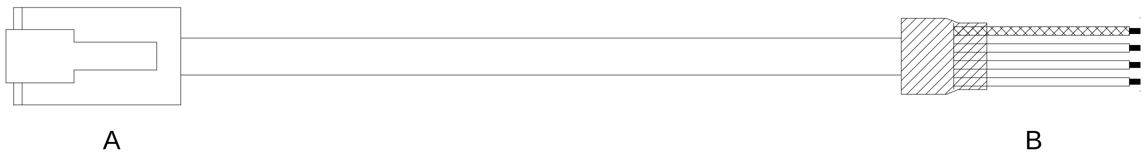


Figure 4-16 Example of PLC and servo communication cable appearance

Table 4-15 Pin connection relationship between PLC and servo communication cable

Drive side RJ45 (A-end)			PLC side (B end)		
Communication type	Signal name	Pin No.	Communication type	Signal name	Pin No.
RS485	RS485+	4	RS485	RS485+	4
	RS485-	5		RS485-	5
	GND	8		GND	8
-	PE (shielding mesh layer)	Shell	-	PE (shielding mesh layer)	Shell

2) 485 communication connection with multiple machines in parallel

When using 485 communication networking, the connecting cables for parallel connection of multiple drives are as follows:

Figure 4-17 Example Appearance of Multiple Parallel Communication Cables

Table 4-16 Pin Connection Relationships of Multimachine Parallel Communication Cables

Drive side RJ45 (A-end)			PLC side (B end)		
Communication type	Signal name	Pin No.	Communication type	Signal name	Pin No.
RS485	RS485+	4	RS485	RS485+	4
	RS485-	5		RS485-	5
	GND	8		GND	8
-	PE (shielding mesh layer)	Shell	-	PE (shielding mesh layer)	Shell

3) 485 Communication Grounding Precautions

When using RS485 communication, pay attention to the connection between the GND terminal of the upper device and the GND terminal of the servo drive, as shown in the following figure:

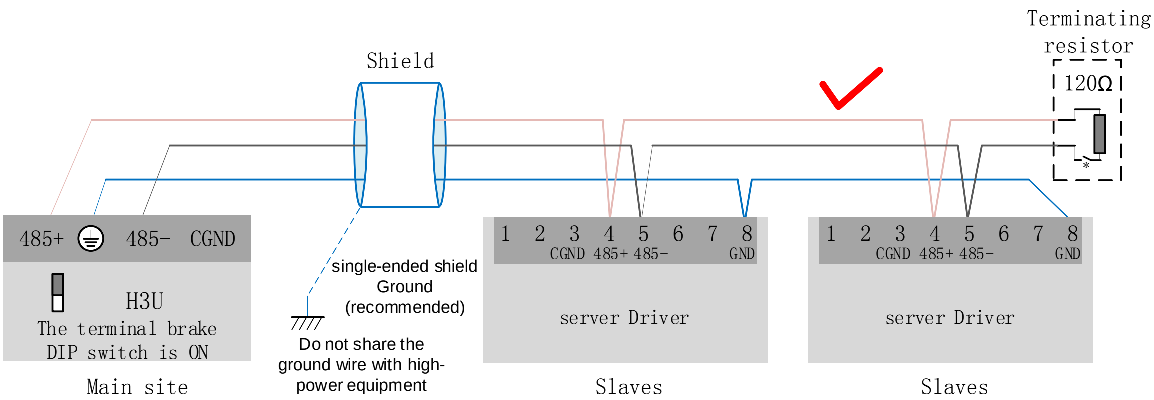


Figure 4-18 Correct 485 Connection Method

⚠Caution:

- The PLC has a built-in 485 communication terminal resistor, and the corresponding dial switch must be set to ON;
- It is recommended to ground the shielding layer at a single end;

- Do not connect the GND terminal of the upper device to the CGND terminal of the servo drive, otherwise the machine will be damaged!

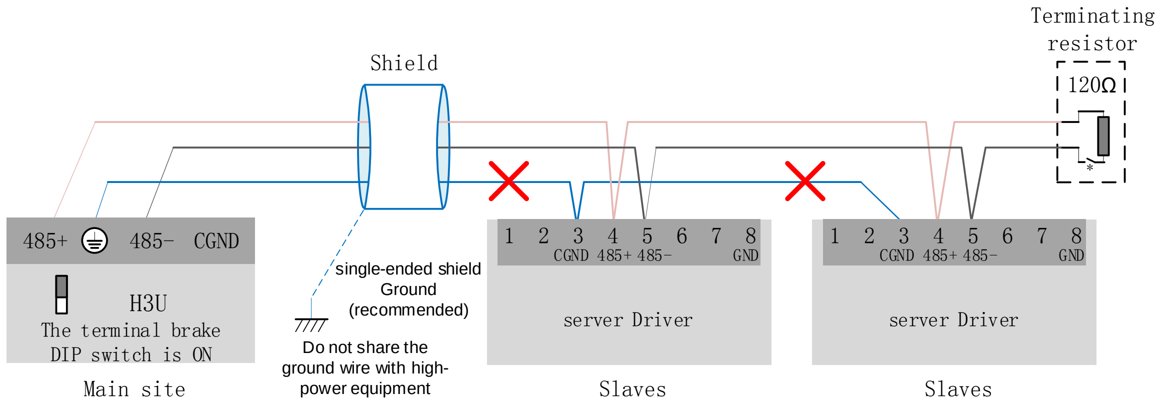


Figure 4-19 Incorrect 485 connection method

1.18.3 Communication connection with PC (232 communication)

Users can connect the drive and PC through a PC communication cable. It is recommended to use a commonly used communication interface RS-232. The cable diagram is as follows：

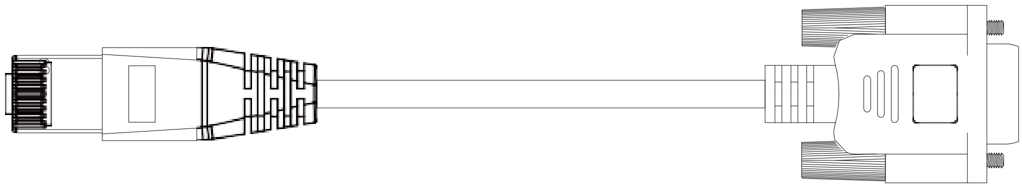


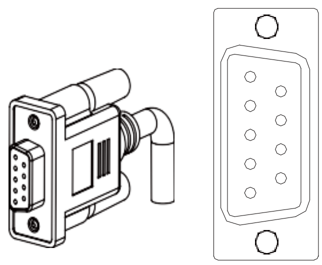
Figure 4-20 Example Appearance of PC Communication Cable

Table 4-17 Pin connection relationship between drive and PC communication cable

Drive side RJ45 (A-end)		PC terminal DB9 (B terminal)	
Signal name	Pin No.	Signal name	Pin No.
RS232-TXD	6	PC-RXD	2
RS232-RXD	7	PC-TXD	3
GND	8	GND	5
PE (shielding mesh layer)	Shell	PE (shielding mesh layer)	Shell

The corresponding PC terminal DB9 is defined as follows.

Table 4-18 Definition of DB9 terminal pin at PC end of communication cable (B end in the above table)

Pin No.	Definition	Description	Terminal pin distribution
2	PC-RXD	PC receiver	
3	PC-TXD	PC sending terminal	
5	GND	Ground	
Shell	PE	Shield	

If the host computer is not configured with a serial port and can only connect to a USB interface, it can be converted using a serial port to USB cable.

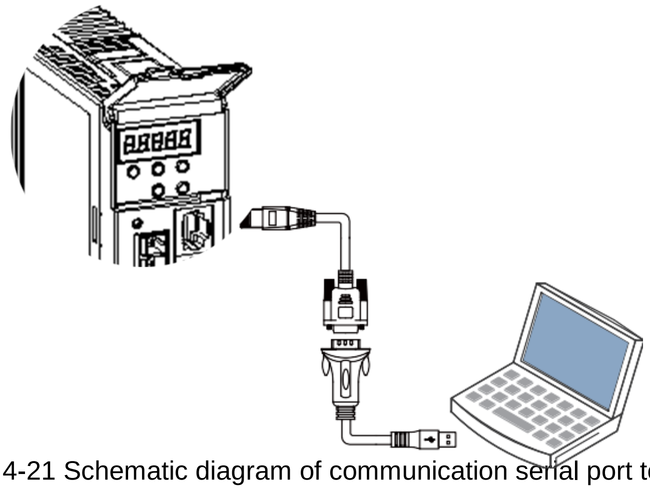


Figure 4-21 Schematic diagram of communication serial port to USB

1.19 Anti-interference measures for electrical wiring

To suppress interference, please take the following measures：

1) The length of the command input cable should be less than 3m, and the encoder cable should be less than 20m.
2) Use thick wires for grounding as much as possible. ($2.0mm^2$ Above)
   a) It is recommended to use more than D types of grounding (with a grounding resistance value of less than 100 Ω).
   b) Must be grounded at one point.
3) Please use a noise filter to prevent radio frequency interference. When using in a civil environment or in an environment with strong power interference noise, please install a noise filter on the input side of the power cord.
4) To prevent malfunctions caused by electromagnetic interference, the following processing methods can be used：
   a) Install the upper device and noise filter near the servo drive as much as possible.
   b) Install surge suppressors on the coils of relays, screw tubes, and electromagnetic contactors.
   c) When wiring, please separate strong current lines from weak current lines and maintain a spacing of more than 30cm. Do not place in the same pipe or bundle together.
   d) Do not share power with electric welding machines, electrical discharge machining equipment, etc. When there is a high-frequency generator nearby, please install a noise filter on the input side of the power cord.

1.19.1 Examples of anti-interference wiring and grounding treatment

The main circuit of this servo drive uses "high-speed switching elements", which may cause switching noise to affect the normal running of the system due to differences in the peripheral wiring and grounding processing of the servo drive. Therefore, it is necessary to adopt correct grounding methods and wiring processing, and add noise filters if necessary.

1) Examples of anti-interference wiring

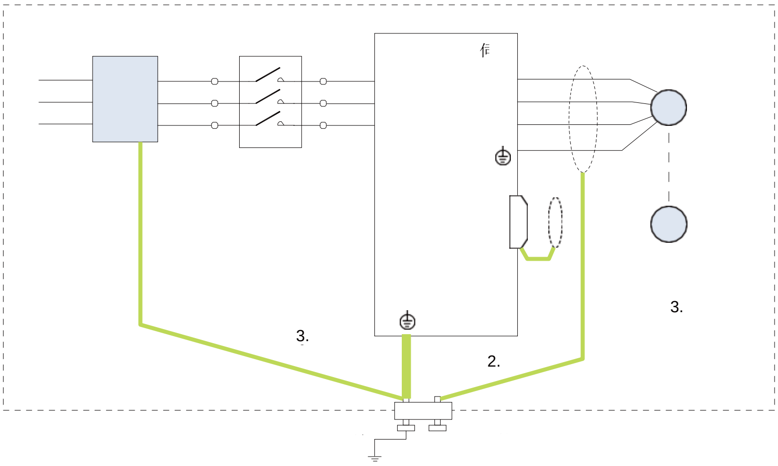
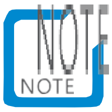


Figure 4-22 Example of anti-interference wiring



- Please use 3.5mm outer box connecting wire for grounding as much as possible ² The thick line above. (Braided copper wire is recommended)
- When using a noise filter, please observe the precautions described in "Use of noise filter" below.

2) Grounding treatment

To avoid possible electromagnetic interference issues, please ground as follows.

a) Grounding of servo motor housing

Please connect the ground terminal of the servo motor to the ground terminal PE of the servo drive, and reliably ground the PE terminal to reduce potential electromagnetic interference problems.

b) Power line shield grounding

Please ground the shielding layer or metal conduit in the main circuit of the motor at both ends. Crimping is recommended to ensure good bonding.

c) Grounding of servo drive

The grounding terminal PE of the servo drive needs to be reliably grounded, and the fixing screw should be tightened to maintain good contact.

1.19.2 Use of noise filter

To prevent interference from the power cord and weaken the impact of the servo drive on other sensitive devices, please select a corresponding noise filter at the power input terminal based on the magnitude of the input current. In addition, please install a noise filter at the power cord of the peripheral device as needed. When installing and wiring a noise filter, please observe the following precautions to avoid weakening the actual use effect of the filter.

1) Please arrange the input and output wiring of the noise filter separately, and do not put them into the same pipe or bundle them together.

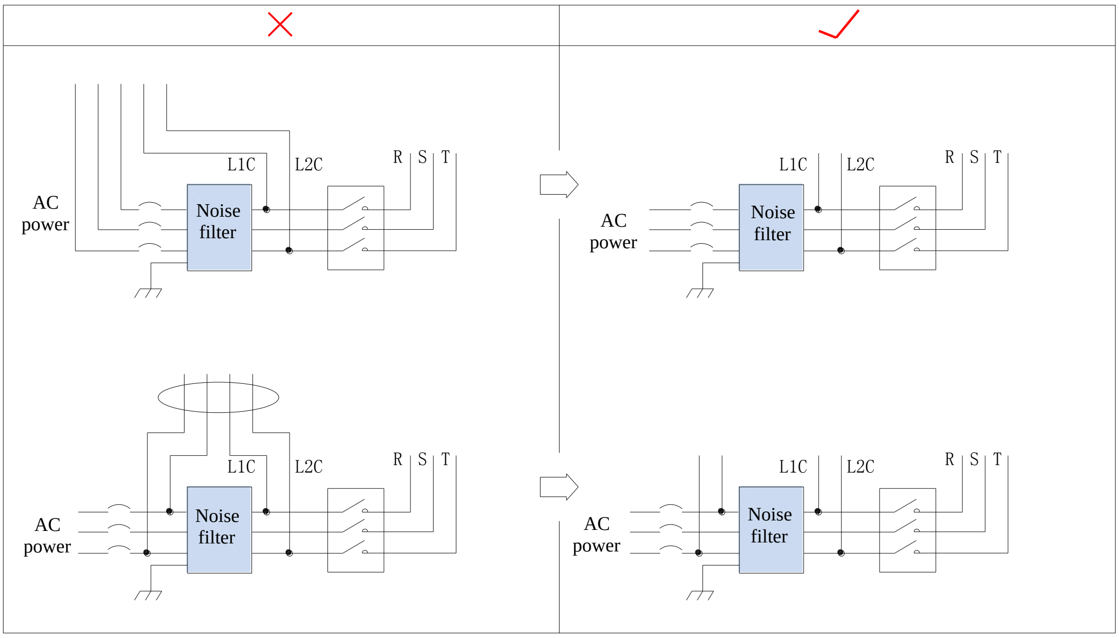


Figure 4-23 Noise Filter Input and Output Wiring Separation Routing Diagram

2) **Separate the ground wire of the noise filter from its output power line.**

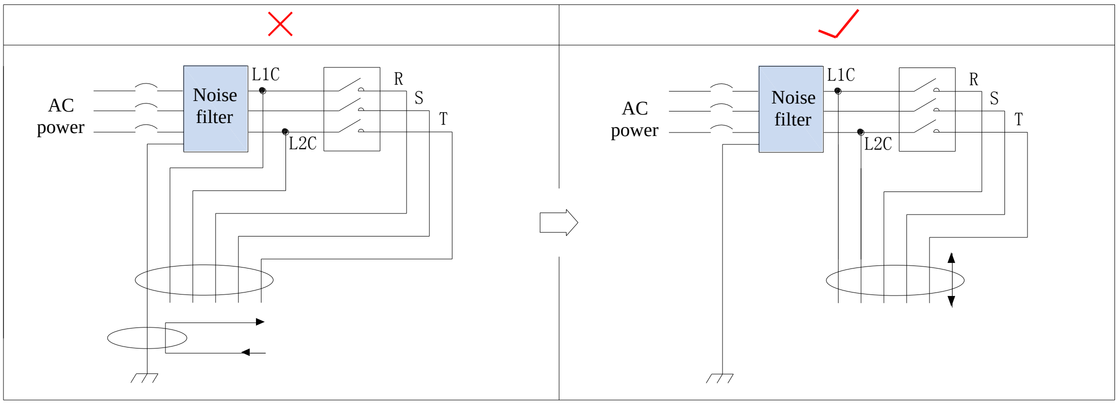


Figure 4-24 Schematic diagram of separate routing of noise filter ground wire and output wiring

3) **The noise filter should be grounded separately using a thick wire that is as short as possible. Do not share a ground wire with other grounding devices.**

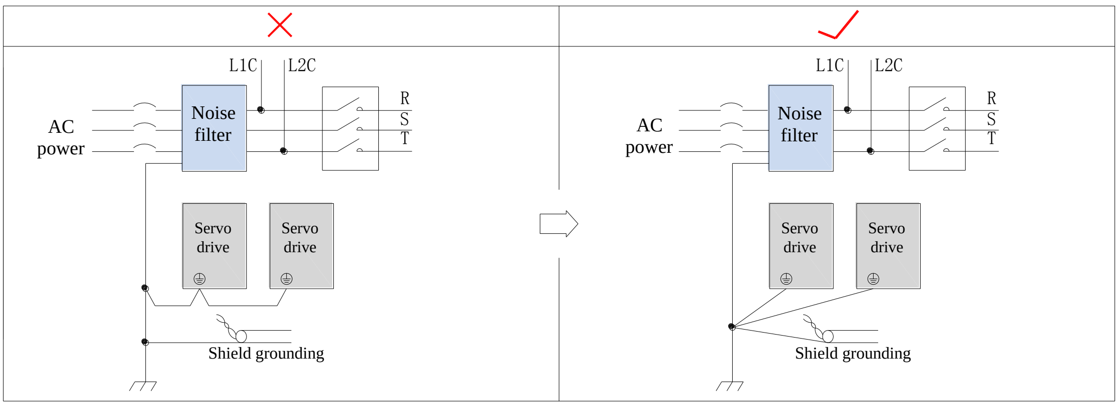


Figure 4-25 Single Point Grounding Schematic Diagram

4) Noise filter ground wire processing installed in the control cabinet

When the noise filter and servo drive are installed in a control cabinet, it is recommended to fix the filter and servo drive on the same metal plate, ensure that the contact parts are electrically conductive and well lapped, and ground the metal plate. Or separately grounded as shown in Figure 4-26.

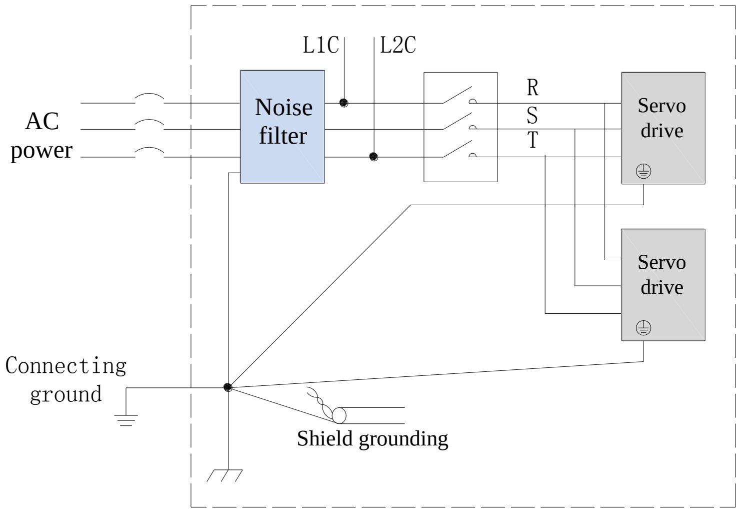


Figure 4-26 Noise Filter Ground Wire Processing Diagram

1.20 Precautions for cable use

1) Do not bend or strain the cable. Due to the fact that the core wire diameter of the signal cable is only 0.2mm or 0.3mm, it is easy to break. Please pay attention when using it.
2) When moving cables, please use flexible cables. Ordinary cables can easily be damaged after long-term bending. Small power motors with their own cables cannot be used for cable movement occasions.
3) When using cable protection chains, ensure that：

●The bending radius of the cable is more than 10 times the outer diameter of the cable;

●Do not fix or bundle the wiring inside the cable protection chain, but only bundle and fix it at the two immovable ends of the cable protection chain;

●Do not wind or twist the cable;

●Ensure that the duty factor within the cable protection chain is below 60%;

●Do not mix cables with too large differences in appearance to prevent thick wires from breaking the thin wires. Be sure to mix cables. Please install a partition device in the middle of the cable.

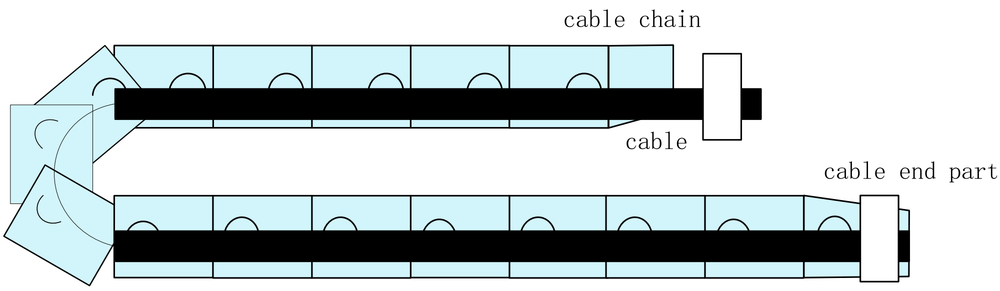


Figure 4-27 Schematic Diagram of Cable Protection Chain

1.21 Wiring in three control modes

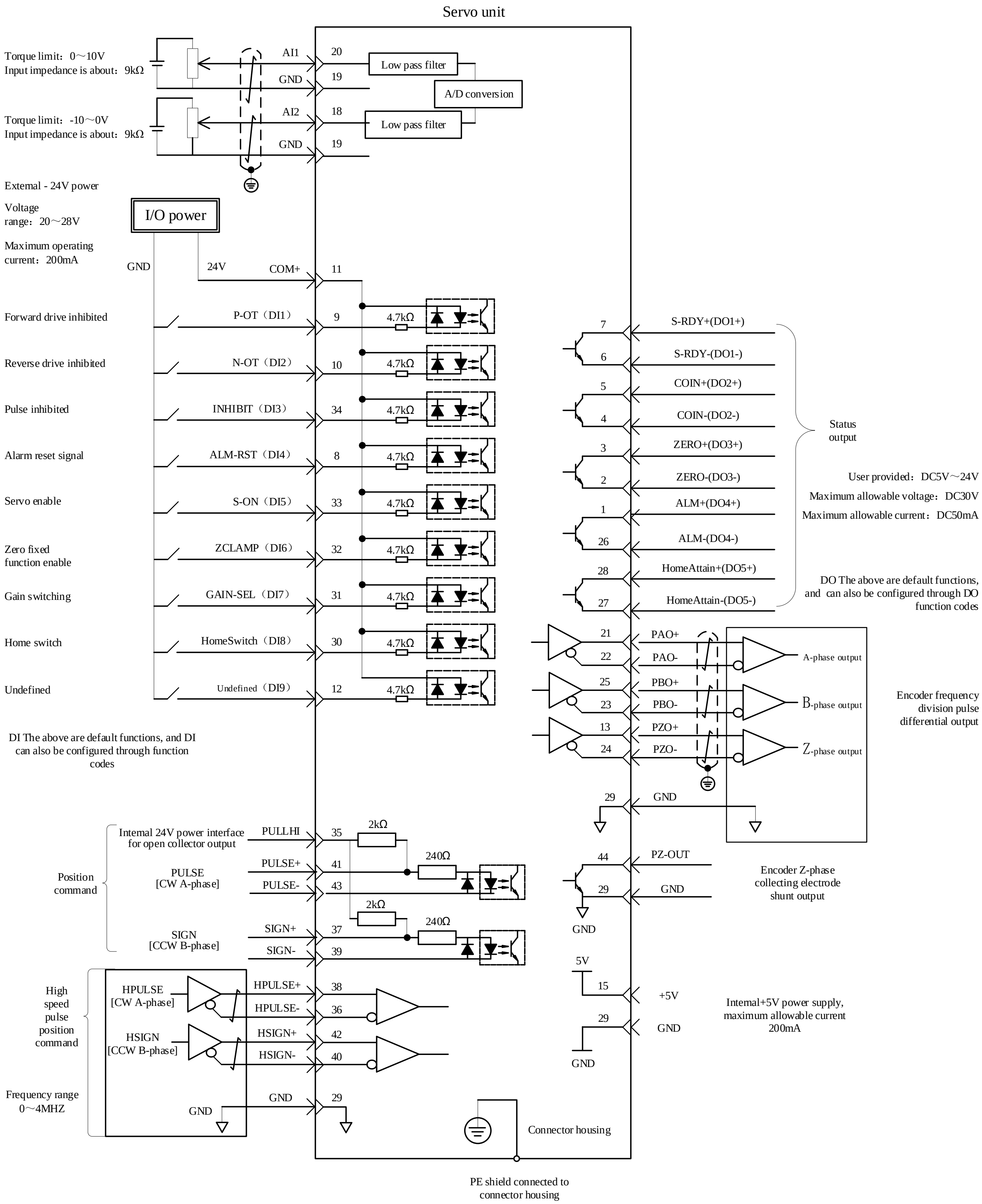


Figure 4-28 Location Mode Wiring Diagram

NOTE

- Please select twisted pair shielded wire for AI/AO circuit wiring, and both ends of the shielding layer must be connected to PE.
- The internal+24V power supply voltage range is 20~28V, and the maximum working current is 200mA.
- DI8 and DI9 are high-speed DI, please select and use them according to their functions.
- Please select twisted pair shielded wire for high-speed/low-speed pulse port wiring. Both ends of the shielding layer must be connected to PE, and GND must be reliably connected to the upper computer signal ground.
- The DO output power supply is provided by the user, with a power supply range of 5V to 24V. The maximum allowable voltage of DO port is DC30V, and the maximum allowable current is 50mA.
- Please select twisted pair shielded cables for encoder frequency division output cables. Both ends of the shielding layer must be connected to PE, and GND must be reliably connected to the upper computer signal ground.
- Internal+5V power supply, maximum allowable current 200mA。

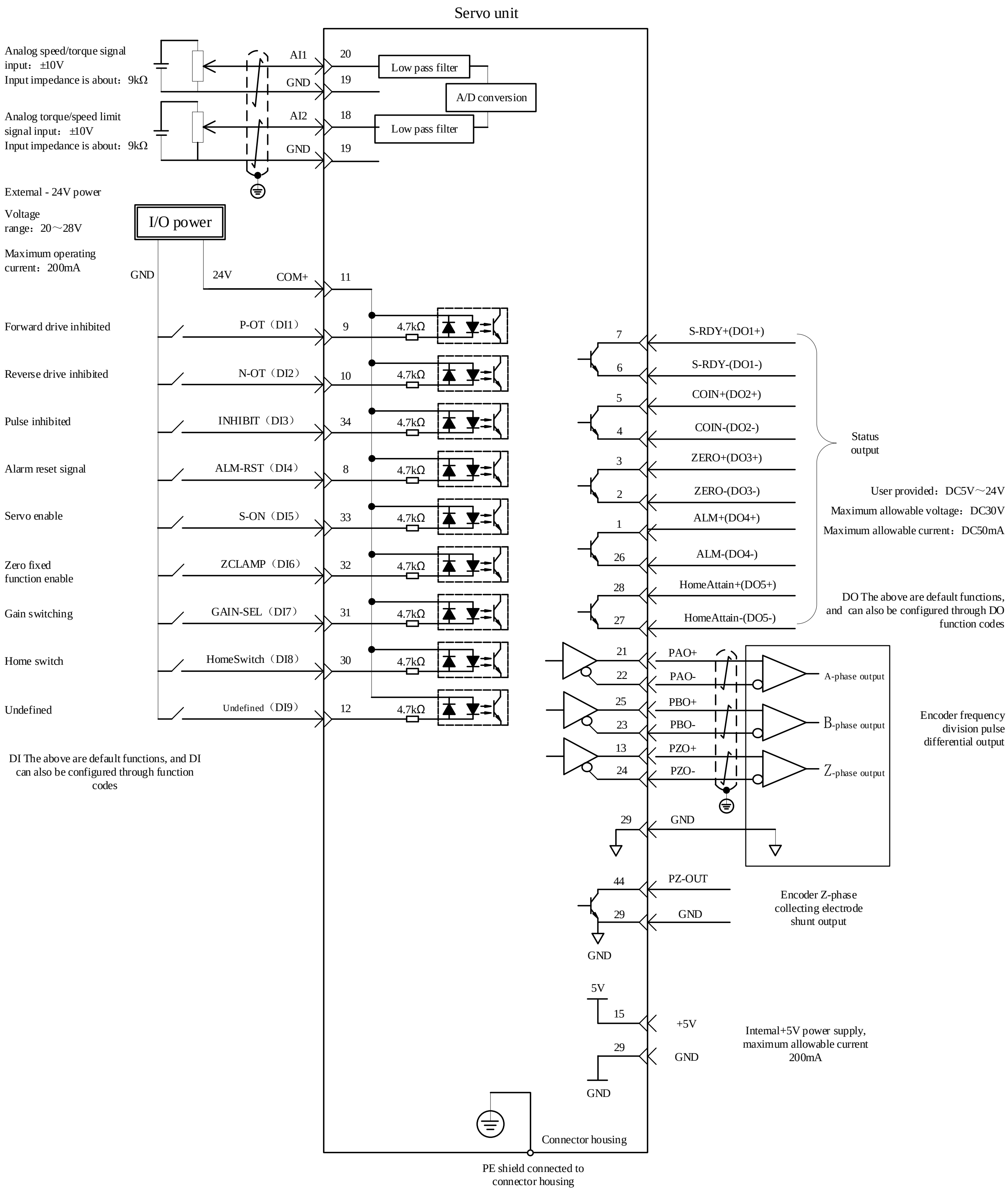


Figure 4-29 Speed Mode Wiring Diagram

NOTE

- The internal+24V power supply voltage range is 20~28V, and the maximum working current is 200mA.
- DI8 and DI9 are high-speed DIs, please choose to use them according to their functions.
- Please select twisted pair shielded wire for AI/AO circuit wiring, and the shielding layer must be connected to PE at both ends.

- The DO output power supply is provided by the user, with a power supply range of 5V to 24V. The maximum allowable voltage of DO port is DC30V, and the maximum allowable current is 50mA.
- The encoder frequency division output cable should be a twisted pair shielded wire. The shielding layer must be connected to PE at both ends, and the GND must be reliably connected to the upper computer signal ground.
- Internal+5V power supply, maximum allowable current 200mA.

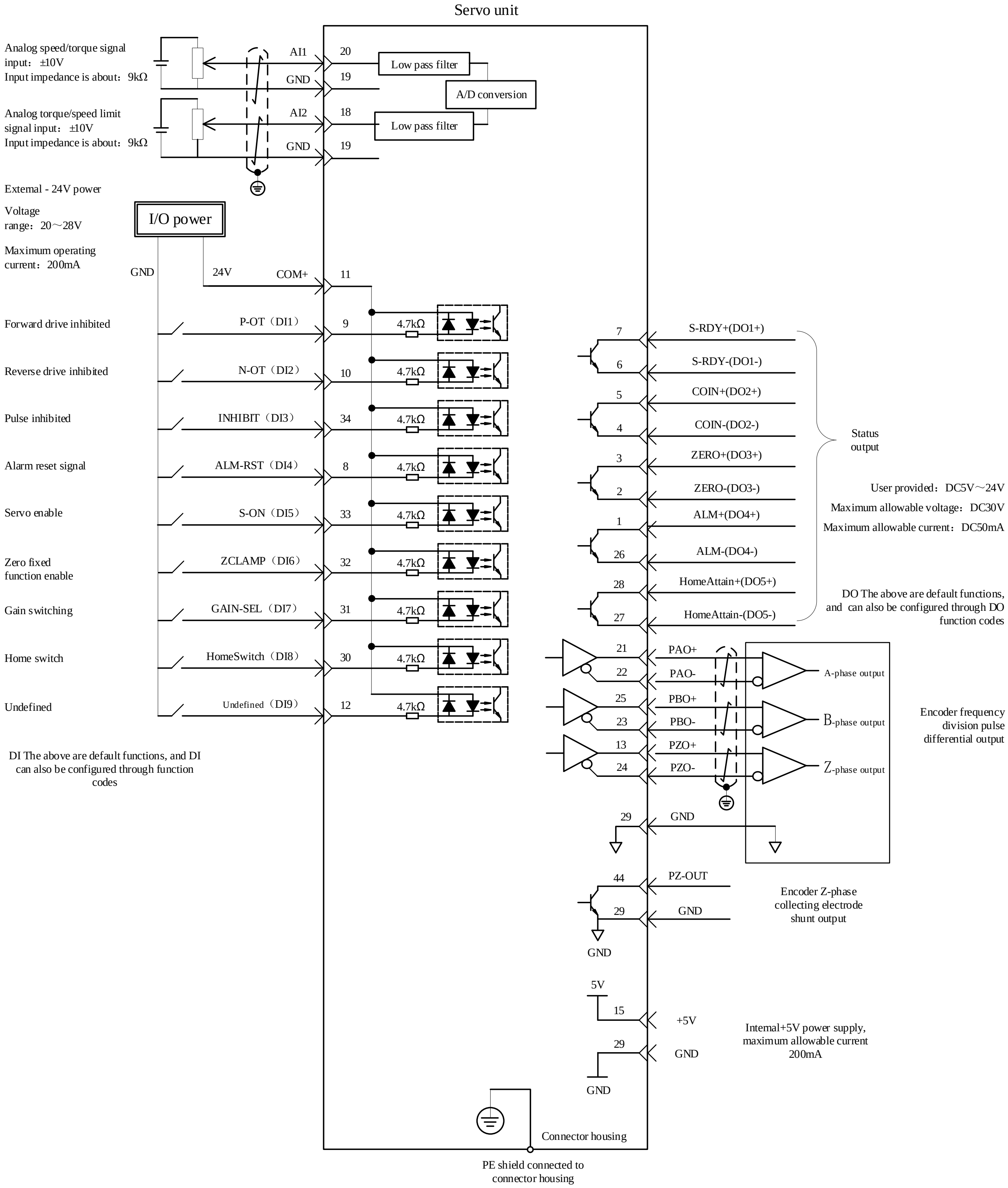


Figure 4-30 Torque Mode Wiring Diagram

- The internal+24V power supply voltage range is 20~28V, and the maximum working current is 200mA.
- DI8 and DI9 are high-speed DIs, please choose to use them according to their functions.
- Please select twisted pair shielded wire for AI/AO circuit wiring, and the shielding layer must be connected to PE at both ends.
- The DO output power supply is provided by the user, with a power supply range of 5V to 24V. The maximum allowable voltage of DO port is DC30V, and the maximum allowable current is 50mA.
- The encoder frequency division output cable should be a twisted pair shielded wire. The shielding layer must be connected to PE at both ends, and the GND must be reliably connected to the upper computer signal ground.
- Internal+5V power supply, maximum allowable current 200mA.

Chapter V Panel Display and running

1.22 Introduction to panel composition

Table 5-1 Introduction to General Functions of Keys

Sign	Name	General functions
↵	SET Key	Press this key to display the settings and set values of various parameters, and enter the parameter setting state (Long press the parameter to confirm)
◄	SHIFT Key	Press this key to move the selected digit (the decimal point of the digit flashes) one digit to the left
▲	UP Key	The set value can be increased to function as a forward rotation start key during auxiliary function mode JOG running
M	MODE Key	Switch basic modes: status display, auxiliary functions, parameter setting, monitoring
▼	DOWN Key	The set value can be reduced to function as a reverse start key during auxiliary function mode JOG running

Figure 5-1 Panel Appearance Diagram

The panel of the servo drive consists of a display (5-bit 7-segment LED digital tube) and keys. It can be used for various displays, parameter settings, user password settings, and general function execution of servo drives。

1.23 Panel display

When the servo drive is running, the display can be used for servo status display, parameter display, trouble display, and monitoring display.

- Status display: displays the status of the current servo, such as servo preparation completed, servo running, etc;
- Parameter display: display the function code and its set value;
- Trouble display: displays the faults and warnings of the servo system;
- Monitoring display: displays the current operating parameters of the servo.

1.23.1 Panel display switching method

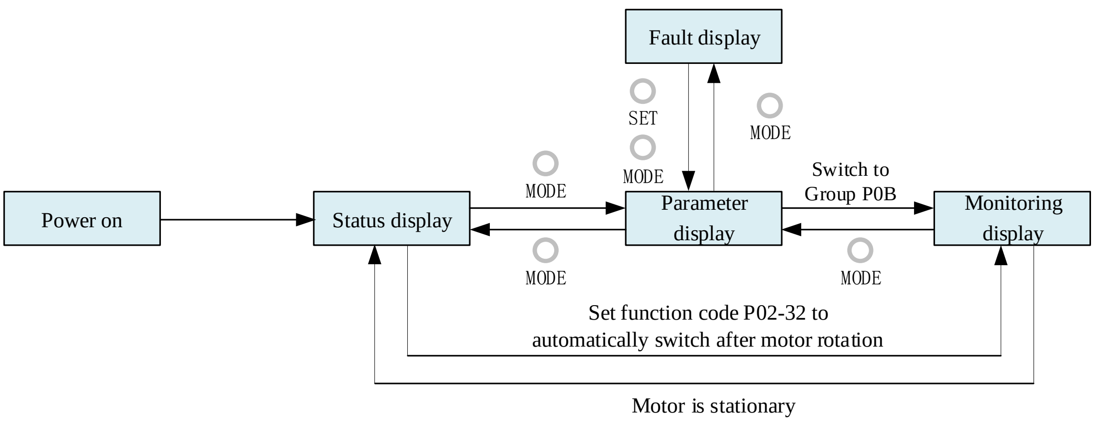
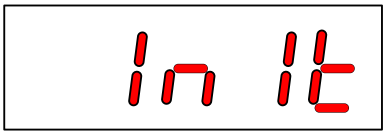
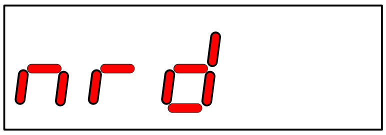
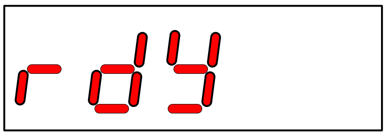
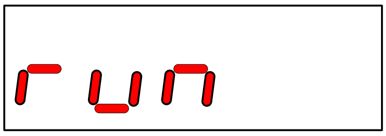
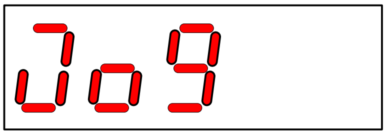


Figure 5-2 Schematic diagram of switching methods for various types of panel displays

- When the power is turned on, the Panel display immediately enters the Status display mode.

- "Press the" MODE "key to switch between different display modes, and the switching conditions are shown in the above figure.".
- During Status display, set the function code P02-32 and select the target parameters for monitoring. When the motor rotates, the display automatically switches to the monitoring display. After the motor is stationary, the display automatically resumes Status display.
- When displaying parameters, set the P0B group function code to select the target parameters for pre monitoring, and then switch to the monitoring display.
- In the event of a fault, immediately switch to the Trouble display mode, at which time the 5-bit digital tube flashes synchronously. Press the "SET" key to stop the flashing of the nixie tube, and then press the "MODE" key to switch to the parameter display mode.

1.23.2 Status display

Display	Name	Display occasion	Meaning
	Reset Servo initializing	The servo is powered on instantly.	The drive is in an initialization or reset state. Wait for initialization or reset to complete and automatically switch to another state.
	Nrd Servo not ready	Servo initialization completed, but the drive is not ready.	The servo is in an inoperable state because the main circuit is not powered on. Please refer to"Chapter 9 Troubleshooting"
	Rdy Servo ready	The drive is ready.	The servo drive is in a operable state, waiting for the upper computer to give a servo enable signal.
	Run Servo is running	The servo enable signal is active. (S-ON is ON)	The servo drive is running.
	Jog Jog is running	The servo drive is in inching running.	Please refer to "6.1.3 Inching running"for inching running settings.

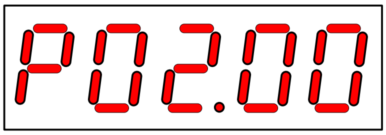
1.23.3 Parameter display

The servo is divided into 19 groups of function codes according to different parameter functions, and the function code position is quickly located according to the function code group. For a list of function codes, please refer to"Appendix B List of Function Code Parameters".

1) Parameter group display

Display	Name	Content
PXX.YY	Function code group	20: Function code group number YY: Function code group number

For example, the function code P02-00 is displayed as follows：

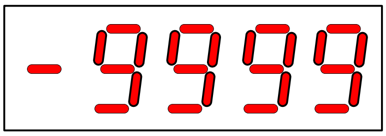
Display	Name	Content
	Function code P02-00	02: Function code group number 00: Function code group number

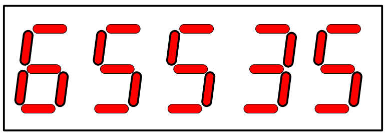
2) Display of data with different lengths and negative numbers

a) Signed numbers up to 4 digits or unsigned numbers up to 5 digits

A single page (5-digit digital tube) display is used. For signed numbers, the highest digit "-" of the data indicates a negative sign.

Example: - 9999 is displayed as follows： Example: 65535 is displayed as follows：





b) More than 4 signed digits or more than 5 unsigned digits

Display by page from low to high, with each 5 digits as a page. Display method: current page+current page value, as shown in the following figure. Switch the current page by long pressing "DATA" for more than 2 seconds.

Example: - 1073741824 is displayed as follows：

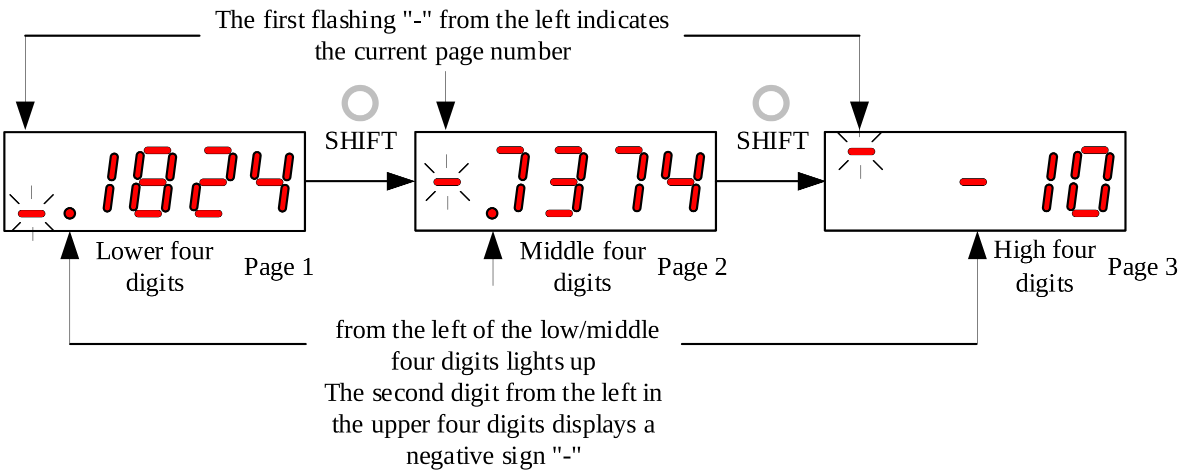


Figure 5-3 - 1073741824 Display Running Diagram

Example: 1073741824 is displayed as follows：

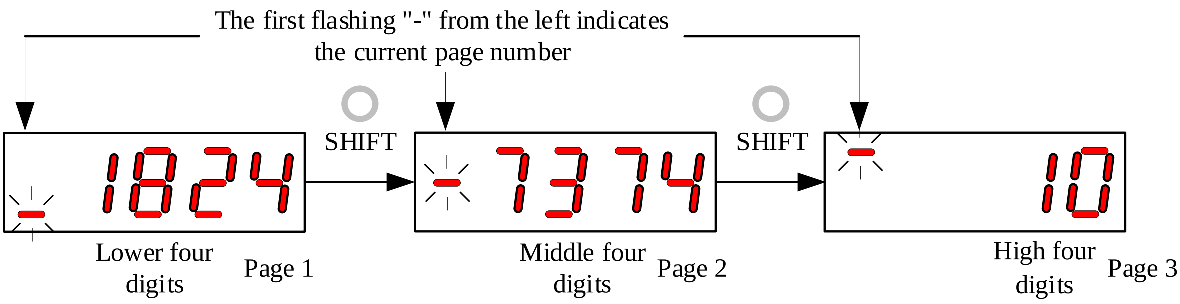
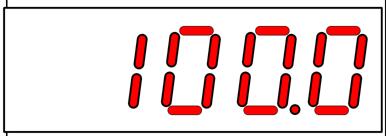


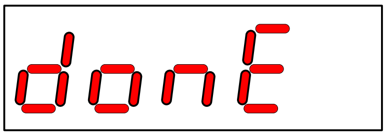
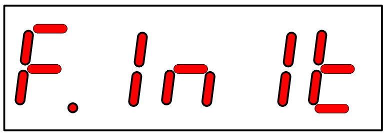
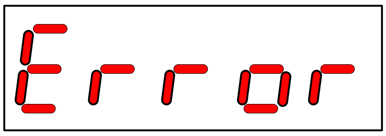
Figure 5-4 1073741824 Display Running Diagram

3) Decimal point display

The "." on the digital tube of single digit data indicates a decimal point, and the decimal point "." does not flash.

Display	Name	Content
	Decimal point	100.0

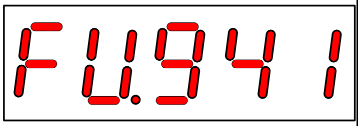
4) Parameter setting display

Display	Name	Display occasion	Meaning
	Done Parameter setting completed	Parameter set successfully	Indicates that the parameter value has been set and stored in the servo drive (Done). The drive can now perform other runnings.
	F.InIt Restore parameters to factory settings	Currently using the system parameter initialization function (P02-31=1)	The drive is in the process of restoring parameters to their factory settings (FunctionCodeInitialize). Wait until the system parameters are initialized, and then switch on the control power again.
	Error Password error	Using the user password function (P02-30), the password was entered incorrectly	Prompt for an error in password input. You need to re-enter the password.

1.23.4 Trouble display

- The panel can display current or historical fault and warning codes. For analysis and troubleshooting of faults and warnings, please refer to“Chapter 9 Troubleshooting”.
- When a single fault or warning occurs, immediately display the current fault or warning code; When multiple faults or warnings occur, the fault code with the highest fault level is displayed.
- After setting the number of historical faults to be viewed through P0B-33, viewing P0B-34 allows the Panel display to display the selected fault or warning code.
- Setting P02-31=2 can clear information about ten faults or warnings stored by the servo drive.

Example: FU.941 Trouble display is as follows：

Display	Name	Content
	Current warning code	FU.： Servo drive fault or warning 941: Warning Codes

1.23.5 Monitoring display

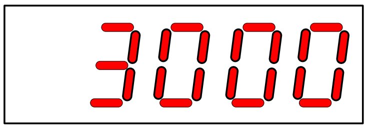
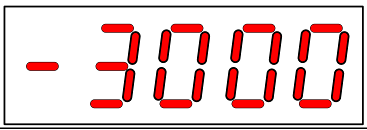
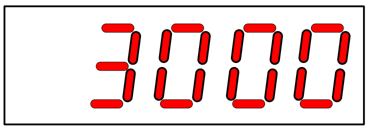
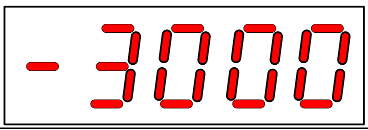
P0B group of servo drive: display parameters can be used to monitor the running status of the servo drive.

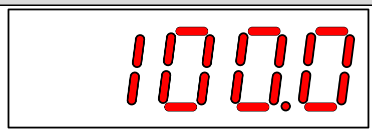
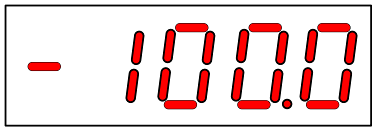
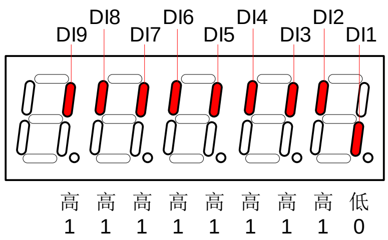
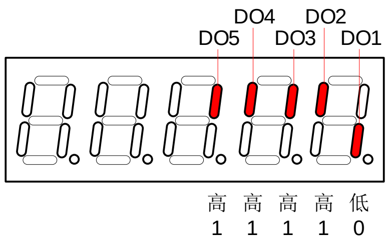
By setting the function code P02-32 (default display function on the panel), the display will automatically change from "Servo Status display mode" after the servo motor operates normally

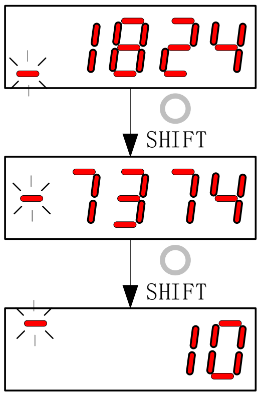
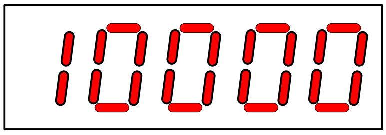
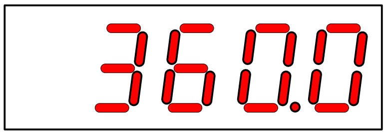
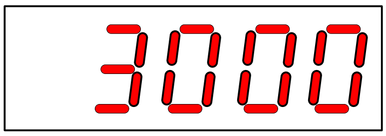
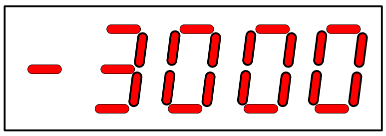
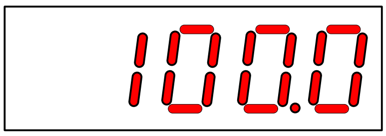
Switch to "Parameter Display Mode", the function code group number where the parameter is located is P0B, and the number in the group is the set value of P02-32.

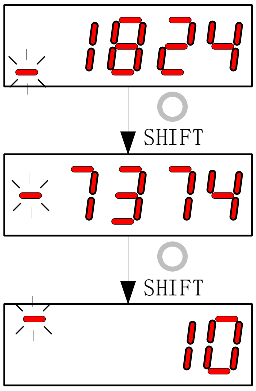
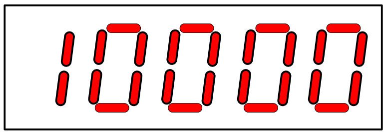
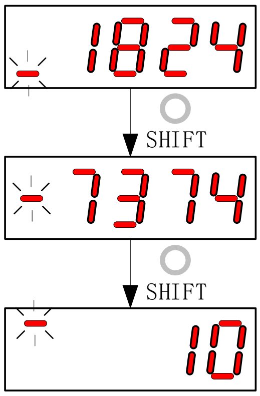
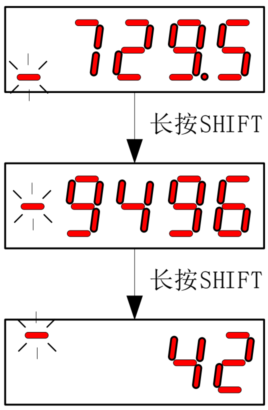
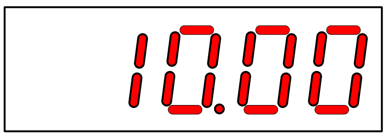
For example, if P02-32=00 is set, the display will display the parameter value corresponding to P0B-00 when the servo motor speed is not 0.

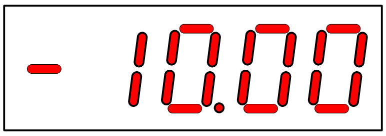
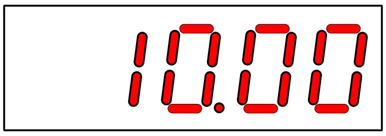
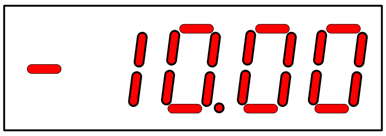
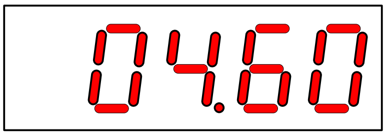
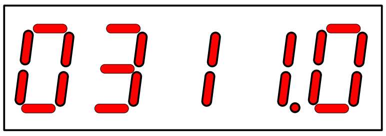
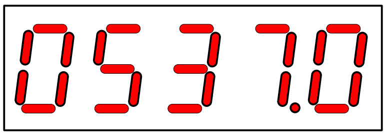
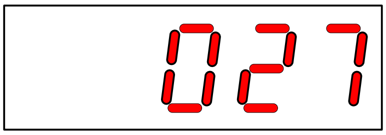
The specific description of P0B group monitoring display is as follows：

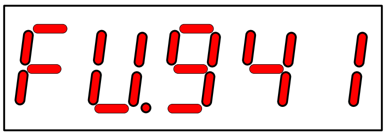
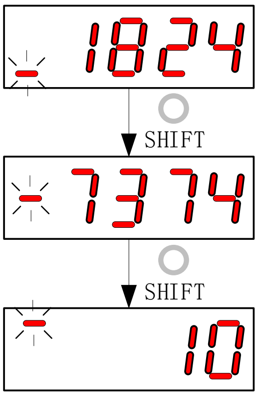
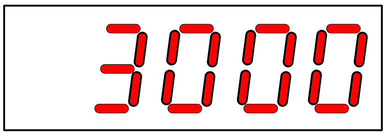
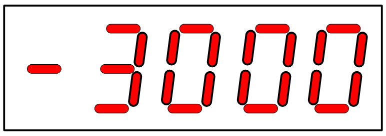
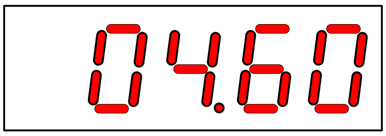
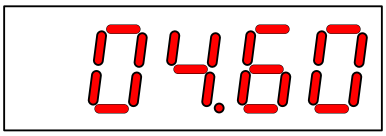
Function code	Name	Unit	Meaning	Display Example
P0B-00	Actual motor speed	rpm	The actual running speed of the servo motor can be rounded to 1 rpm after being displayed	3000rpm display：  -3000rpm display： 
P0B-01	Speed command	rpm	Current speed command of drive	3000rpm display：  -3000rpm display： 
P0B-02	Internal torque	0.1%	Percentage of actual output	100.0% display：

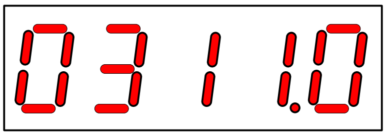
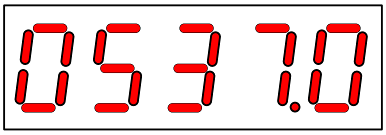
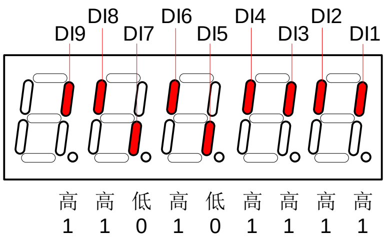
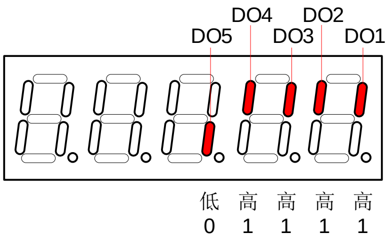
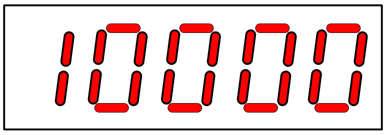
Function code	Name	Unit	Meaning	Display Example
	command		torque of servo motor in rated torque of motor	 -100.0% display： 
P0B-03	Input signal (DI signal) monitoring	-	Corresponding level status of 9 DI terminals: The bright upper half of the nixie tube indicates high level: (indicated by "1") The lower half light indicates a low level (represented by "0"). The P0B-03 read by the background software is a decimal value	Taking DI1 terminal as low level and DI2~DI9 terminal as high level as an example: The corresponding binary code is "111111110" Corresponding background reading P0B-03=510. The display is as follows： 
P0B-05	Output signal (DO signal) monitoring	-	The corresponding level status of the 5 DO terminals: The bright upper half of the nixie tube indicates high level (represented by "1") and the bright lower half indicates low level (represented by "0"). The P0B-05 read by the background software is a decimal value	Take DO1 terminal as low level, DO2 to DO5 For example, if the terminal is at a high level: The corresponding binary code is "11110"; Corresponding background reading P0B-05=30. The display is as follows: 
P0B-07	Absolute position counter (32-bit decimal display)	Command unit	Current absolute position of the motor (command unit)	1073741824 command unit display：

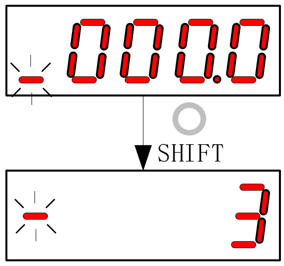
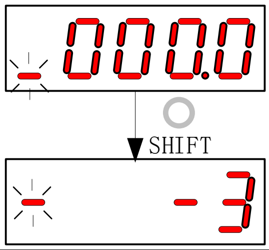
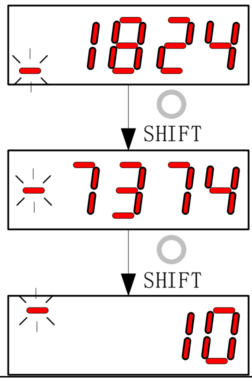
Function code	Name	Unit	Meaning	Display Example
				
P0B-09	Mechanical angle (Number of pulses starting at the home)	P	Current mechanical angle of motor (p) 0 corresponds to a mechanical angle of 0 ° Incremental encoder P0B-09 Maximum value: encoder line number × 4-1 (Example: 2500 line incremental encoder, P0B-09 maximum value is 9999) Absolute encoder P0B-09 maximum value: sixty-five thousand five hundred and thirty-five Actual mechanical angle= $\frac{\mathrm{P0B-09}}{\mathrm{P0B-09Maximum}+1}\times 360.0°$	10000p display： 
P0B-10	Rotation angle (Electrical angle)	°	Current electrical angle of motor	360.0° display： 
P0B-11	Input speed information corresponding to position command	rpm	Corresponding speed value of position command for a single control cycle of the drive	3000rpmdisplay：  -3000rpm display： 
P0B-12	Average load rate	0.1%	Average load torque as a percentage of motor rated torque	100.0% display： 

Function code	Name	Unit	Meaning	Display Example
P0B-13	Input position command counter (32-bit decimal display)	Command unit	Count and display the number of input position commands	1073741824 command unit display： 
P0B-15	Encoder position deviation counter (32-bit decimal display)	Encoder unit	Encoder position deviation= Total number of input position commands (encoder unit) - Total number of encoder feedback pulses (encoder unit)	10000 encoder unit display： 
P0B-17	Feedback pulse counter (32-bit decimal display)	Encoder unit	Count and display the number of pulses fed back by the servo motor encoder (encoder unit)	1073741824 encoder unit display： 
P0B-19	Total power on time (32-bit decimal display)	0.1s	Count and display servo drive power-on time	429496729.5s display： 
P0B-21	AI1 sampling voltage value	0.01V	Analog channel 1 input voltage value	10.00V display：  -10.00V display：

Function code	Name	Unit	Meaning	Display Example
				
P0B-22	AI2 sampling voltage value	0.01V	Analog channel 2 input voltage value	10.00Vdisplay： -10.00Vdisplay：
P0B-24	Effective value of phase current	0.01A	Effective value of servo motor phase current	4.60Adisplay：
P0B-26	Bus voltage	0.1V	Main circuit DC bus voltage value, i.e. the voltage between drives B1/⊕ and 1	After AC220V rectification: 311.0Vdisplay:  After AC380V rectification ： 537.0Vdisplay：
P0B-27	Module temperature value	℃	Servo drive internal power module temperature	27℃display：
P0B-33	Fault record	-	Set the number of times to view historical faults 0 - Current fault 1 - Last fault 2 - Last 2 faults …… 9 - Last 9 faults	0- current trouble display：
P0B-34	Fault code for selected times	-	P0B-34 displays the value "FU.000" when no fault occurs in the selected fault code for	If P0B-33=0 and P0B-34=FU.941, it indicates that the current fault code is 941. Display：

Function code	Name	Unit	Meaning	Display Example
			P0B-33	
P0B-35	Selected fault timestamp	S	P0B-34 shows the total servo running time when the fault occurs When no fault occurs, P0B-35 displays a value of "0"	If P0B-34=FU.941 P0B-35=107374182.4 Indicates that the current fault code is 941, and the total servo running time when the fault occurs is 107374182.4s 
P0B-37	Motor speed at selected fault	rpm	When the fault shown in P0B-34 occurs, the servo motor speed When no fault occurs, P0B-37 displays a value of "0"	3000rpmdisplay：  -3000rpmdisplay： 
P0B-38	Motor U-phase current at selected fault	0.01A	When the fault of P0B-34display occurs, the effective value of servo motor U-phase winding current When no fault occurs, P0B-38 displays a value of "0"	4.60Adisplay： 
P0B-39	Motor V phase current at selected fault	0.01A	When the fault shown in P0B-34 occurs, the effective value of the V phase winding current of the servo motor When no fault occurs, P0B-39 displays a value of "0"	4.60Adisplay： 
P0B-40	Bus voltage at selected fault	V	P0B-34 shows the DC bus voltage value of the main circuit when the fault occurs When no fault occurs, P0B-40 displays a value of "0"	After AC220V rectification: 311.0V display:

Function code	Name	Unit	Meaning	Display Example
				 After AC380V rectification: 537.0Vdisplay： 
P0B-41	Input terminal status at selected fault	-	P0B-34 shows the high and low level states corresponding to the 9 DI terminals when a fault occurs The viewing method is the same as P0B-03. When no fault occurs, P0B-41 displays that all DI terminals are low, and the corresponding decimal value is "0"	P0B-41=431display： 
P0B-42	Output terminal status at selected fault	-	When the fault shown in P0B-34 occurs, the corresponding high and low level status of the five DO terminals The viewing method is the same as P0B-05 When there is no fault, P0B-42 displays that all DO terminals are low, and the corresponding decimal value is "0"	P0B-42=15display： 
P0B-53	Position deviation counter	Command unit	Position deviation=total number of input position commands (command unit)- Total encoder feedback pulses (command unit) Note: The position deviation (command unit) is the value converted by the encoder position deviation, and there is a loss of accuracy when performing division runnings.	10000 command unit display： 
P0B-55	(32-bit decimal display)	0.1rpm	The actual running speed of the servo motor can be accurate to 0.1 rpm	3000.0rpmdisplay：

Function code	Name	Unit	Meaning	Display Example
				 -3000.0rpmdisplay： 
P0B-64	Real time input position command counter	Command unit	Display the position command counter before the electronic gear ratio multiplication, independent of the current servo state and control mode	1073741824 command unit display: 

1.24 Parameter setting

Parameter setting can be performed using the panel of the servo drive. Please refer to Chapter 8 for parameter details. Take changing the drive from position control mode to speed control mode after turning on the power as an example:

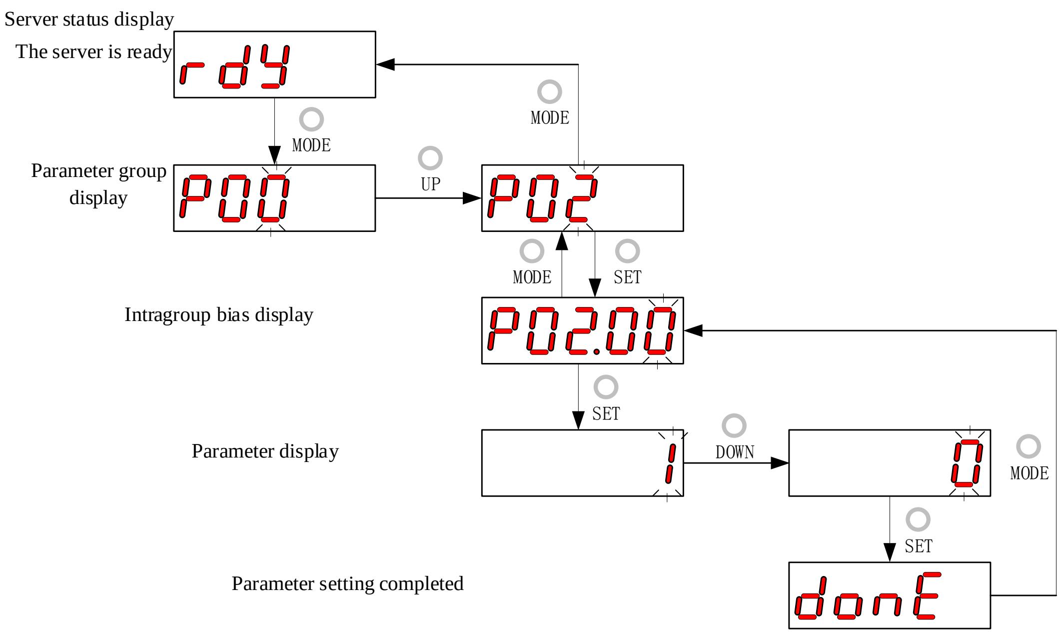


Figure 5-5 Schematic Diagram of Parameter Setting Steps

- "MODE" key can be used to switch Panel display mode and return to the upper interface;
- "UP"/"DOWN" keys can increase or decrease the current flashing bit value;
- "SHIFT" key can change the current flashing bit;
- "SET" key can store the current set value or enter the lower level interface。

After the parameter setting is displayed, that is, in the "Done" interface, you can use the "MODE" key to return to the parameter group display ("P02-00" interface).

1.25 User Password

After the User Password (P02-30) function is enabled, the user holds parameter setting permission, and other operators can only view it and cannot change parameter values.

1) User Password Settings

The user password setting process and corresponding display are shown in the following figure, taking setting the password to "00001" as an example.

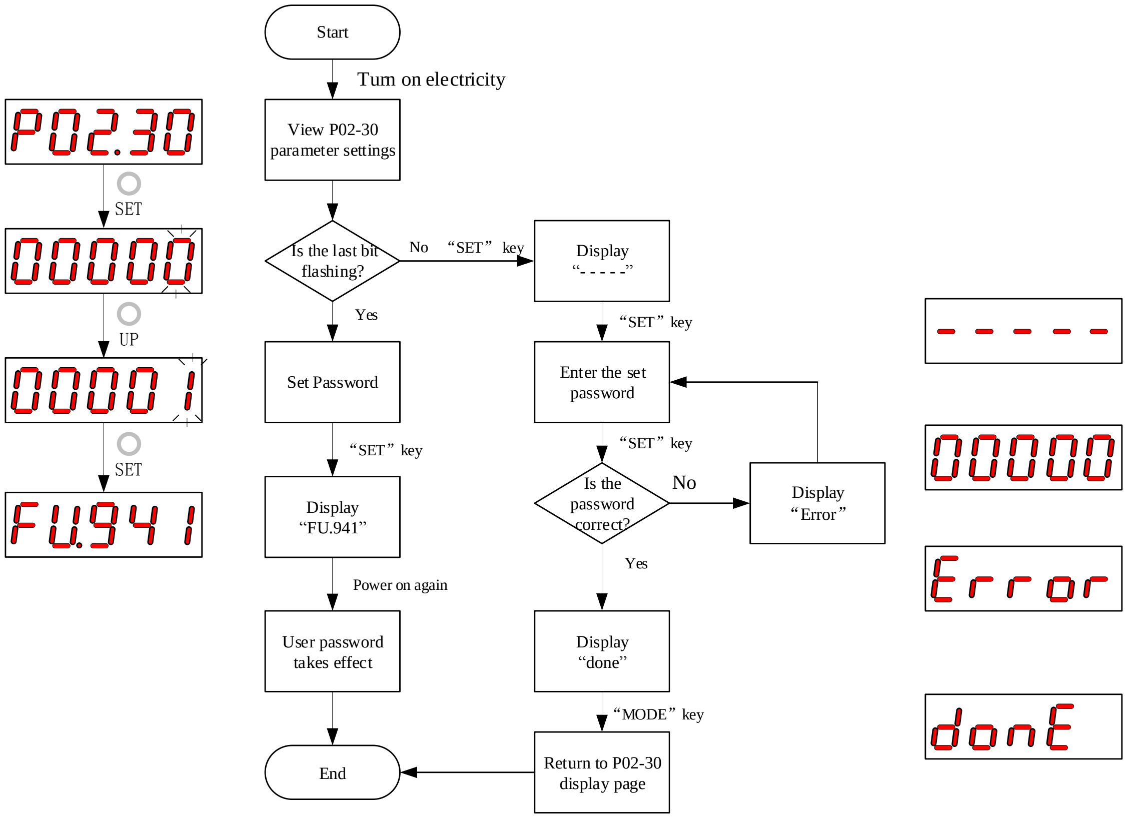


Figure 5-6 User Password Setting Step Diagram

When modifying the User Password, first enter the current password to activate the Parameter Setting permission. Enter P02-30 again to set a new password, as shown in the figure above.

NOTE

- The last bit does not flash, indicating that it is currently in a password protected state; The last digit flashes, indicating that a password has not been set or that the correct password has been entered.

2) User Password Cancel

After the user has to enter the set User Password, setting the P02-30 parameter value to "00000" indicates that the User Password is canceled.

1.26 General functions

1.26.1 Jog running

Caution:

- When using the Jog running function, it is necessary to disable the servo enable signal (S-ON), otherwise it cannot be performed!

To test run the servo motor and drive, the Jog running function can be used.

1) Operation method

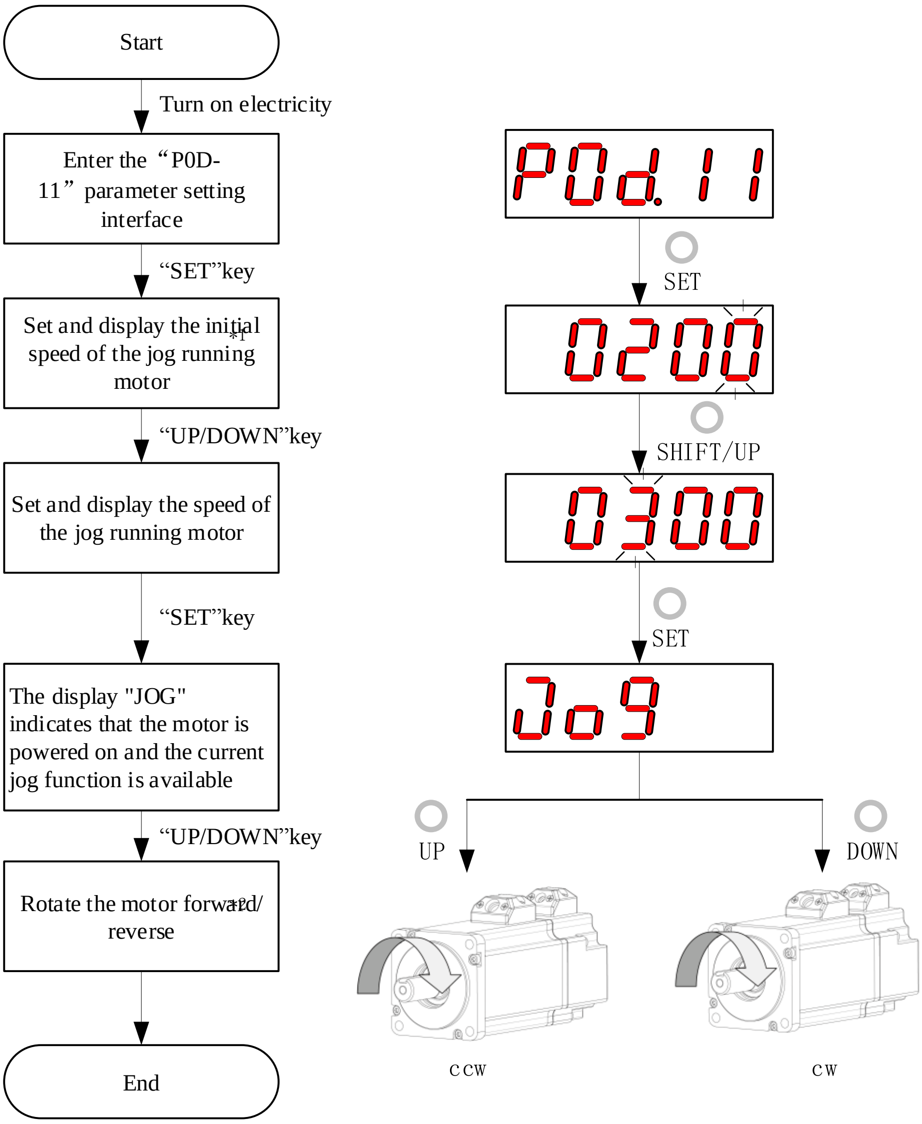


Figure 5-7 Schematic Diagram of Jog Running Setting Steps

NOTE

- Note * 1: Use the "UP" or "DOWN" key to increase or decrease the rotation speed of the current Jog running motor. Exit the Jog running function and restore the initial rotation speed;
- Note * 2: Press the "UP" or "DOWN" key, and the servo motor will rotate in the positive or negative direction. Release the key, and the servo motor will immediately stop running.

2) Exit Jog running

You can exit the current Jog running state by pressing the "MODE" key and return to the upper menu at the same time.

1.26.2 Digital signal forced input/output

Digital signals include digital input signals (Digital Input Signal, or DI signals) and digital output signals (Digital Output Signal, or DO signals). Users can use the panel (or upper computer communication) to configure the DI/DO function and terminal logic to P03/P04 group parameters, respectively, so that the upper computer can control corresponding servo functions through DI, or the servo drive can output DO signals for use by the upper computer.

In addition, the servo drive has a DI/DO forced input/output function, where the forced DI input can be used to test the drive's DI function, and the forced DO output can be used to check the DO signal connection between the upper computer and the drive.

When using the Digital signal forced input/output function, the logic of both physical and virtual DIs is given by forced input。

1) DI signal forced input

After this function is enabled, the level of each DI signal is only controlled by the setting of the forced input (P0D-18), regardless of the external DI signal status.

a) Operation method

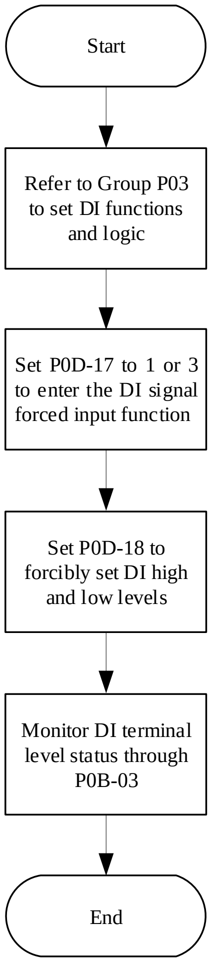


Figure 5-8 Schematic diagram of DI signal forced input setting steps

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P0D-17	DIDO forced input/output enabled	0 - No running 1-Force DI enabled, Force DO not enabled 2-Force DO enabled, Force DI not enabled 3-Force DIDO all enabled	DIDO forced input/output enable running selection	Running setting	Effective immediately	0

Among them, P0D-18 is used to forcibly set the DI level, which is displayed in hexadecimal on the panel. After being converted to binary, "1" indicates a high level, and "0" indicates a low level.

Set DI terminal logic selection through P03 group parameters. P0B-03 is used to monitor the level status of the DI terminal. The panel displays the level, and the P0B-03 read by the background software is a decimal number.

Examples:

The setting method for "the DI functions corresponding to DI1 terminals are active, while the DI functions corresponding to DI2 to DI9 terminals are inactive" is as follows: (The logic for all 9 DI terminals is "Low level active")

"Since" 1 "indicates a high level and" 0 "indicates a low level, the corresponding binary number is" 111111110 ", and the corresponding hexadecimal number is" 1FE ". Therefore, the parameter value of" P0D-18 "can be set to" 1FE "through the panel."

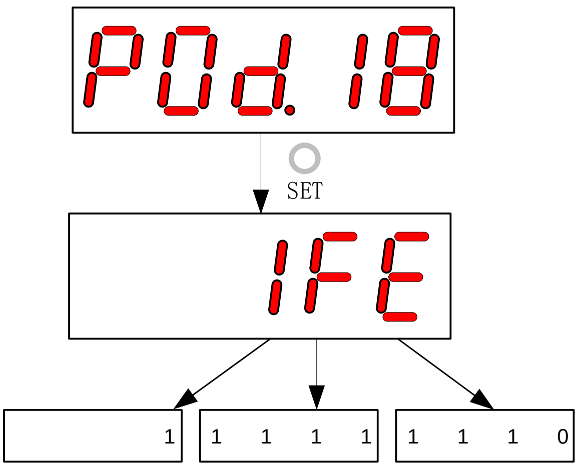


Figure 5-9 Description of P0D-18 Setting Meaning

P0B-03 Monitoring DI level status:

If there is no fault with the DI function, the displayed value of P0B-03 is always consistent with P0D-18.

Therefore, the display on the panel shows that the DI1 terminal is at a low level, and the DI2 to DI9 terminals are at a high level. The P0B-03 value read by the background software is 510 (decimal).

The display is as follows:

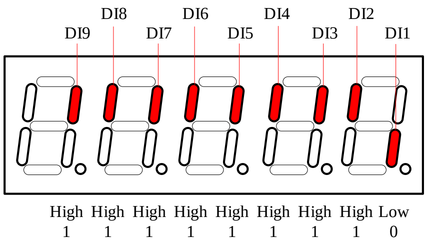


Figure 5-10 Description of DI Level Status Corresponding to P0B-03

b) Exit function

The DI signal forced input function does not remember after a power outage, and can be restored to normal DI by powering on again, or can be switched back to normal DI mode by setting P0D-17=0.

2) DO signal forced output

After this function is enabled, the level of each DO signal is only controlled by the setting of the forced output (P0D-19), regardless of the internal DO function status of the drive.

⚠Caution:

- If the servo motor is used for vertical movement, when the band brake output signal (DO function 9: BK) is set to active, the band brake will open and the load may fall. Therefore, protective measures against falling should be taken on the machinery.

a) Operation method

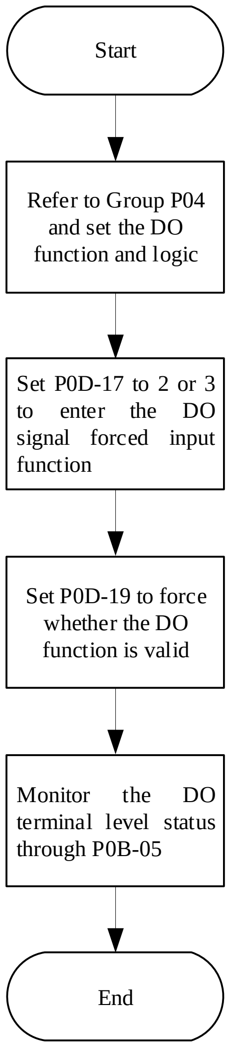


Figure 5-11 Schematic diagram of DO signal forced output setting steps

Among them, P0D-19 is used to forcibly set whether the DO function is active. The display on the panel is hexadecimal, and after converting to binary, "1" indicates that the DO function is active, and "0" indicates that the DO function is inactive.

Set DO terminal logic selection through P04 group of parameters. P0B-05 is used to monitor the DO level status. The panel displays the level, and the P0B-05 read by the background software is a decimal number.

For example, the setting method of "the DO function corresponding to the DO1 terminal is inactive, and the DO functions corresponding to the DO2 to DO5 terminals are all active" is as follows:

Since" 1 "indicates that the DO function is active, and" 0 "indicates that the DO function is inactive, the corresponding binary number is" 11110 ", and the corresponding hexadecimal number is" 1E ". Therefore, the parameter value of" P0D-19 "can be set to" 1E "through the panel.

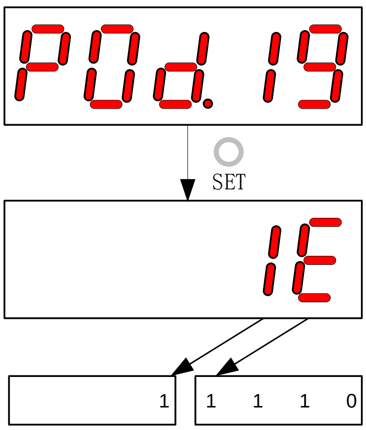


Figure 5-12 Description of the meaning of P0D-19 setting

P0B-05 Monitor DO level status:

If the logic selection of the five DO terminals is "Low level active", then the DO1 terminal is at high level, and the DO2 to DO5 terminals are at low level. The corresponding binary code is "00001", and the P0B-05 value read by the background software is 1 (decimal). The display is as follows：

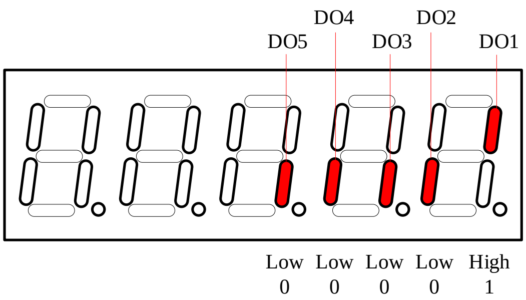


Figure 5-13 P0B-05 display when DO terminal levels are all "low active"

If the logic selection of the five DO terminals is "High level active", then the DO1 terminal is at low level, and the DO2 to DO5 terminals are at high level. The corresponding binary code is "11110", and the P0B-05 value read by the background software is 30 (decimal). The display is as follows:

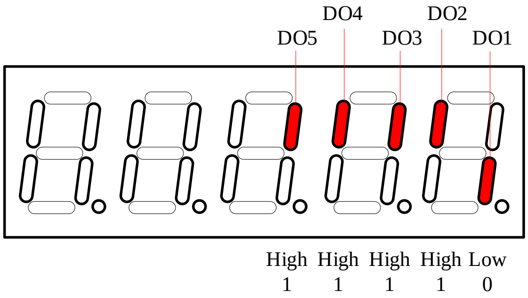


Figure 5-14 P0B-05 display when DO terminal levels are "high active"

b) Exit function

The DO signal forced output function does not remember after a power fault. It can be restored to normal DO by powering on again, or it can be switched back to normal DO mode by setting P0D-17=0.

Chapter VI Control Mode

The servo system consists of three main parts: a servo drive, a servo motor, and an encoder.

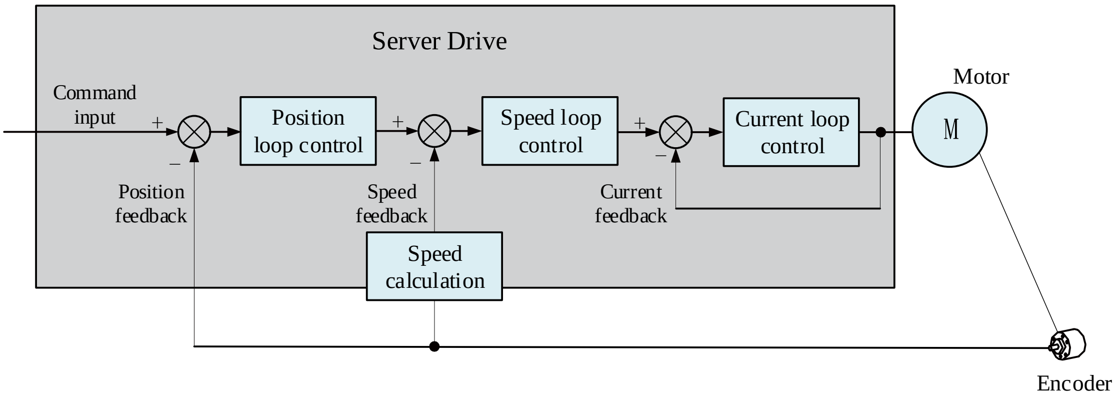


Figure 6-1 Servo system control diagram

The servo drive is the control core of the servo system. Through the processing of input and feedback signals, the servo drive can accurately control the position, speed, and torque of the servo motor, that is, position, speed, torque, and hybrid control modes. Among them, position control is the most important and commonly used control mode for servo systems.

Each control mode is briefly described as follows:

Position control refers to controlling the position of the motor through position commands. The target position of the motor is determined by the total number of position commands, and the frequency of the position commands determines the rotational speed of the motor. The position command can be given through a combination of external pulse input, the total number of internal given position commands, and speed limits. Through an internal encoder (servo motor with encoder) or an external encoder (full closed-loop control), the servo drive can achieve fast and accurate control of the position and speed of the machine. Therefore, the position control mode is mainly used in situations where positioning control is required, such as robotic manipulators, placement machines, engraving, milling, and engraving (pulse sequence instructions), and CNC machines.

Speed control refers to controlling the speed of a machine through speed commands. Servo drives can achieve fast and accurate control of mechanical speed through digital, analog voltage, or communication given speed commands. Therefore, the speed control mode is mainly used in situations where the rotational speed is controlled, or where the upper computer is used to achieve position control, and the output of the upper computer is input as a speed command to a servo drive, such as analog engraving and milling machines.

The current of the servo motor has a linear relationship with the torque, so controlling the current can achieve torque control. Torque control refers to controlling the output torque of a motor through torque commands. The torque command can be given by digital, analog voltage, or communication. The torque control mode is mainly used in devices that have strict requirements on the stress of materials, such as tension control situations such as winding and unwinding devices. The torque setting value should ensure that the stress of materials is not affected by changes in the winding radius.

1.27 Basic settings

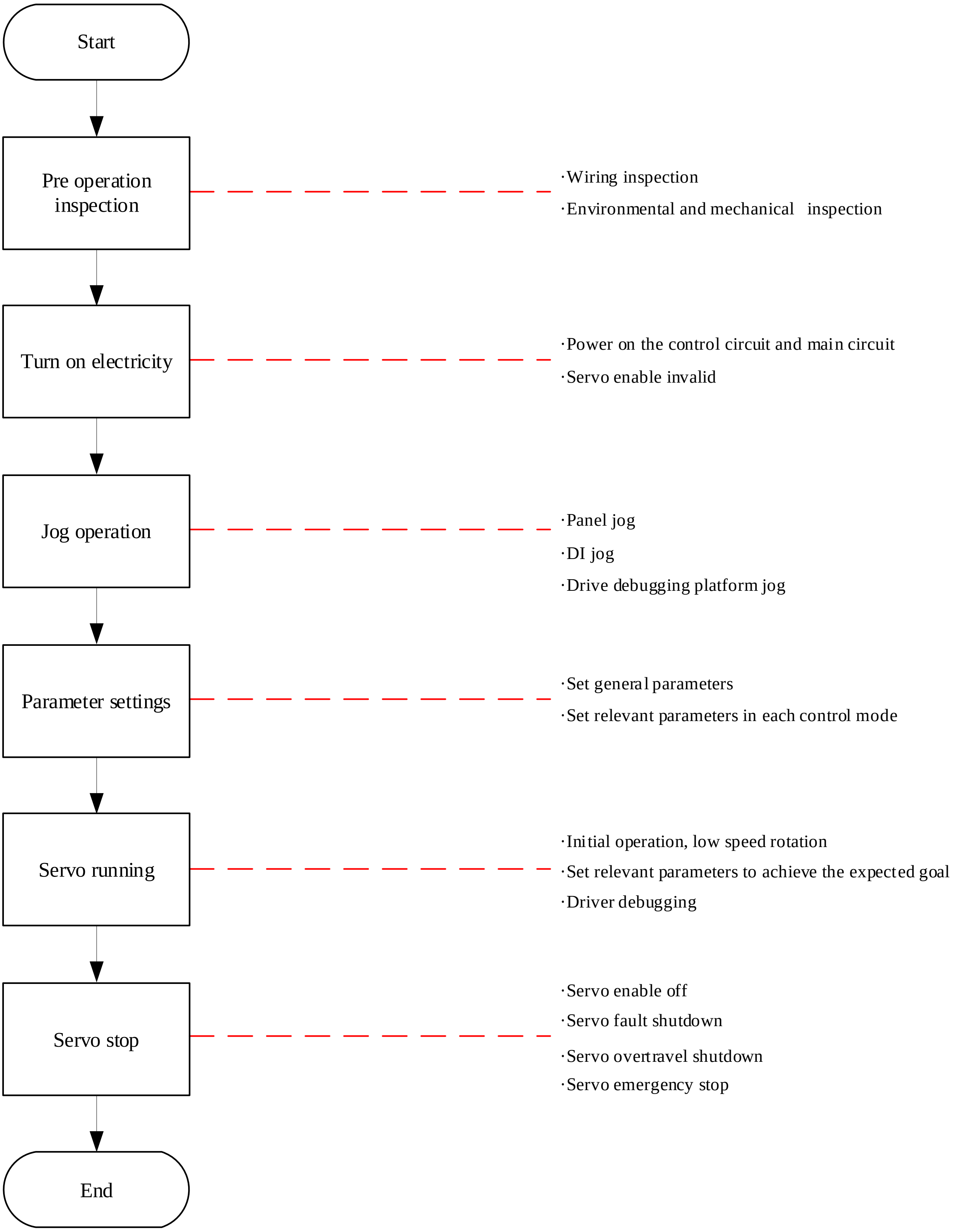


Figure 6-2 Servo setting process

1.27.1 Pre running inspection

Before running the servo drive and servo motor, the following checks are required:

Table 6-1 Pre running inspection list

Record	Serial No.	Content
Wiring		
□	1	The control circuit power input terminals (L1C, L2C) and the main circuit power input terminals (L1, L2, L3) of the servo drive must be connected correctly.
□	2	The main circuit output terminals (U, V, W) of the servo drive and the main circuit cables (U, V, W) of the servo motor must be in phase and connected correctly.
□	3	The main circuit power input terminals (L1, L2, L3) and main circuit output terminals (U, V, W) of the servo drive cannot be short-circuited.
□	4	The control signal cables of the servo drive are correctly wired: external signal cables such as band brake and overtravel protection have been reliably connected.
□	5	The servo drive and servo motor must be reliably grounded.
□	6	When using an external braking resistor, the short circuit between drives B2 and B3 must be removed.
□	7	The stress on all cables is within the specified range.
□	8	The wiring terminals have been insulated.
Environment and Machinery		
□	1	The internal and external parts of the servo drive are free of foreign matters such as wire ends, metal chips, etc. that may cause short circuits in signal lines and power lines.
□	2	The servo drive and external braking resistor are not placed on combustible objects.
□	3	Installation of servo motor, shaft and mechanical connection must be reliable.
□	4	The servo motor and the connected machinery must be in a working condition.

1.27.2 Switch on power supply

1) Switch on the control circuit power supply and the main circuit power supply

Switch on the control circuit (L1C, L2C) and the main circuit power supply:

The single-phase 220V main circuit power supply terminals are L1 and L2; The three-phase 220V or 380V main circuit power supply terminals are L1, L2, and L3.

- After the control circuit power supply and the main circuit power supply are turned on, the bus voltage indicator shows no abnormality, and the Panel display displays "Reset" → "Nrd" → "Rdy" in order, indicating that the servo drive is in a operable state, waiting for the upper computer to give a servo enable signal.
- If the drive Panel display always displays "Nrd", please refer to "9.1Handling of faults and warnings during startup" to analyze and eliminate the cause of the fault.
- If the drive Panel display displays other fault codes, please refer to "9.2.1Table of fault and warning codes" to analyze and eliminate the cause of the fault.

2) Set servo enable (S-ON) to disable (OFF)

When using servo enable, first configure one DI terminal of the servo drive as function 1 (FunIN. 1: S-ON, servo enable), and determine the valid logic of the DI terminal. Then set it to invalid through upper computer communication or external switch.

☆Associated function code:

Code	Name	Function name	Function
FunIN.1	S-ON	Servo enable	Inactive, servo motor is not powered on; Active, the servo motor is powered on.

1.27.3 Jog running

Please use Jog running to confirm whether the servo motor can rotate normally and there is no abnormal vibration or sound during rotation. You can use the Jog running function through three methods: panel, configuring two external DIs, and driving a debugging platform. The motor uses the stored value of the current function code P06-04 as the jog speed.

1. Panel Jog

Enter the Jog running mode through panel running P0D-11. At this time, Panel displayP06-04 jog speed defaults. Adjust the Jog running speed through the UP/DOWN key, and press the SET key to enter the jog state. At this time, the Panel display is in the "JOG" state. Forward and reverse jog running can be achieved through the UP/DOWN key. When pressing the MODE key to exit the Jog running mode, the previously set P06-04 Jog running speed value is not saved and is restored to the default value.

For running and display, please refer to “5.5.1Jog running”.

☆Associated function code

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-04	Jog speed setpoint	0～6000	rpm	Set the speed command value in JOG jog mode	running settings	Effective immediately	100

2. DIJog running

Caution：

- DIJog running is not affected by the servo control mode, i.e., the DIJog running function can be performed in any control mode.

Configure two external DI terminals and set them to FunIN.18 and FunIN.19 functions respectively. After setting the P06-04 jog speed value, turn on the servo enable S-ON and pass the DI status Jog running.

☆Associated function code

Code	Name	Function name	Description
FunIN.18	JOGCMD+	Forward jog	Valid - Input according to the given command; Invalid - Run command stops input.
FunIN.19	JOGCMD-	Reverse jog	Valid - Reverse input according to a given command; Invalid - Run command stops input.

3. Drive debugging platform Jog running

Open the Drive Debugging Platform Jog Running interface, set the P06-04 jog speed value, click the interface servo ON button, and realize the jog forward and reverse running function through the forward and reverse buttons on the interface. When you close the Jog running interface and exit the Jog running mode, the previously set P06-04 Jog running speed value is not saved and is restored to the default value.

1.27.4 Rotation direction selection

By setting "Rotation direction selection (P02-02)", the rotation direction of the motor can be changed without changing the polarity of the input command.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time
P02-02	Rotation direction selection	0 - Take CCW direction as forward rotation direction 1-Take CW direction as forward rotation direction	Set the forward direction of motor rotation when viewed from the motor shaft end	running settings	Effective immediately	0

When the rotation direction selection (P02-02) is changed, the shape of the servo drive output pulse and the positive and negative monitoring parameters will not change.

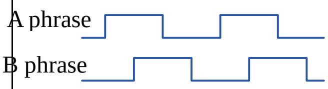
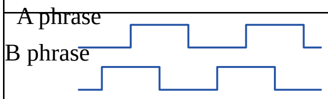
The "forward drive" setting in the overtravel prevention function is consistent with the setting of the rotation direction selection (P02-02).

1.27.5 Output pulse phase selection

The output pulse of the servo drive is an A-phase+B-phase quadrature pulse.

By setting the output pulse phase (P02-03), the phase relationship between the A-phase pulse and the B-phase pulse can be changed without changing the rotation direction of the motor.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time
P02-03	Output pulse phase	0：A leads B 1：A lags B	Set the phase relationship of the output pulse.  A leads B 90°  A lags B 90°	Shutdown setting	Re-energize	0

1.27.6 Band brake settings

Band brake is a mechanism that prevents the servo motor shaft from moving and keeps the motor locked in position when the servo drive is not running, so that the moving part of the machine will not move due to its own weight or external force.

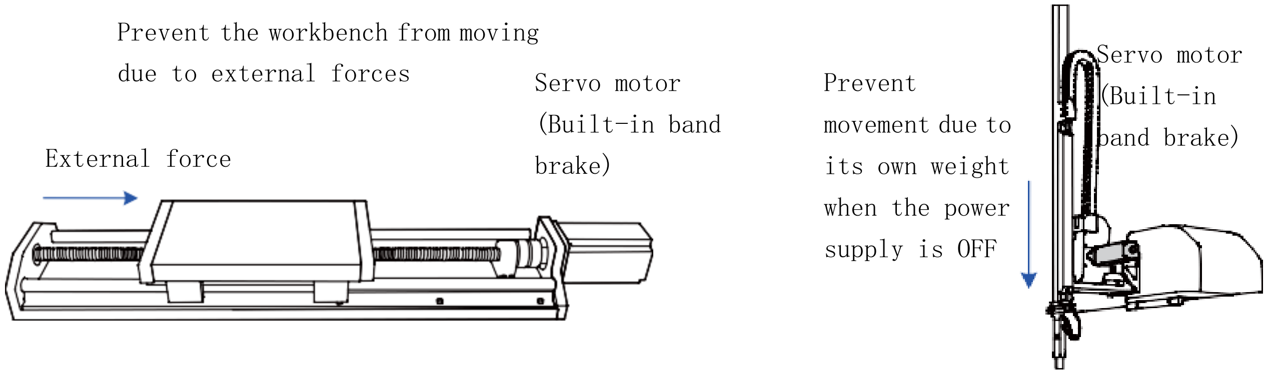


Figure 6-3 Application diagram of band brake

Caution:

- The band brake mechanism built into the servo motor is a fixed special mechanism that is not powered on and cannot be used for braking purposes. It is only used to keep the servo motor in a stopped state.
- Band brake coil has no polarity.
- After the servo motor is stopped, turn off the servo enable (S-ON).
- When the motor with a built-in band brake is running, the band brake may emit a clicking sound, which has no functional impact.
- When the band brake coil is powered on (the band brake is open), magnetic flux leakage may occur at the shaft end and other parts. Please pay attention when using instruments such as magnetic sensors near the motor.

a) Band brake wiring

The connection of the band brake input signal has no polarity and requires the user to prepare a 24V power supply. Examples of standard wiring between the band brake signal BK and the band brake power supply are as follows:

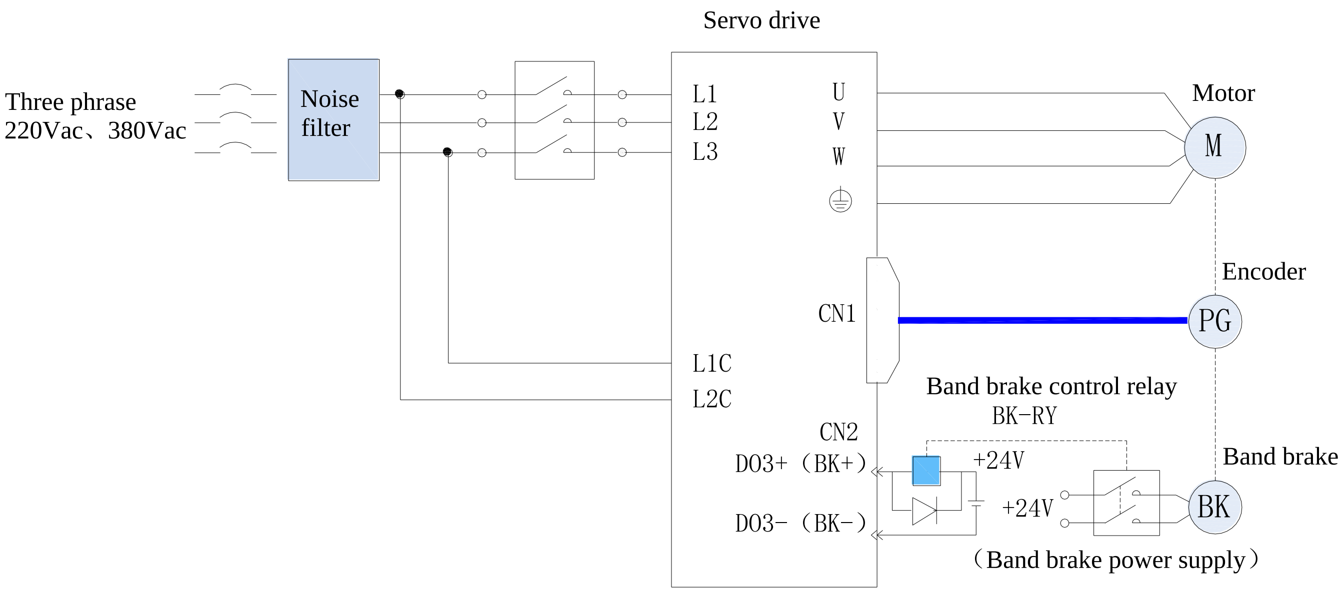


Figure 6-4 Brake wiring diagram

Precautions for brake wiring:

- It is best not to share the power supply with other electrical appliances to prevent the voltage or current from dropping due to the running of other electrical appliances, which ultimately leads to incorrect running of the band brake.
- It is recommended to use cables above $0.5mm^2$.

b) Band brake software settings

For servo motors with band brakes, one DO terminal of the servo drive must be configured as function 9 (FunOUT. 9: BK, band brake output), and the valid logic for the DO terminal must be determined.

☆Associated function NO.:

Code	Name	Function name	Function
FunOUT.9	BK	Band brake output	Invalid, the power supply of the band brake is connected, and the motor is in a position locked state; Valid, the power supply of the band brake is disconnected, the band brake is released, and the motor can rotate;

According to the current state of the servo drive, the working timing of the band brake mechanism can be divided into the normal state of the servo drive band brake timing and the fault state of the servo drive band brake timing.

c) Servo drive normal state band brake timing

The normal band brake timing can be divided into two situations: when the motor is stationary and when the motor is rotating:

- Stationary: the actual rotation speed of the motor is lower than 20 rpm;
- Rotating: The actual rotation speed of the motor reaches 20 rpm or above.

①Band brake timing when the servo motor is stationary

When the servo enable is switched from ON to OFF, if the current motor speed is lower than 20 rpm, the drive operates in a stationary band brake timing.

⚠Caution：

- After the band brake output is set from OFF to ON, do not input position/speed/torque commands during P02-09, as this may cause command loss or running errors.
- When used on a vertical axis, the self weight or external force of the moving part of the machine may cause slight movement of the machine. When the servo motor is stationary, the servo enable OFF occurs, and the band brake output immediately becomes OFF. However, within P02-10, the motor is still powered on, preventing the mechanical movement part from moving due to its own weight or external force.

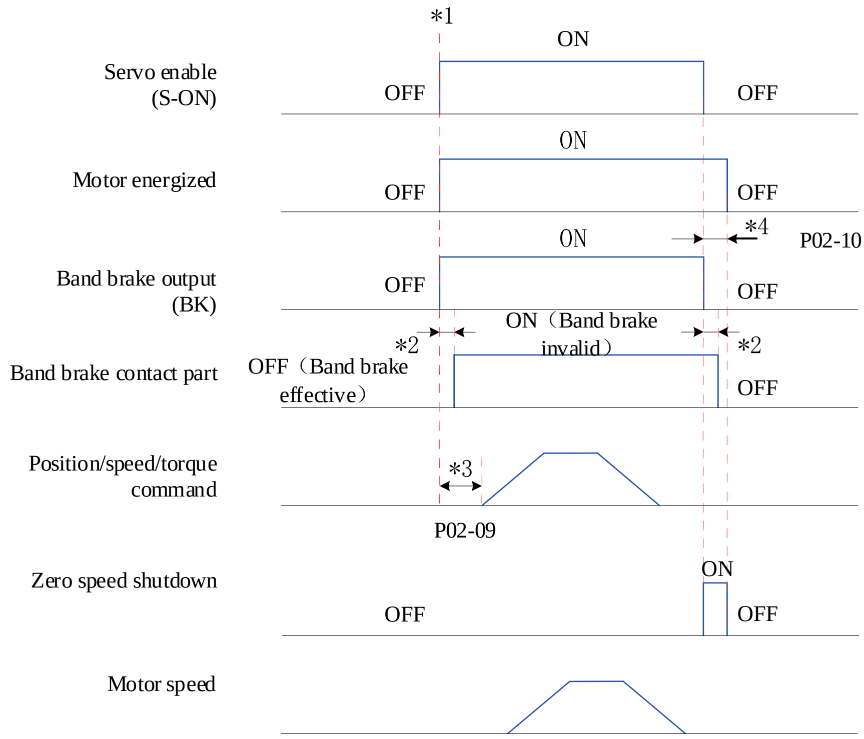


Figure 6-5 Band brake timing diagram when the motor is stationary

NOTE

- Note * 1: When the servo is enabled to be ON, the band brake output is set to be ON, and the motor enters the energized state;
- Note * 2: For the delay time of the action of the band brake contact, please refer to the relevant motor specifications, see Chapter 2 for details;
- Note * 3: Please interval P02-09 or more between setting the output of the band brake to ON and entering the command;
- Note * 4: When the servo motor is stationary (the motor speed is lower than 20 rpm) and the servo is enabled to OFF, the band brake output is also set to OFF. Through P02-10, it is possible to set the delay for the motor to enter the non energized state after the band brake output is OFF.

☆Associated function code：

Function code	Name	Setting range	Unit	Factory setting	Effective time	Setting method	Related modes
P02-09	Band brake output ON to command reception delay	0～500	ms	250	Effective immediately	running settings	PS
P02-10	Stationary state, band brake output OFF to motor power off delay	1～1000	ms	150	Effective immediately	running settings	PS

① Band brake timing during servo motor rotation

When the servo enable is switched from ON to OFF, if the current motor speed is greater than or equal to 20 rpm, the drive operates in a rotating band brake timing.

Caution:

- When the servo enable is set from OFF to ON, do not input position/speed/torque commands during P02-09, as this may cause command loss or running errors;
- When the servo motor rotates, servo enable OFF occurs, and the servo motor enters a zero speed

shutdown state. However, the band brake output must meet any of the following conditions before it can be set to OFF:

The time for P02-12 has not yet arrived, but the motor has decelerated to P02-11;

The time for P02-12 has expired, but the motor speed is still higher than P02-11.

- After the band brake output is changed from ON to OFF, the motor is still in the energized state within 50ms, preventing the mechanical movement part from moving due to its own weight or external force.

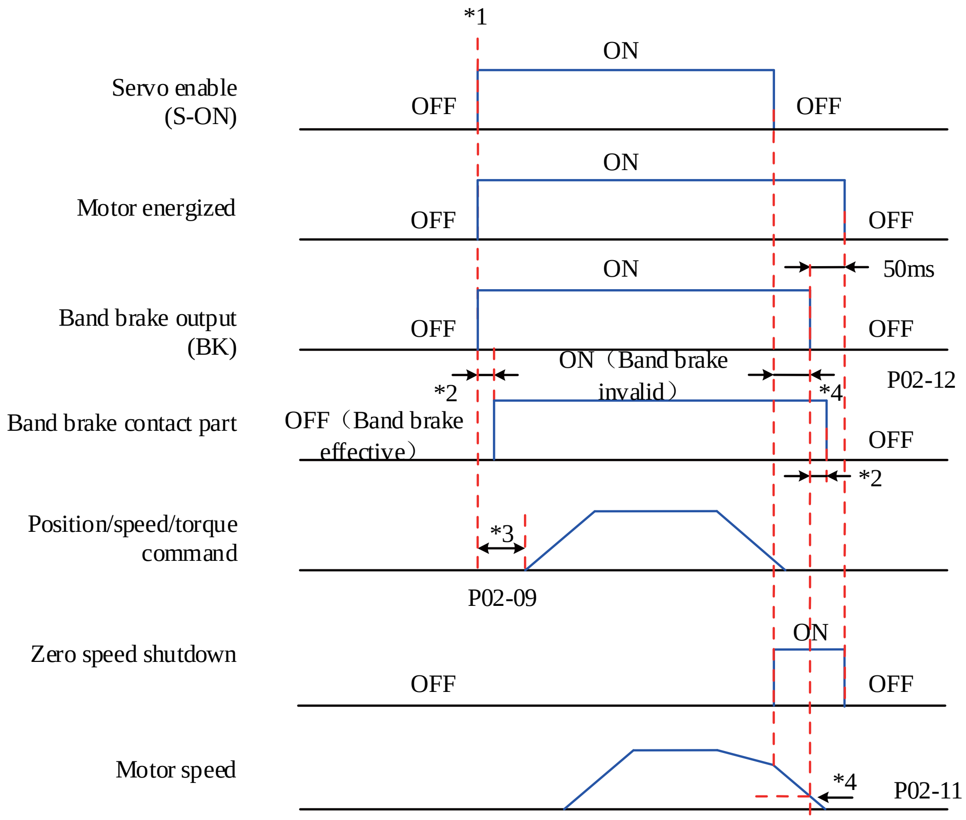


Figure 6-6 Band brake timing diagram during motor rotation

- Note * 1: When the servo is enabled to be ON, the band brake output is set to be ON, and the motor enters the energized state;
- Note * 2: For the delay time of the action of the band brake contact, please refer to the relevant motor specifications, see Chapter 2 for details;
- Note * 3: Please interval P02-09 or more between setting the output of the band brake to ON and entering the command;
- Note * 4: When the servo motor is rotating and the servo is enabled to be OFF, it is possible to set the delay for the band brake output to be OFF after the servo is enabled to be OFF through P02-11 and P02-12. After the band brake output is OFF, a further delay of 50ms is allowed before the motor enters the non energized state.

☆Associated function code：

Function code	Name	Setting range	Unit	Factory setting	Effective time	Setting method	Related modes
P02-11	Rotation speed threshold when the band brake output is OFF in rotating state	0～3000	rpm	30	Effective immediately	running settings	PS
P02-12	Rotation status, band brake output OFF	1～1000	ms	500	Effective	running	PS

	delay				immediately	settings	

c）Servo drive fault status band brake timing

Servo faults can be divided into Type 1 faults (referred to as "No.1") and Type 2 faults (referred to as "No.2") according to different shutdown modes. Please refer to Chapter 9. The servo drive fault state band brake timing can be divided into the following two situations:

① Type 1 fault occurs:

The output condition of the band brake DO is the same as "the band brake timing when the servo motor rotates under normal state of the servo drive". That is, the band brake output must meet any of the following conditions to be set to OFF:

- The time for P02-12 has not yet arrived, but the motor has decelerated to P02-11;
- The time for P02-12 has expired, but the motor speed is still higher than P02-11.

②Type 2 fault occurs:

When a Type 2 fault occurs and the band brake is enabled, the Type 2 fault shutdown mode is forced to "zero speed shutdown, free running state.".

At this time, the servo motor first performs a zero speed shutdown. When the actual rotational speed of the motor is lower than 20 rpm, the band brake DO output condition is the same as the "band brake timing when the servo motor is stationary under normal state of the servo drive", that is, the band brake output immediately becomes OFF, but within P02-10, the motor is still in the powered on state.

1.27.7 Brake setting

When the torque and rotational speed directions of the motor are opposite, energy is transmitted from the motor end back into the drive, causing the bus voltage value to increase. When it rises to the braking point, energy can only be consumed through the braking resistor. At this time, the braking energy must be consumed according to the braking requirements, otherwise the servo drive will be damaged. The braking resistor can be built in or externally connected. Internal and external braking resistors cannot be used simultaneously.

1) No external load torque

If the motor reciprocates, the kinetic energy during braking will be converted into electrical energy and fed back to the bus capacitance. When the bus voltage exceeds the braking voltage, the braking resistor will consume excess feedback energy. Taking the no-load motor from 3000 rpm to standstill as an example, the motor speed curve is as follows:

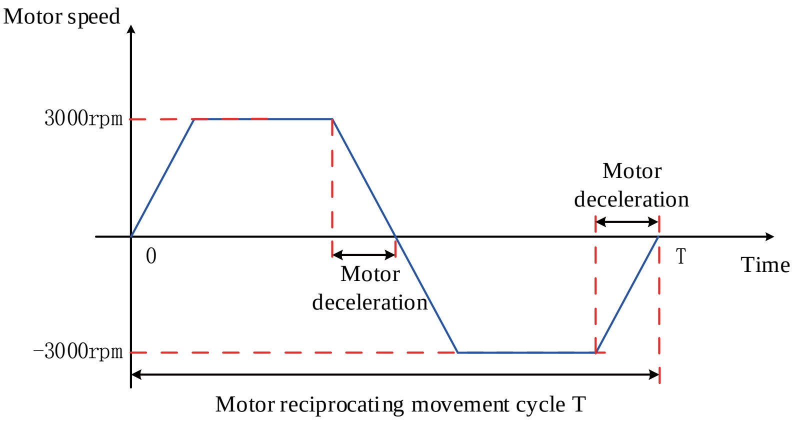
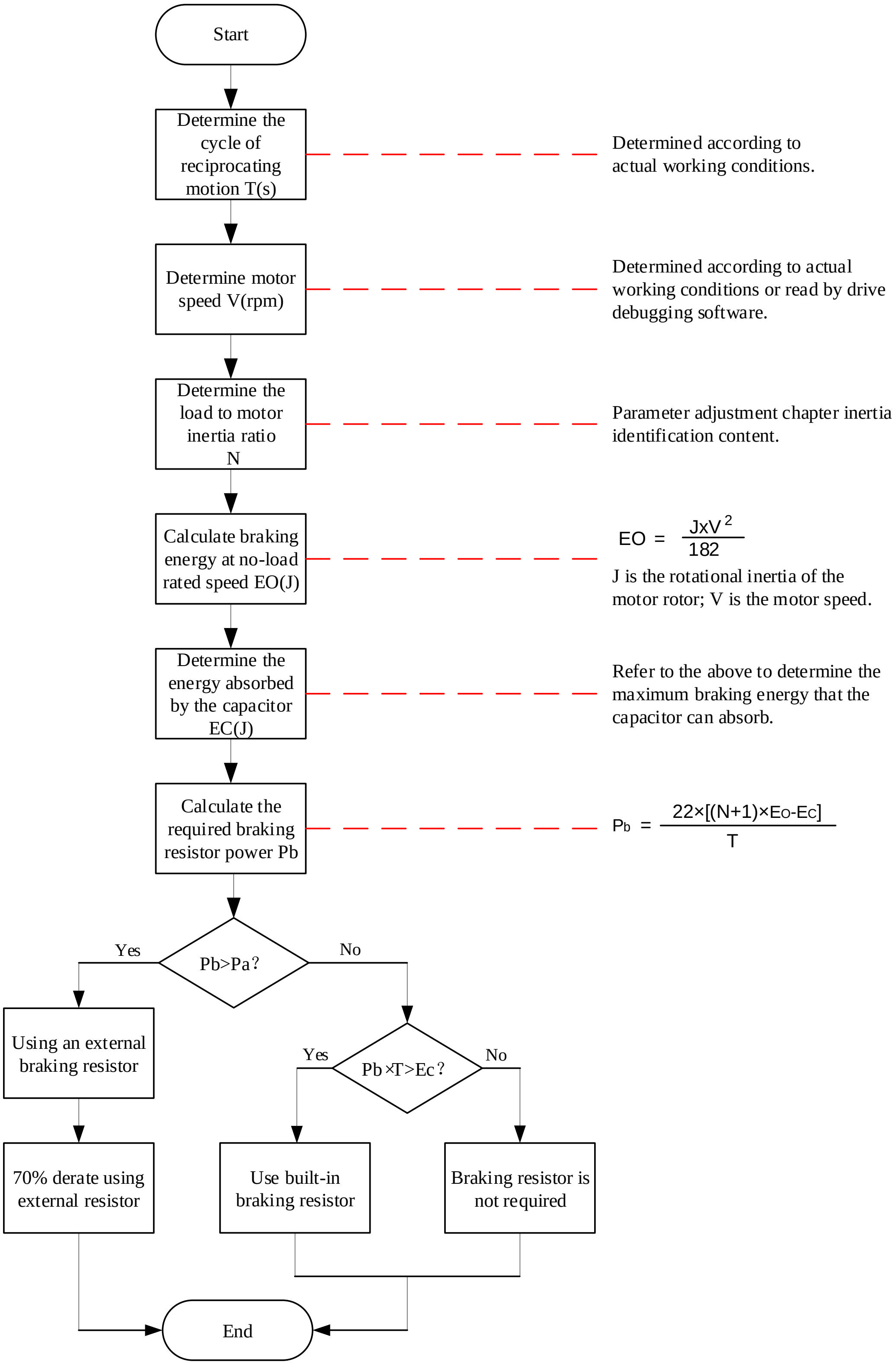


Figure 6-7 Example of motor speed curve without external load torque

a) Braking resistor selection process



Flow chart of braking resistor selection

Here, let's take the motor from 3000 rpm to standstill as an example, and assume that the load inertia is N times the motor inertia. When decelerating from 3000 rpm to 0, the braking energy is (N+1) × E_ o。Remove the energy absorbed by the capacitor E_ c. The energy consumed by the required braking resistor is (N+1) × E_ o-E_ C Joules. Assuming that the cycle of reciprocating motion is T, the braking resistance power required is 2 × [(N+1) × E_ o-E_ c]/T。

According to the above figure, it can be determined whether to currently use braking resistors, as well as built-in or external braking resistors. Based on this, set the function code P02-25.

NOTE

- Aluminum housing resistors are recommended.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P02-25	Braking resistor setting	0- 0-Use built-in braking resistor 1- 1-Use external braking resistor and naturally cool 2- 2-Use external braking resistor and forced air cooling 3- Without braking resistor, it is completely absorbed by capacitance	Set the way to absorb and release braking energy.	Shutdown setting	Effective immediately	0

Taking 750W as an example, assuming a reciprocating motion cycle of T=2s, a maximum rotational speed of 3000rpm, and a load inertia of 4 times that of the motor, the braking resistance power is required:

$$P_b=\frac{2\times[(N+1)\times E_o-E_c]}{T}=\frac{2\times[(4+1)\times 6.4-9]}{2}=23\text{W}$$

It is smaller than the capacity that the built-in braking resistor can handle by 25W, so using the built-in braking resistor can meet the requirements.

If the load inertia in the above assumed conditions is changed from 4 times to 10 times, and other conditions remain unchanged, the braking resistor power is required:

$$P_b=\frac{2\times[(N+1)\times E_o-E_c]}{T}=\frac{2\times[(10+1)\times 6.4-9]}{2}=61.4\text{W}$$

Greater than the power that the built-in braking resistor can handle by P_a25W. Therefore, it is necessary to use an external braking resistor. The recommended power of external braking resistor isE_o/(1-70%)=204.6W.

b) Connection and setting of braking resistor

●Using an external braking resistor:

When P_b>P_a,the external braking resistor needs to be connected. At this time, set P02-25 to 1 or 2 depending on the cooling method of the braking resistor.

When the external braking resistor needs to be derated by 70%, that is,P_r=P_b/(1-70%),and ensure that it is greater than the minimum resistance value allowed by the drive. Connect both ends of the external braking resistor to "B2" and "B1/⊕" respectively, and remove the wire between terminals "B2" and "B3".

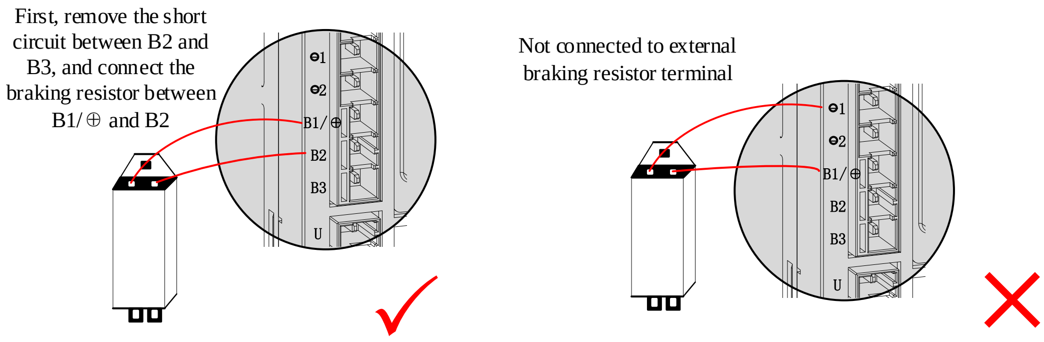


Figure 6-9 Connection diagram of external braking resistor

Set P02-25 to 1 or 2 depending on the cooling method of the braking resistor, and confirm and set the following parameters.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P02-21	Minimum allowable braking resistance value of the drive	Not settable, depending on the model	-	Check the minimum allowable resistance value of the external braking resistor.	Display	-	Depending on models
P02-26	External braking resistor power	1～65535	W	Set the power of the actually selected external braking resistor. ● Please note: The actual selected external braking resistor power cannot be less than the "braking power calculation value".	Shutdown setting	Effective immediately	Depending on models
P02-27	External braking resistance value	1～1000	Ω	Set the resistance value of the actually selected external braking resistor. ● Please note: The actual selected external braking resistance value (P02-27) cannot be less than the "minimum allowable resistance value (P02-21)", otherwise FU.922 (external braking resistance too small) will occur.	Shutdown setting	Effective immediately	Depending on models

⚠Note:

- Please set the resistance value (P02-27) and power (P02-26) of the external braking resistor correctly, otherwise the use of this function will be affected.
- When using an external braking resistor, please determine whether the resistance value meets the minimum allowable resistance value limit.
- In natural environments, when the braking resistor can handle power (average value) at rated capacity, the temperature of the resistor will rise to above 120 ℃ (under continuous braking). For safety reasons, please use forced cooling to reduce the temperature of the braking resistor; Or use a braking resistor with a thermal switch. Consult the manufacturer regarding the load characteristics of the braking resistor.

Finally, when using an external braking resistor, the heat dissipation coefficient of the resistor must be set according to the heat dissipation conditions of the resistor.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P02-24	Resistance heat dissipation coefficient	10～100	%	When using an external braking resistor, the heat dissipation coefficient (P02-24) of the resistor is generally not more than 30% when naturally cooled; When forced air cooling, the heat dissipation coefficient generally does not exceed 50%.	Shutdown setting	Effective immediately	30

NOTE

- The greater the resistance heat dissipation coefficient, the higher the braking efficiency.

●Use built-in braking resistor:

When $P_b < P_a$ and $P_b \times T > E_c$, A built-in braking resistor is required. At this time, set P02-25 to 0.

The drive uses a built-in braking resistor, and it is necessary to directly connect terminals "B2" and "B3" with a short connector.

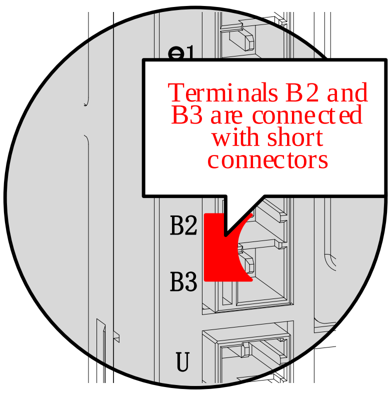


Figure 6-10 Schematic diagram of using short connectors for built-in braking resistors

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P02-22	Power of built-in braking resistor	Not settable, depending on the model	Check the power of the built-in braking resistor.	Display	-	Depending on models
P02-23	Internal braking resistance value	Not settable, depending on the model	Check the value of the built-in braking resistor.	Display	-	Depending on models

●No need to use a braking resistor:

When $P_b \times T < E_c$, it is not necessary to connect the braking resistor, and braking energy can be absorbed only through the bus capacitance. At this time, set P02-25 to 3.

2) There is external load torque and the motor is in power generation state

The rotation direction of the motor is the same as the rotation direction, and the motor outputs energy to the outside. However, in some special situations, the torque output of the motor is opposite to the direction of rotation. At this time, the motor performs negative work, and external energy is fed back to the drive through the electrical energy generated by the motor.

When the load is in a continuous power generation state, it is recommended to adopt a common DC bus scheme.

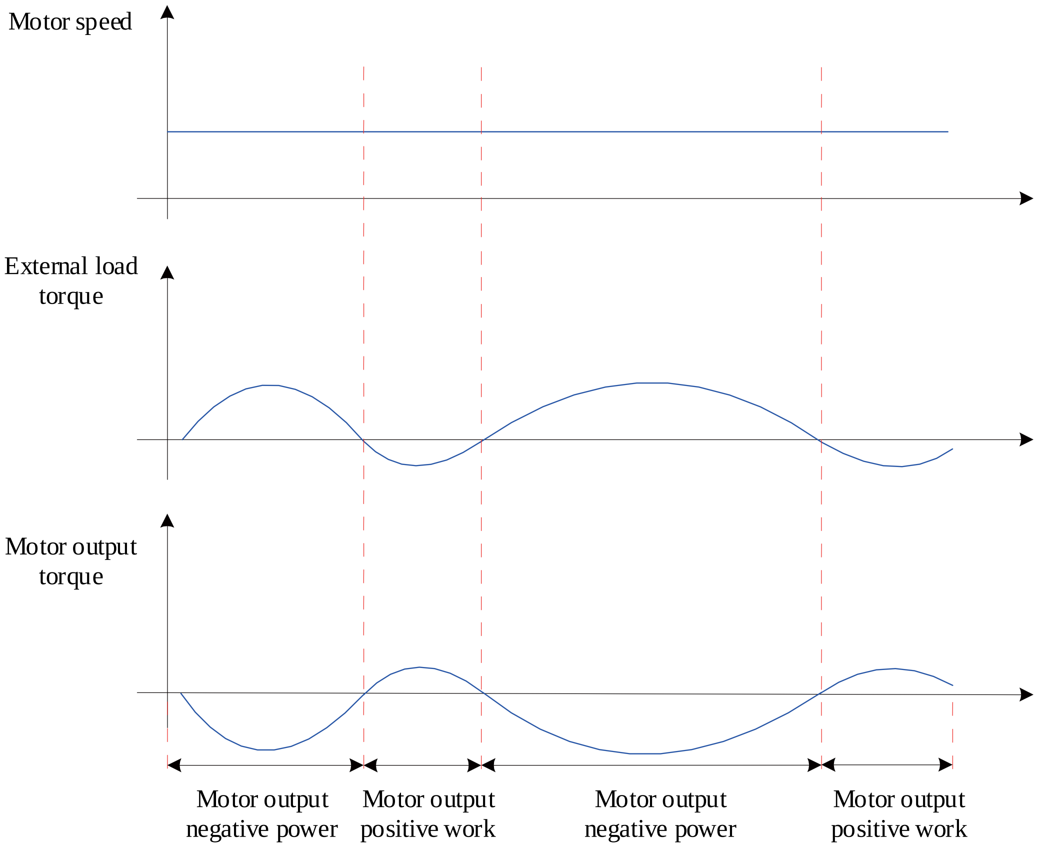


Figure 6-11 Example of curve with external load torque

Taking 750W (rated torque 2.39Nm) as an example, when the external load torque is 60% of the rated torque and the rotational speed reaches 1500rpm, the power fed back to the drive is (60% × 2.39) × (1500 × 2 π/60)=225W, considering that the braking resistor needs to be derated by 70%, the power of the external braking resistor is 225/(1-70%)=750W, and the resistance value is 50 Ω.

1.27.8 Servo running

1) Set servo enable (S-ON) to active (ON)

The servo drive is in an running state and the display displays "Run". However, due to no command input at this time, the servo motor does not rotate and is in a locked state.

2) After inputting the command, the servo motor rotates.

Table 6-3 Running Instructions for Servo Running

Record	Serial No.	Content
□	1	During initial running, appropriate instructions should be set to rotate the motor at low speed to confirm whether the motor rotates correctly.
□	2	Observe whether the motor rotates in the correct direction. If the rotation direction of the motor is found to be opposite to the expected direction, please check the input command signal and the command direction setting signal.
□	3	If the motor rotates in the correct direction, you can use the drive panel or drive debugging platform to observe the actual speed P0B-00, average load rate P0B-12, and other parameters of the motor.
□	4	After checking the operating conditions of the above motors, you can adjust the relevant parameters to make the motors work under the expected conditions.
□	5	Refer to "Chapter 7 Adjustment" to debug the servo drive.

3) Power on sequence diagram

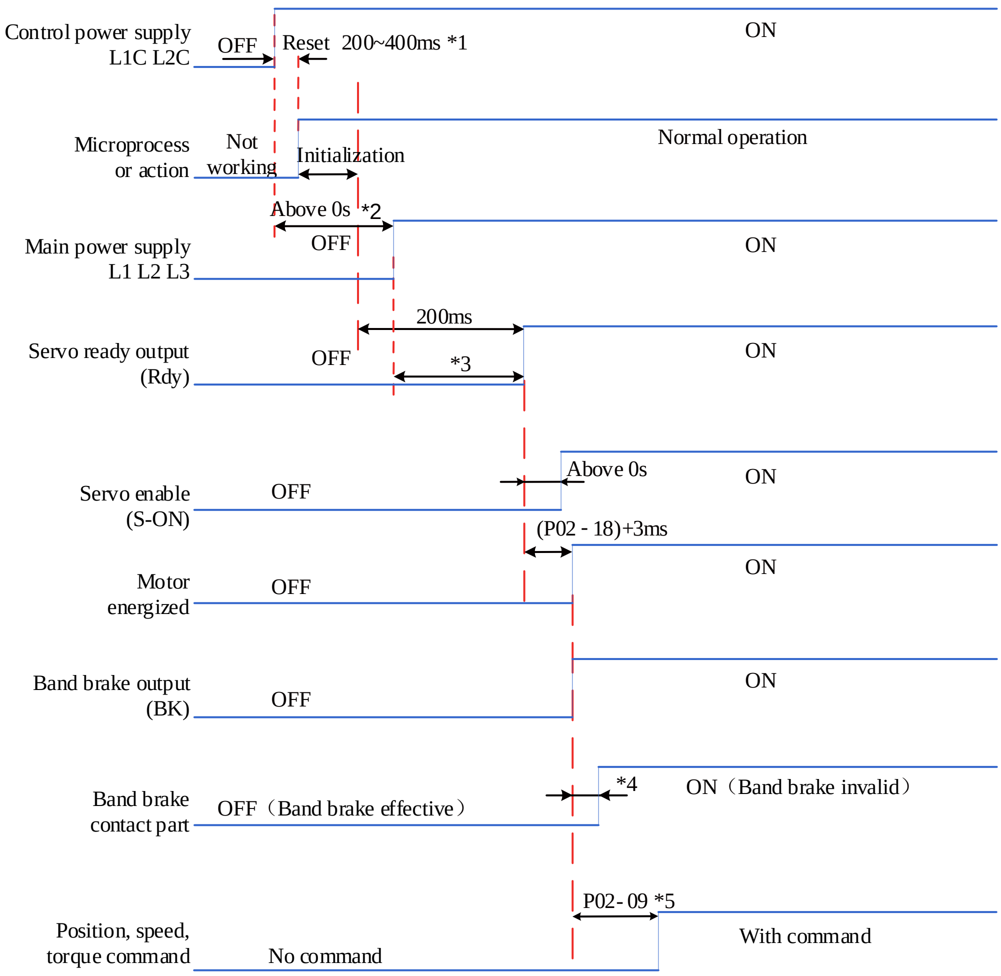


Figure 6-12 Power on timing diagram

- Note * 1: The reset time is determined by the establishment time of the microprocessor+5V power supply;
- Note * 2: Above 0s refers to the time determined by the actual main power on action time;
- Note * 3: When the control power supply and the main power supply are powered on simultaneously, this time is the same as the time from the completion of microprocessor initialization to the effective time of Rdy;
- Note * 4: For the delay time of the action of the band brake contact, please refer to the relevant specifications of the motor;
- Note * 5: When DO function 9 (FunOUT. 9: BK) is not assigned, P02-09 has no effect.

4) Shutdown sequence diagram in case of warning or fault

a） Type 1 fault: free shutdown, maintaining free running status

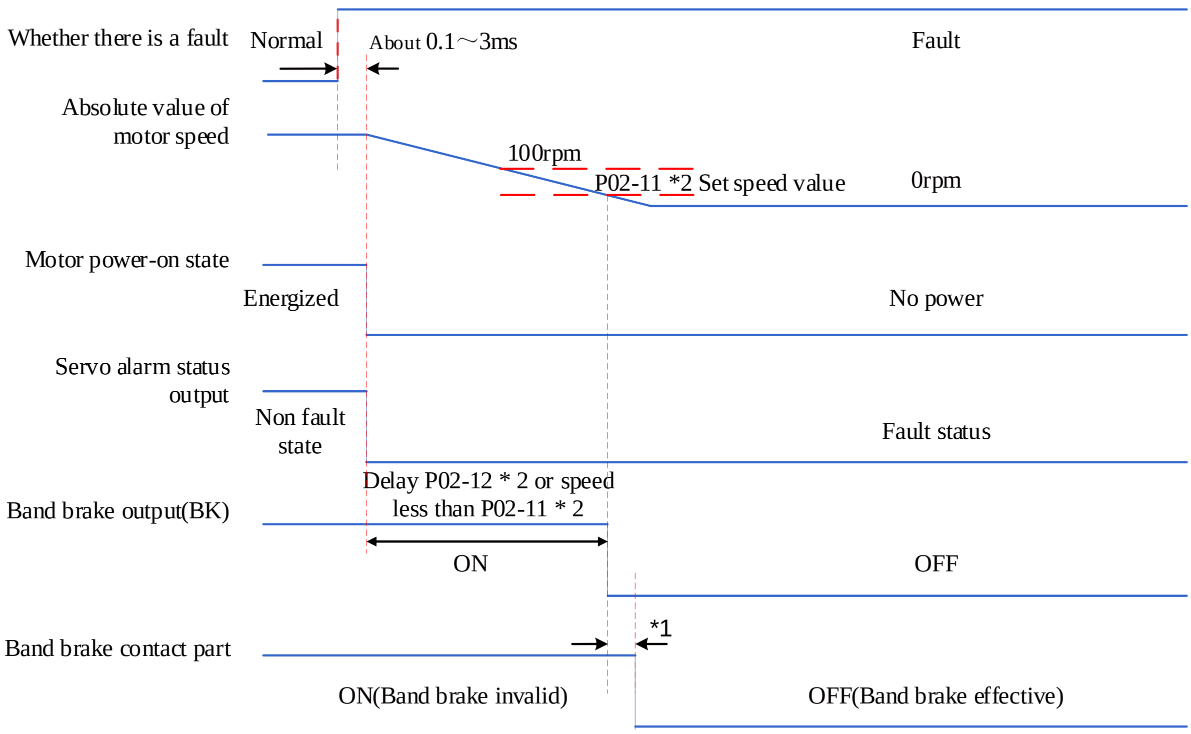


Figure 6-13 Time sequence diagram of free shutdown and maintaining free running during Type 1 fault

- Note * 1: Please refer to the relevant specifications of the motor for the delay time of the action of the contact part of the band brake;
- Note * 2: When DO function 9 (FunOUT. 9: BK) is not assigned, P02-12 has no effect.

b） Type 2 fault: non band brake: free shutdown, maintaining free running status

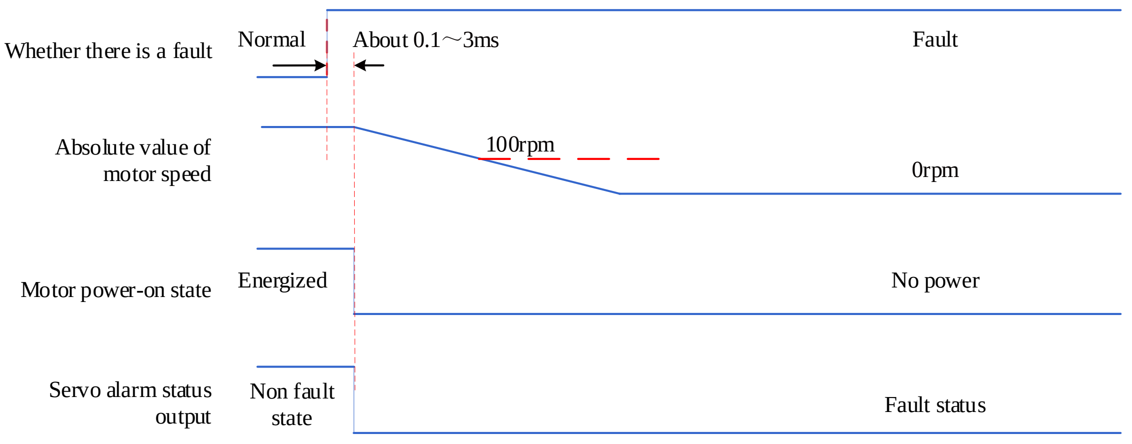


Figure 6-14 Time Sequence diagram of free shutdown and maintaining free running during Type 2 fault

c） Type 2 fault ,non band brake: zero speed shutdown, maintaining free running status

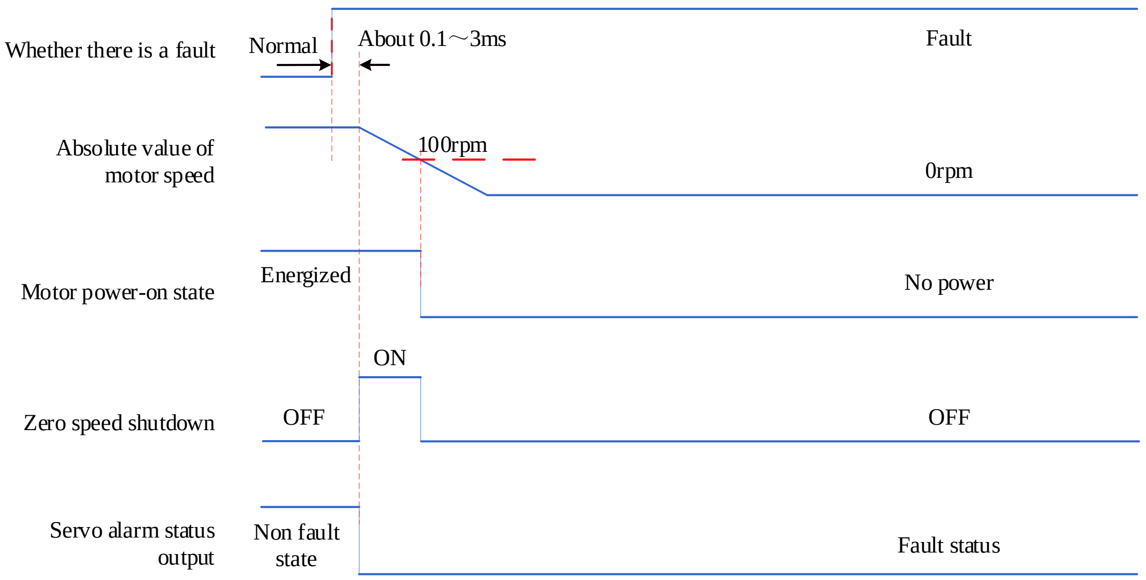


Figure 6-15 Time sequence diagram of zero speed shutdown and maintaining free running state during Type 2 fault (non band brake)

d） Type 2 fault, with band brake: Forced zero speed shutdown to maintain free running status

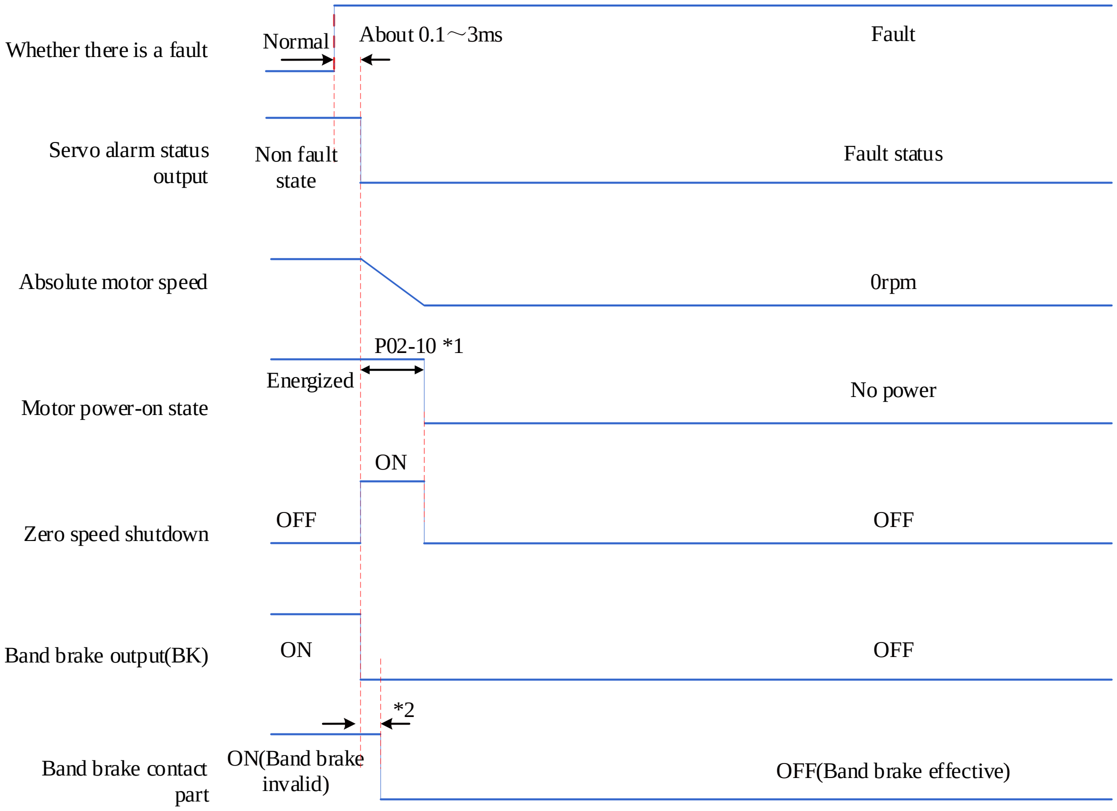


Figure 6-16 Time sequence diagram of zero speed shutdown mode and free shutdown state in case of Type 2 fault (with band brake)

NOTE

- Note * 1: When DO function 9 (FunOUT. 9: BK) is not assigned, P02-10 has no effect;
- Note * 2: Please refer to the relevant motor specifications for the delay time of the action of the band brake contact.

When the servo encounters the third type of warning: FU.900 (DI emergency braking), FU.950 (forward overtravel warning), and FU.952 (reverse overtravel warning), the current operating state of the servo will be interrupted, and the shutdown sequence is shown in e).

e） Overtravel and brake stop warning: stop at zero speed and keep the position locked

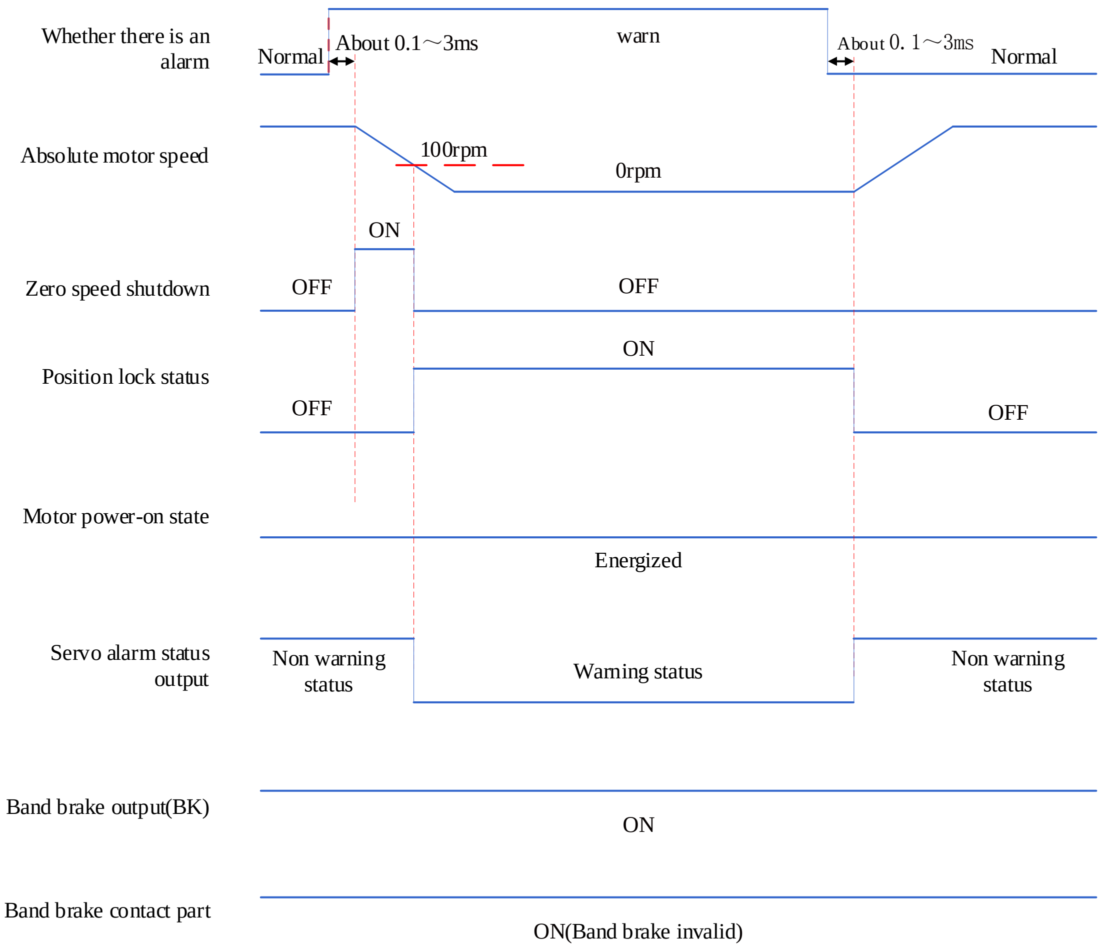


Figure 6-17 Timing chart of shutdown warning

Except for the above three Type 3 warnings, other warnings have no impact on the current status of the servo, as shown in f).

f）Non shutdown warning

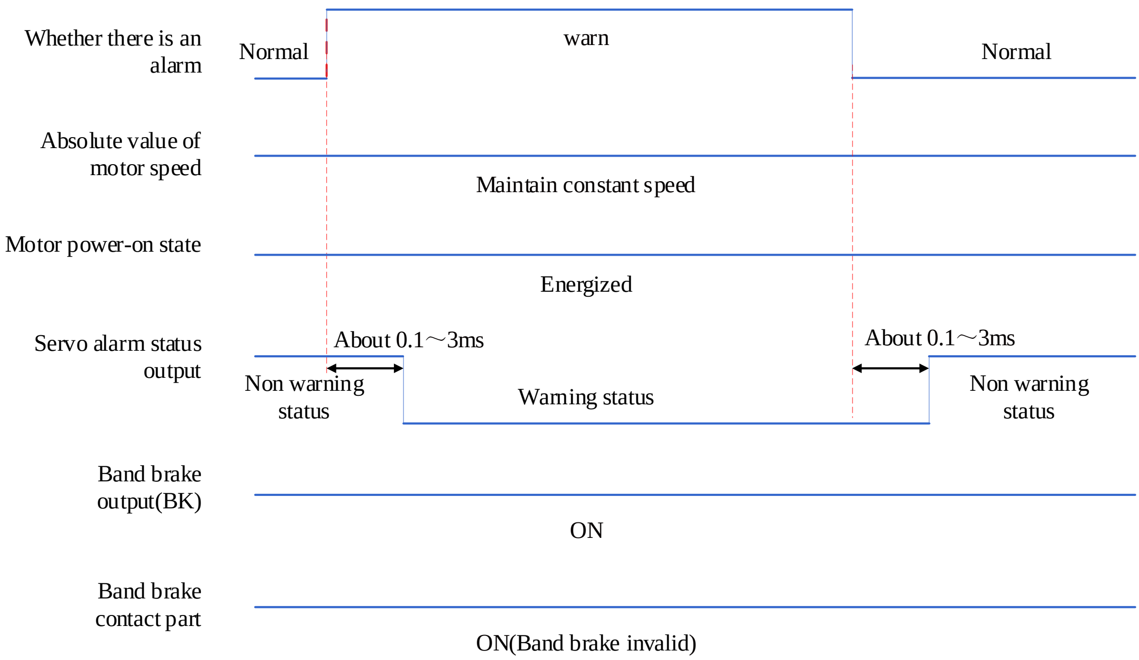


Figure 6-18 Non shutdown warning timing chart

g） Fault reset

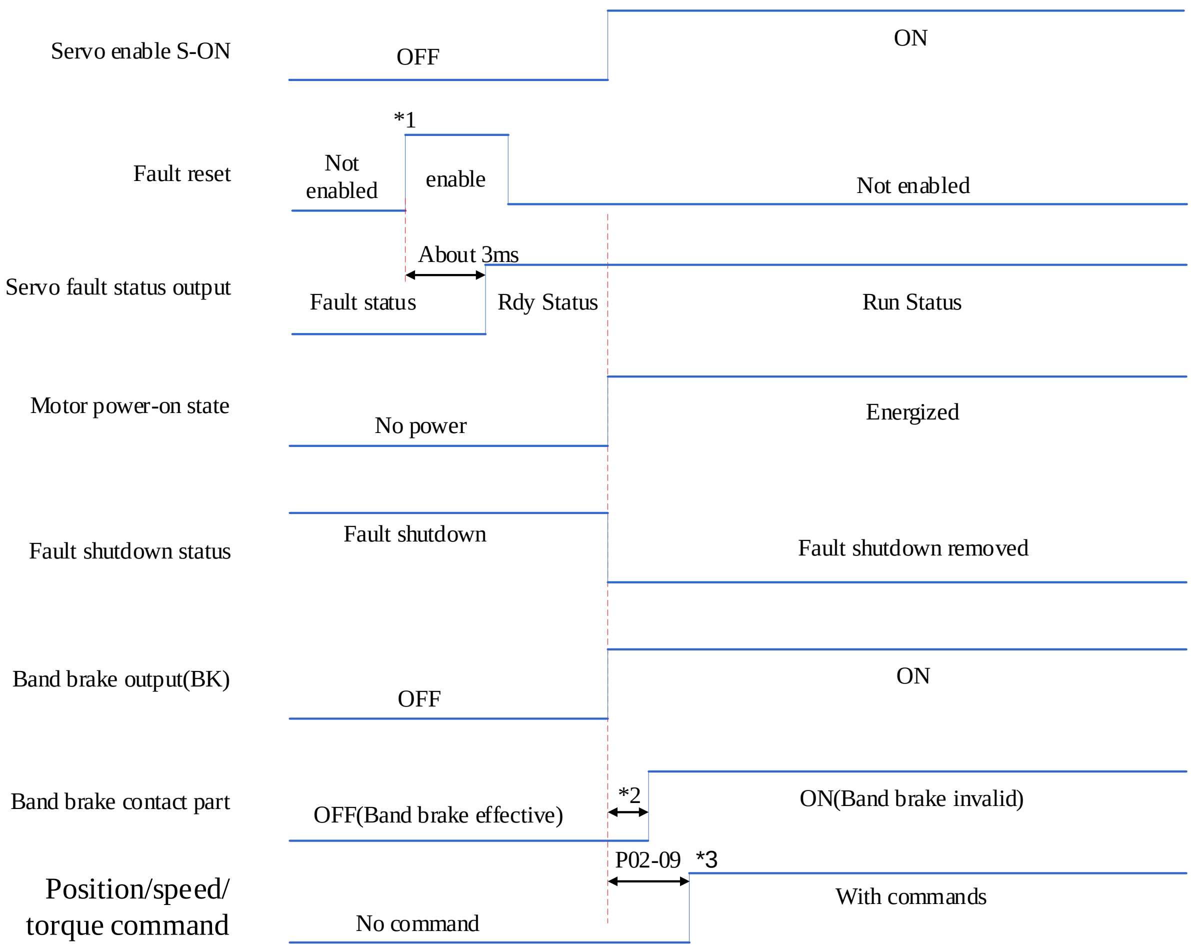


Figure 6-19 Fault reset sequence diagram

- Note * 1: The DI fault reset signal (FunIN. 2: ALM-RST) is valid along the change;
- Note * 2: When DO function 9 (FunOUT. 9: BK) is not assigned, P02-09 has no effect;
- Note * 3: Please refer to the relevant motor specifications for the delay time of the action of the band brake contact.

1.27.9 Servo Shutdown

According to different shutdown methods, it can be divided into free shutdown and zero speed shutdown; According to the shutdown status, it can be divided into free running status and position holding locked status. The details are as follows:

Table 6-4 Comparison of Two Shutdown Modes

Shutdown mode	Free shutdown	Zero speed shutdown
Shutdown description	The servo motor is powered off and decelerates freely to 0. The deceleration time is affected by mechanical inertia, mechanical friction, etc.	The servo drive outputs a reverse braking torque and the motor quickly decelerates to 0.
Shutdown characteristics	The deceleration is smooth, the mechanical impact is low, but the deceleration process is slow.	The deceleration is fast, with mechanical impact, but the deceleration process is fast.

Table 6-5 Comparison of Two Shutdown States

Free running state	Position remains locked
After the motor stops rotating, the motor is not powered on and the motor shaft can rotate freely.	After the motor stops rotating, the motor shaft is locked and cannot rotate freely.

Servo shutdown conditions can be divided into the following categories:

1） Servo enable (S-ON) OFF shutdown:

Set the servo enable DI terminal to disable.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P02-25	Servo enable OFF shutdown mode selection	Free shundown, maintain free running status Zero speed shutdown, maintain free running status	Set the motor shutdown mode when the servo enable is set to OFF	Shutdown setting	Effective immediately	0

2） Fault shutdown：

The servo shutdown mode varies depending on the type of fault. Please refer to Chapter 9 for fault classification.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P02-06	Fault No.2 Shutdown Mode Selection	Free shundown, maintain free running status Zero speed shutdown, maintain free running status	Set the motor shutdown mode when Type 2 fault occurs ◆ Please note： When the band brake is enabled, the internal force of the	Shutdown setting	Effective immediately	0

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
			drive is 1, and the drive is shut down at zero speed to maintain a free running state.			
P02-08	Fault No.1 Shutdown Mode Selection	0-Free shutdown, maintain free running status	Set the motor shutdown mode when Type 1 fault occurs	Shutdown setting	Effective immediately	0

3） Overtravel shutdown:

★Explanation of terms:

"Overtravel": refers to the mechanical movement exceeding the designed safe movement range.

"Overtravel shutdown": refers to the safety function of forcing the servo motor to stop when the moving part of the machine exceeds the safe movement range, and the output level of the limit switch changes.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P02-07	Overtravel shutdown mode selection	0: Free shutdown, maintain free running status 1: Zero speed shutdown, maintain the position locked 2: Zero speed shutdown, maintain free running state	Set the motor shutdown mode when overtravel occurs	Shutdown setting	Effective immediately	1

When the servo motor drive is perpendicular to the shaft, if it is in an overtravel state, the workpiece may fall. To prevent the workpiece from falling, make sure to set the overtravel shutdown mode selection (P02-07) to "1: Zero speed shutdown, position locked state". In situations such as linear movement of the workpiece, be sure to connect a limit switch to prevent mechanical damage. In the overtravel state, the motor (workpiece) can be reversely moved by inputting a reverse command.

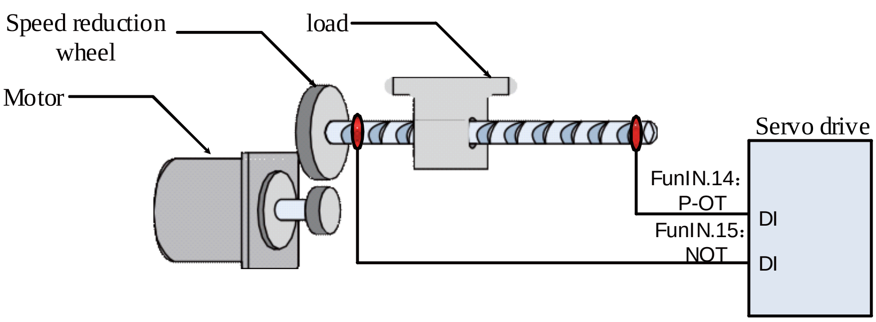


Figure 6-20 Installation Diagram of Limit Switch

When using the overtravel shutdown function, the two DI terminals of the servo drive should be configured as function 14 (FunIN.14: P-OT, forward overtravel switch) and function 15 (FunIN.15: N-OT, reverse overtravel switch) to receive the limit switch input level signal, and set the DI terminal effective logic. Depending on whether the DI terminal level is valid, the drive will enable or remove the overtravel shutdown state.

☆Associated function code:

Code	Name	Function name	Function
FunIN.14	P-OT	Forward overtravel switch	Enter the overtravel prevention function when the mechanical movement exceeds the movable range Invalid, forward drive allowed Valid, forward drive Inhibited
FunIN.15	N-OT	Reverse overtravel switch	Enter the overtravel prevention function when the mechanical movement exceeds the movable range Invalid, reverse drive allowed Valid, reverse drive Inhibited

4） Emergency shutdown:

There are two emergency shutdown modes for servo:

- Use DI function 34: FunIN.34: Emergency shundown to brake;
- Use auxiliary functions: Emergency shutdown (P0D-05).

☆Associated function code:

Code	Name	Function name	Function
FunIN.34	Emergency Stop	Brake	Invalid, the servo drive remains in the current operating state; Valid, zero speed shutdown, position locked status maintained, servo warning FU.900 (DI emergency braking) occurred.

☆Associated function code:

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P0D-05	Emergency Stop	0: The servo drive remains in the current operating state 1: Enable emergency shutdown. The shutdown mode is determined by P02-05	Enable the emergency shutdown function, and the shutdown method is the same as when the servo is enabled to be OFF.	Shutdown setting	Effective immediately	0

1.28 Position control mode

★Explanation of terms:

"Command unit": Refers to the minimum distinguishable value input from the upper device to the servo drive.

"Encoder unit": refers to the value of the input command after electronic gear ratio processing.

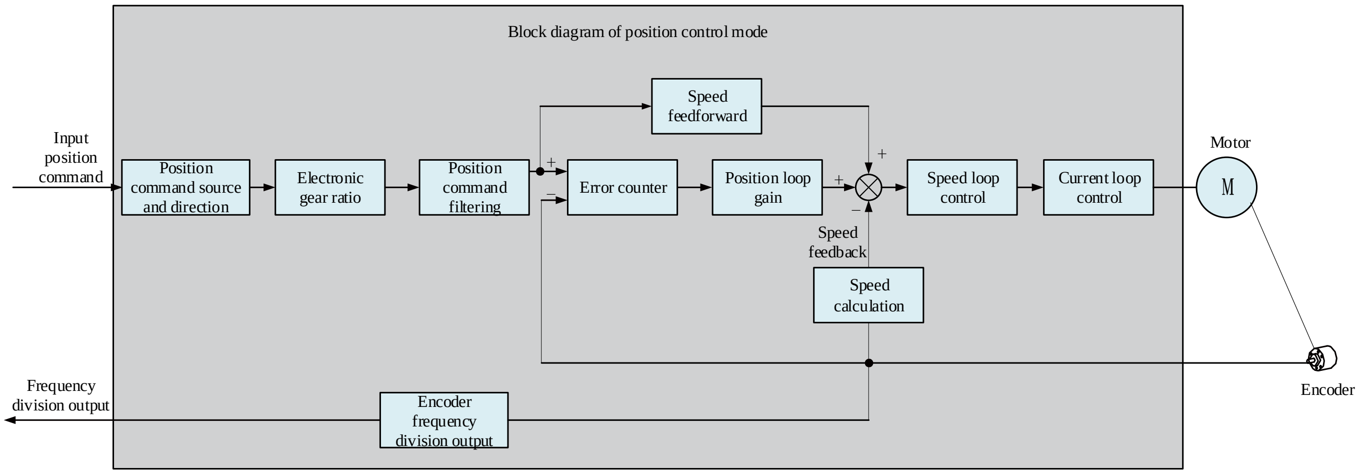


Figure 6-21 Position Control Block Diagram

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.

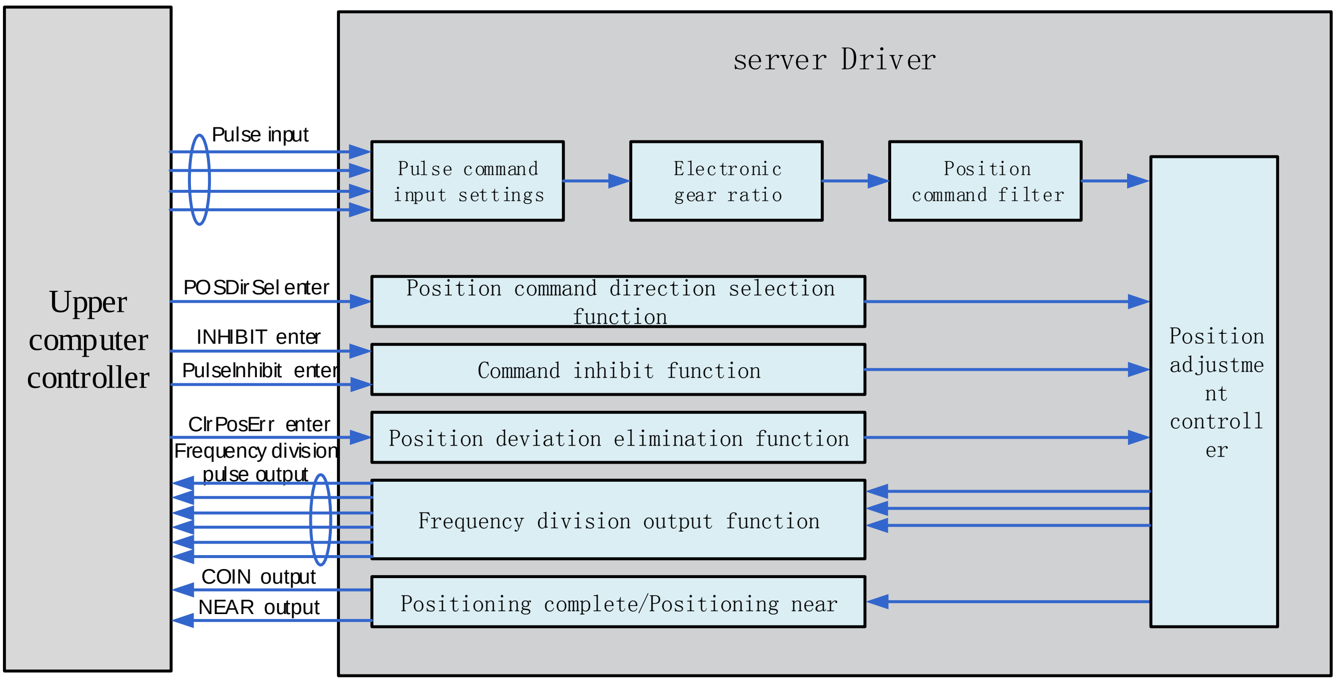


Figure 6-22 Signal Interaction Diagram between Servo Drive and Host Computer

1.28.1 Position command input settings

Position command input settings include: position command source, position command direction, and position command inhibition.

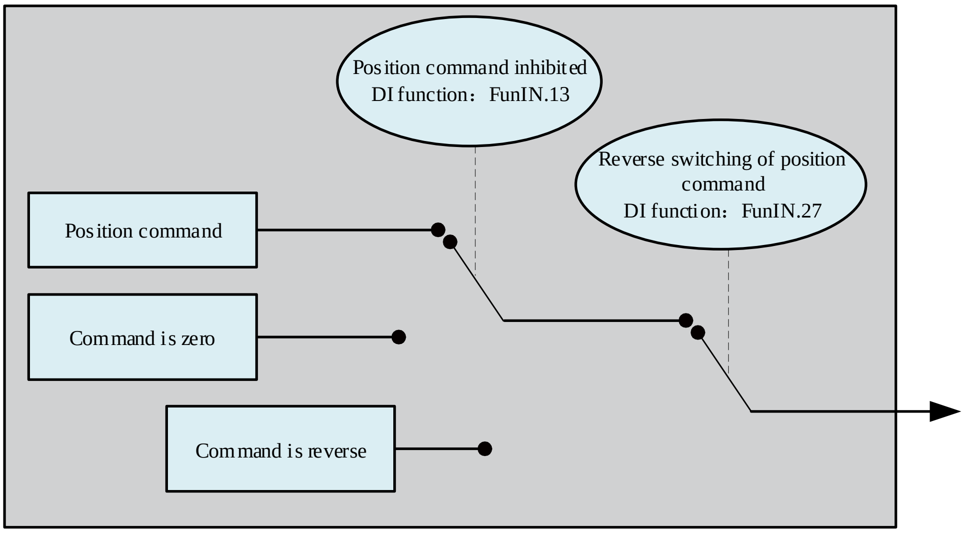


Figure 6-23 Position command input settings block diagram

1）Location command source

In position control mode, you should first set the Location command source through the function code P05-00.

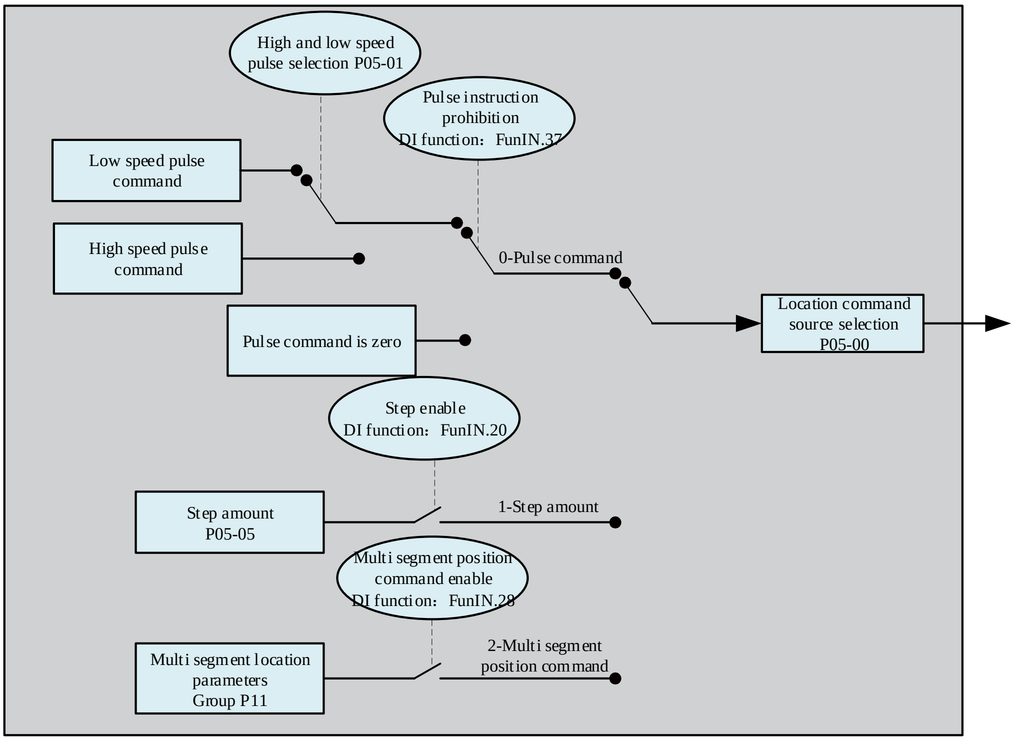


Figure 6-24 Location command source settings

☆Associated function code:

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P05-00	Location command source	0: Pulse command 1: Step amount 2: Multi segment	Set the Location command source. The pulse command is an external position command, and the step amount and multi segment position	Shutdown setting	Effective immediately	0

		position command	commands are internal position commands.			

a) Location command source is a pulse command (P05-00=0)

When selecting a pulse command, please follow the steps below to obtain the correct pulse command configuration.

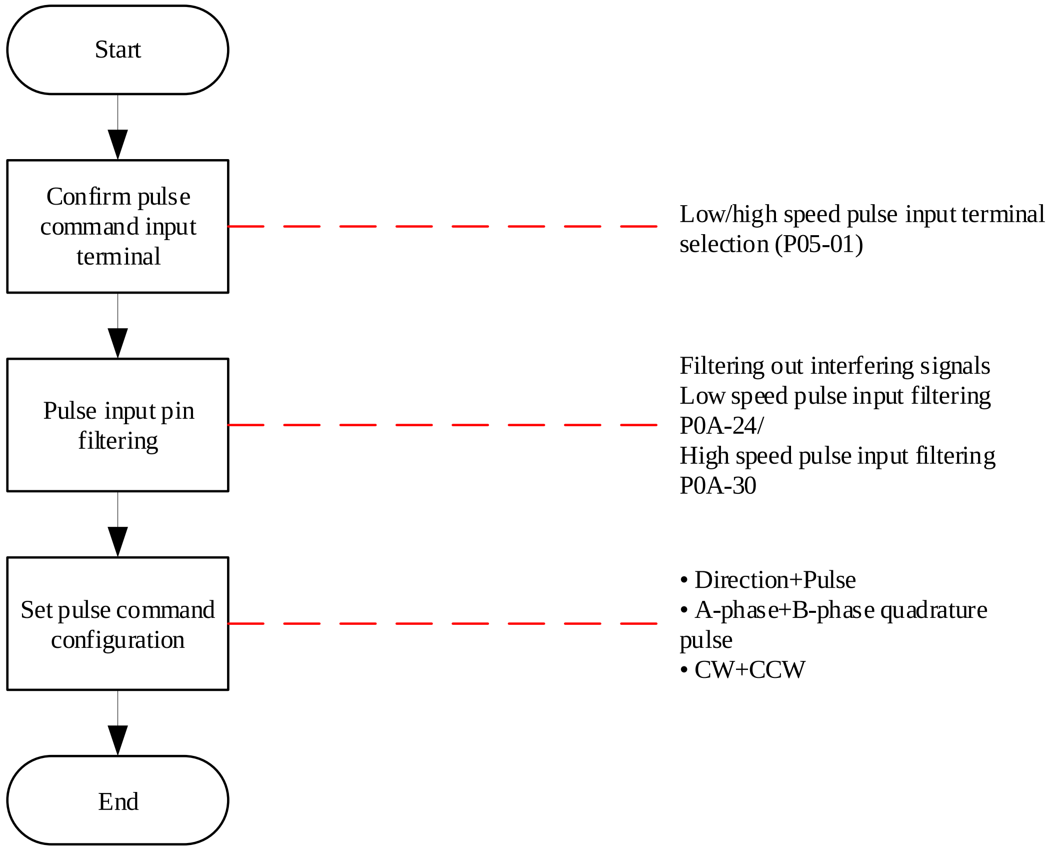
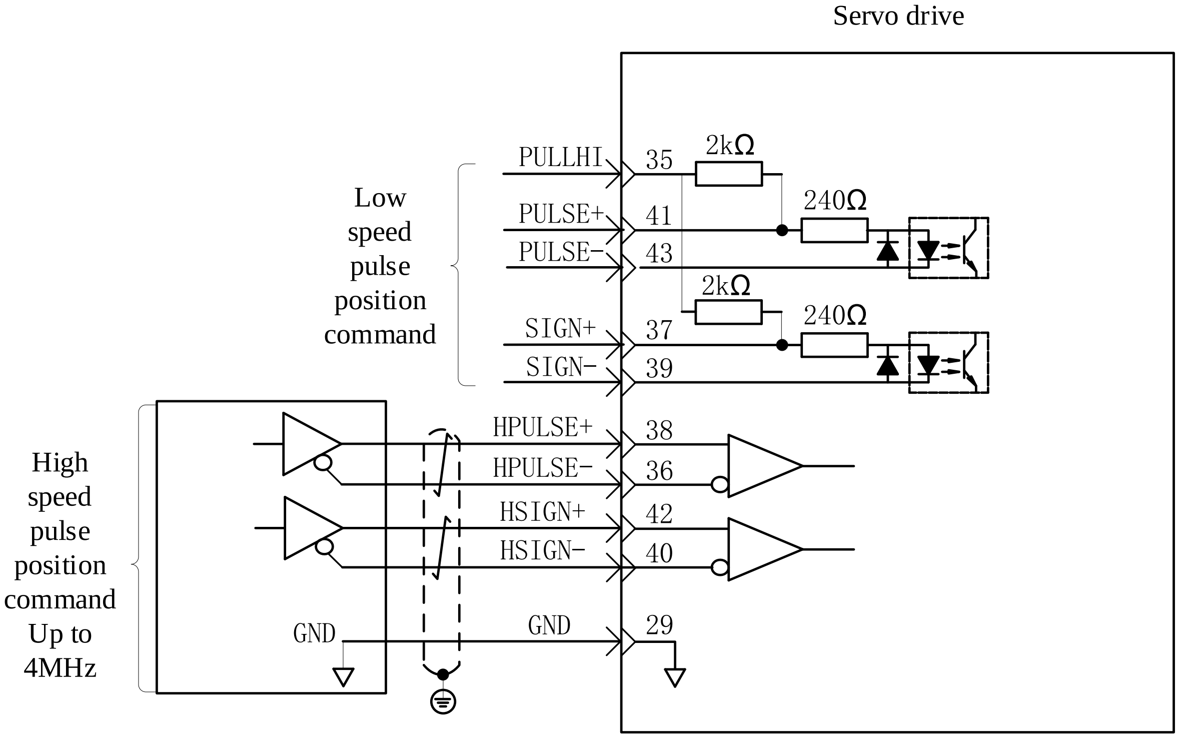


Figure 6-25 Pulse Command Source Setting Process

① Pulse command input terminal

The servo drive has 2 sets of pulse input terminals:



- The low speed pulse input terminal (corresponding to PULSE+, PULSE -, SIGN+, SIGN -) accepts differential input (maximum frequency of input pulse is 500 kpps) and open collector input (maximum frequency of input pulse is 200 kpps).
- The high-speed pulse input terminal (corresponding to HPULSE+, HPULSE -, HSIGN+, HSIGN -) only accepts differential input (the maximum frequency of the input pulse is 4Mpps).

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P05-01	Pulse command input terminal selection	Low speed pulse input terminal High speed pulse input terminal	Set the hardware input terminal for the pulse command.	Shutdown setting	Effective immediately	0

For a detailed description of the interface circuit, please refer to "4.4.1Position command input signal".

Table 6-6 Pulse Input Specifications

Pulse specification		Maximum input frequency	Voltage specification	Forward current
High speed pulse	Differential signal	4M	5V	<25mA
Low speed pulse	Differential signal	500k	5V	<15mA
	Open collector signal	200k	24V	<15mA

② Pulse input pin filtering

The hardware input terminal of low speed pulse or high speed pulse needs to set a certain pin filtering time to filter the input pulse instructions to prevent interference signals from entering the servo drive and causing motor misrunning.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-24	Low speed pulse input pin filtering time constant	0～255	25ns	Sets the filtering time constant for low speed pulses.	Shutdown setting	Re-energize	30
P0A-30	High speed pulse input pin filtering time constant	0～255	25ns	Sets the filtering time constant for high-speed pulses.	Shutdown setting	Re-energize	3

If the Pulse input pin filtering time constant is and the minimum width of the input signal is, the input signal and filtered signal are shown in the following figure. Compared to the input signal, the filtered signal will delayt_F.

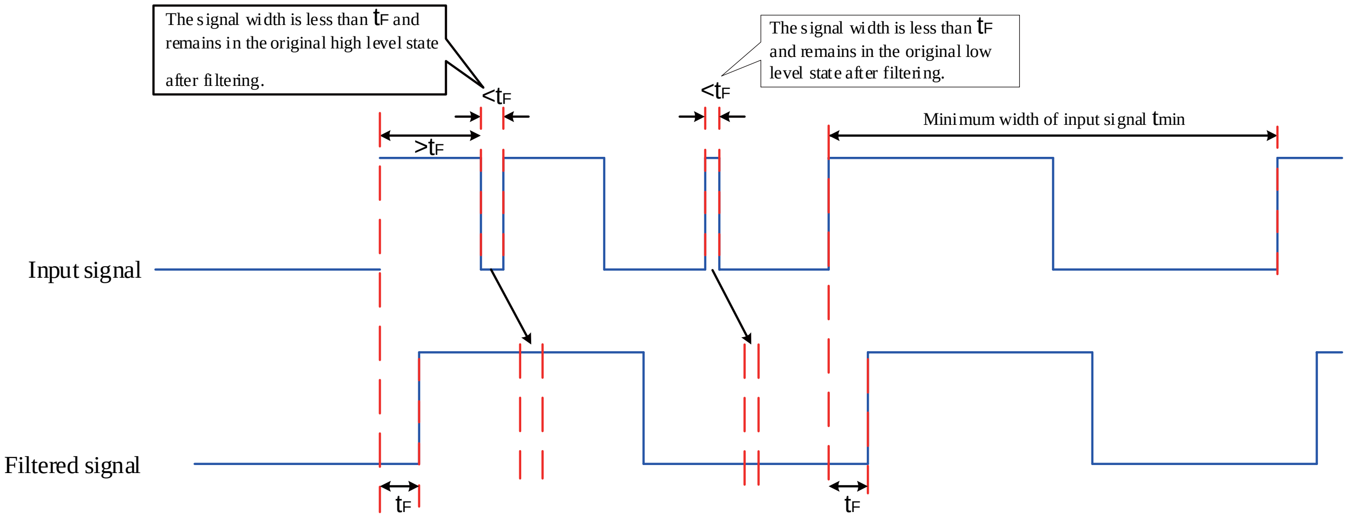


Figure 6-26 Example of filtered signal waveform

Pulse input pin filtering time needs to meet:t_F≤(20%～25%)t_{min} .

The maximum frequency (or minimum pulse width) of the input pulse is known, and the recommended filtering parameters are shown in the table below.

Table 6-7 Recommended Filtering Parameters

Input pulse terminal	Corresponding function code	Maximum frequency of input pulse	Recommended filtering parameters (unit: 25ns)
Low speed pulse input terminal	P0A-24	＜167k	30
Low speed pulse input terminal	P0A-24	167k～250k	20
Low speed pulse input terminal	P0A-24	250k～500k	10
High speed pulse input terminal	P0A-30	500k～1M	5
High speed pulse input terminal	P0A-30	＞1M	3

For example, if the setting value is 30, the actual Pulse input pin filtering time is 30 * 25=750ns.

③ Pulse command form

The pulse commands that the servo drive can input have the following three forms:

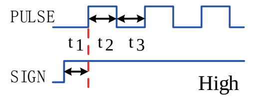
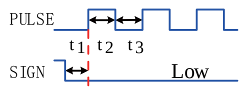
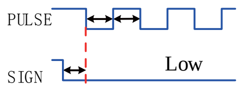
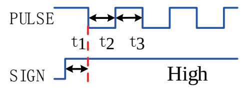
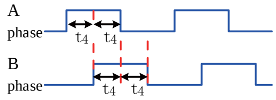
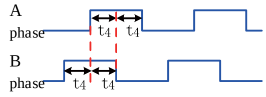
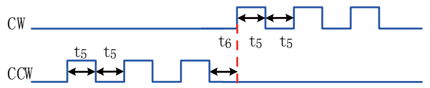
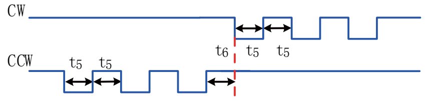
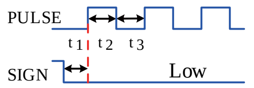
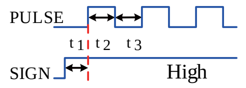
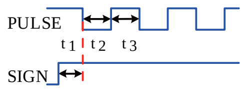
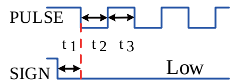
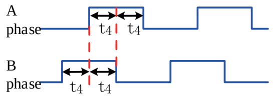
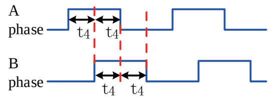
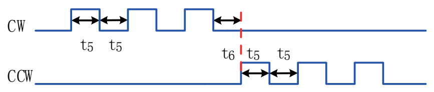
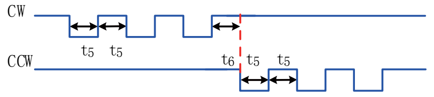
- Direction+pulse (positive or negative logic)
- A-phase+B-phase quadrature pulse, 4-fold frequency
- Positive pulse/negative pulse (CW+CCW)

Please set the pulse shape according to the upper computer or other pulse output devices.

☆Associated function code：

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

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)	 Phase A leads Phase B by 90 °	 Phase B leads Phase A by 90 °
	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)	 Phase B leads Phase A by 90 °	 Phase A leads Phase B by 90 °
	3	CW+CCW	PULSE(CW) SIGN(CCW)		

The maximum frequency and minimum time width specifications of position pulse commands corresponding to different input terminals are shown in the following table:

Table 6-9 Pulse Command Specifications

Input terminal		Maximum frequency	Minimum time width/us					
			t_1	t_2	t_3	t_4	t_5	t_6
High speed pulse input terminal		4Mpps	0.125	0.125	0.125	0.125	0.125	0.125
Low speed pulse input terminal	Differential input	500kpps	1	1	1	2	1	1
	Collector input	200kpps	2.5	2.5	2.5	5	2.5	2.5

The rising and falling time of the position pulse command should be less than 0.1us.

④ Pulse command frequency

The maximum position pulse frequency can be set using function code P0A-09. If the actual input pulse frequency is greater than P0A-09, a warning FU.B01 (abnormal position command input) will occur.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-09	Maximum position pulse frequency.	100～4000	kHz	Sets the maximum frequency of external pulse commands.	Shutdown setting	Re-energize	4000

b) Location command source is the step amount (P05-00=1)

Caution:

- When the servo drive is in the running state (the servo enable is set to ON), if the step command enable is invalid, the motor is in the locked state; Conversely, if the step command is enabled effectively, the servo motor rotates. When the P05-05 command is performed and the step command is no longer triggered, the motor will also be in a locked state.

The servo drive has a step running function, which means that the drive operates at an internal fixed rotational speed until the set displacement is completed. The setting process is as follows:

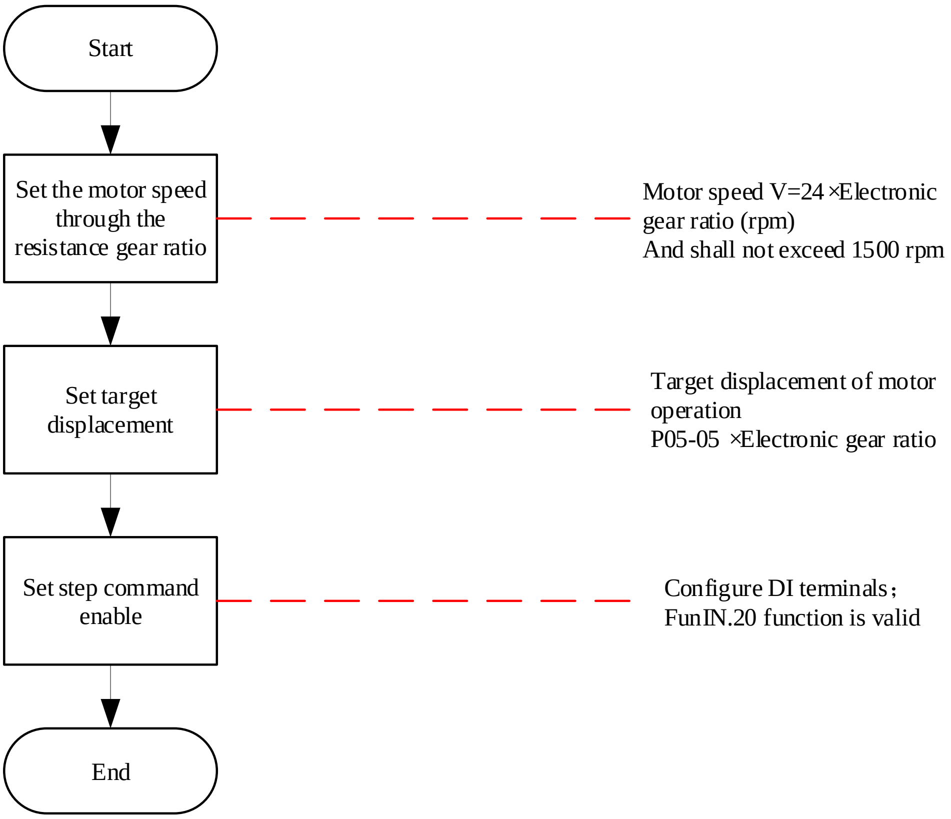


Figure 6-27 Step Amount Command Source Setting Process

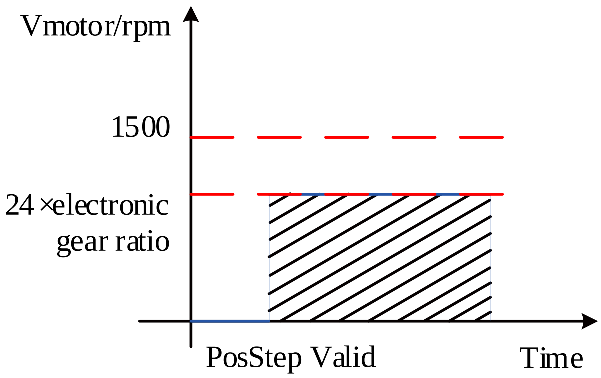


Figure 6-28 Motor running curve when P05-00=1

In the figure, the shaded area is equal to the motor displacement: P05-05 × electronic gear ratio (encoder unit).

①Relationship between motor speed and electronic gear ratio:

When the Location command source is the stepping amount, the servo motor speed cannot be directly set, but there is the following relationship with the electronic gear ratio. At the same time, the drive limits the motor speed to not exceed 1500 rpm at this time.

$$V_{motor} = 24 \times \text{electronic gear ratio(rpm)}$$

② Motor displacement:

When Location command source is the stepping amount, the total number of location commands (command units) is set through P05-05, and the positive or negative value of P05-05 determines the positive or negative speed of the motor.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P05-05	Step amount	-9999～9999	Command unit	When P05-00=1, the total number of position commands is set. The positive or negative value determines the positive or negative speed of the motor.	Shutdown setting	Effective immediately	50

③Step command enable

When selecting the step amount as the Location command source, configure one DI terminal of the servo drive to function 20 (FunIN.20: PosStep, enable the step amount command), and determine the valid logic for the DI terminal.

☆Associated function code:

Code	Name	Function name	Function
FunIN.20	PosStep	Step command enable	In the Servo running state: Valid, the position command set in P05-05 is input to the servo drive, and the servo motor runs: invalid, and the servo motor is in the locked state.

FunIN.20 (step command enable) is valid for the change in direction. After the step position command is completed, the servo motor enters the locked state; If FunIN.20 is triggered again, the servo motor will repeatedly perform the position command set in P05-05.

c) Location command source is a multi segment location command (P05-00=2)

The servo drive has a multi segment position running function. It refers to 16 segments of position commands stored inside the servo drive, and the displacement, maximum operating speed, and acceleration/deceleration time of each segment can be set separately. The waiting time and connection method between segments can also be selected based on actual needs. The setting process is as follows:

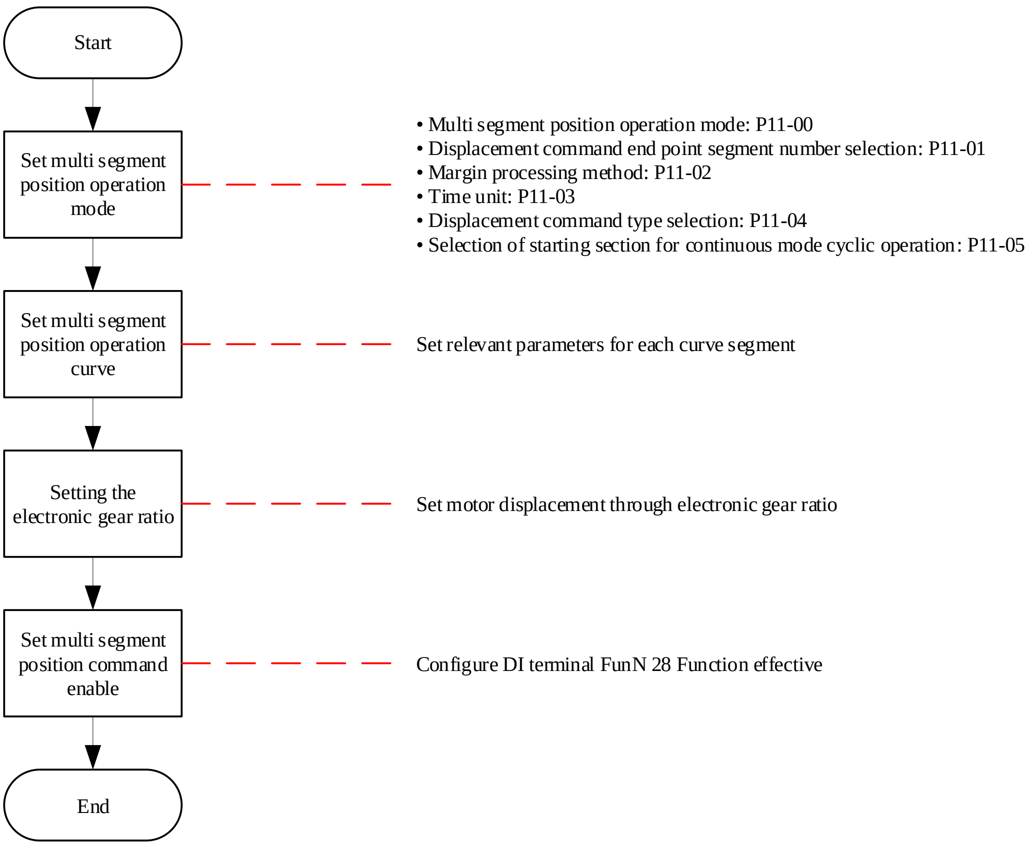


Figure 6-29 Multisegment Location command source setting process

①Set multi segment position running mode

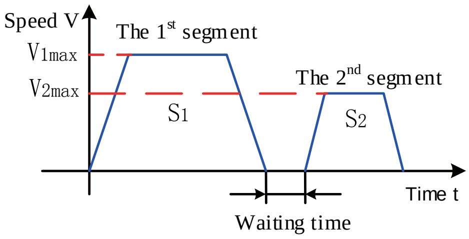
☆Associated function code：

Code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P11-00	Multi segment position running mode	0: Shutdown at the end of a single running 1: Cyclic running 2:DI switching running 3: Sequential running	Set the connection between segments	Shutdown setting	Effective immediately	1
P11-01	Number of end segments of position command	1～16	Set the total number of segments for multi segment position commands	Shutdown setting	Effective immediately	1
P11-02	Margin treatment method	0: Continue running unfinished segments 1: Restart running from the 1st segment	Set the servo enable ON, and the starting segment number from when the multi segment position running is interrupted to when the running is resumed ◆ Cation; P11-02 is only valid when P11-00 ≠ 2.	Shutdown setting	Effective immediately	0

Code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P11-03	Waiting time unit	0：ms 1：s	Set acceleration/deceleration time and waiting time units. Please note: The wait time is only valid when P11-00=0 or 1.	Shutdown setting	Effective immediately	0
P11-04	Displacement command type selection	0: Relative position command 1: Absolute position command	Set displacement command type	Shutdown setting	Effective immediately	0
P11-05	Selection of starting section for sequential running	0～16	When P11-00=3, set the starting segment number for multi segment running after the 1st round. ◆ Please note: P11-05=0 or P11-05 ＞ P11-01 Indicates no cycle; P11-05＞1 Indicates that the starting segment number is the set value of P11-05.	Shutdown setting	Effective immediately	0

●Shutdown at the end of a single running(P11-00=0)

Table 6-10 Single Running Description

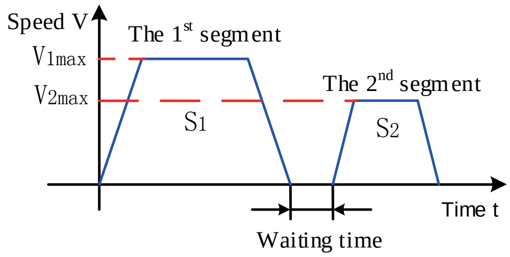
Mode description	Running curve
◆ Run 1 round; ◆ Automatic increment switching of segment number; ◆ Waiting time can be set between each segment; ◆ The multi segment position command enable (PosInSen) signal is level effective.	 V1max, V2max: maximum operating speed of the 1st and second sections; S1, S2: displacement of the 1st and second segments. ◆ After each section of running is completed, the positioning completion signal is valid; ◆ During running, the multi segment position command is enabled to be OFF, and the servo abandons the uncompleted displacement of this segment and stops. After the shutdown is completed, the positioning completion signal is valid; ◆ Reset the multi segment position command to ON, and select the corresponding segment for servo running according to P11-02 settings; ◆ When a servo enable OFF occurs during a certain section of running, the motor shuts down in the servo OFF shutdown mode. After the shutdown is completed, the positioning completion is invalid; ◆ During the running of a certain section, the position command direction switching DI (FunIN.27: PosDirSel) logic switching has no impact on the running direction of this section.

★Explanation of terms:

The total number of segments of the multi segment position command set by P11-01 for the complete running of the drive once is called completing one round of running.

●Cycle running(P11-00=1)

Table 6-11 Cycle Running Description

Mode description	Running curve
◆ Cycle running, with the starting segment number of each round being 1; ◆ Automatic increment switching of segment number; ◆ Waiting time can be set between each segment; ◆ FunIN.28 (multi segment position command enable) is valid and maintains a cyclic running state. ◆ The multi segment position command enable (PosInSen) signal is level effective.	 V1max, V2max: maximum operating speed of the 1st and second sections; S1, S2: displacement of the 1st and second segments. ◆ After each section of running is completed, the positioning completion signal is valid; ◆ During running, enable the multi segment position command to be OFF, and the servo discards the uncompleted displacement of this segment and stops. After the shutdown is completed, the positioning completion signal is valid; ◆ Reset the multi segment position command to ON, and select the corresponding segment for servo running according to P11-02 settings; ◆ When a servo enable OFF occurs during a certain section of running, the motor shuts down in the servo OFF shutdown mode. After the shutdown is completed, the positioning completion is invalid; ◆ During the running of a certain section, the position command direction switching DI (FunIN.27: PosDirSel) logic switching has no impact on the running direction of this section.

●DI switching running(P11-00=2)

Table 6-12 DI Switching Running Description

<table>
<tr><th>Mode description</th><th>Running curve</th></tr>
<tr><td>

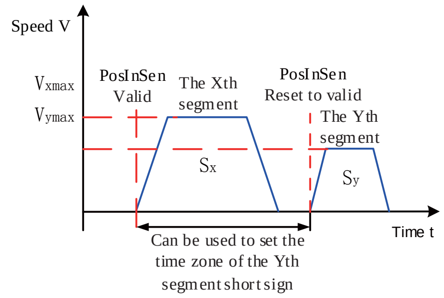
◆ When running the current segment number, you can set the next running segment number. After completing the position command set for the current segment number, the motor stops. After the multi segment position command enable is reset to ON, run the current segment number command;

◆ The segment number is determined by the DI terminal logic;

◆ There is no waiting time between each segment, and the interval time is determined by the command delay of the upper computer;

◆ The multi segment position command enable (PosInSen) signal is valid for edge variation.

</td><td>



Vxmax, Vymax: the maximum operating speed of the x and y segments;

Sx, Sy: displacement of the x and y segments.

◆ After each section of running is completed, the positioning completion signal is valid;

◆ During running, enable the multi segment position command to be OFF, and the servo will continue to perform the uncompleted displacement of this segment, and output the positioning completion signal;

◆ The switching segment number must be in the following order:

①The segment number switching is invalid until the displacement of the x segment is positioned;

②During the running of the x segment displacement or after the positioning is completed, first enable the multi segment position command to be OFF, and then switch the segment number from x to y (if x=y, the servo will perform the x segment displacement again);

③After the positioning of the x-segment displacement is completed, set the multi-segment position command enable to ON, and the servo drive performs the y-segment displacement.

◆ When a servo enable OFF occurs during a certain section of running, the motor shuts down in the servo OFF shutdown mode. After the shutdown is completed, the positioning completion is invalid;

◆ During the running of a certain section, the position command direction switching DI (FunIN.27: PosDirSel) logic switching has no impact on the running direction of this section.

</td></tr>
</table>

When the multi segment position running mode is set to DI switching running, please configure the four DI terminals of the servo drive to function 6 to 9 (FunIN. 6: CMD1 to FunIN. 9: CMD4, multi segment running command switching), and determine the valid logic of the DI terminals.

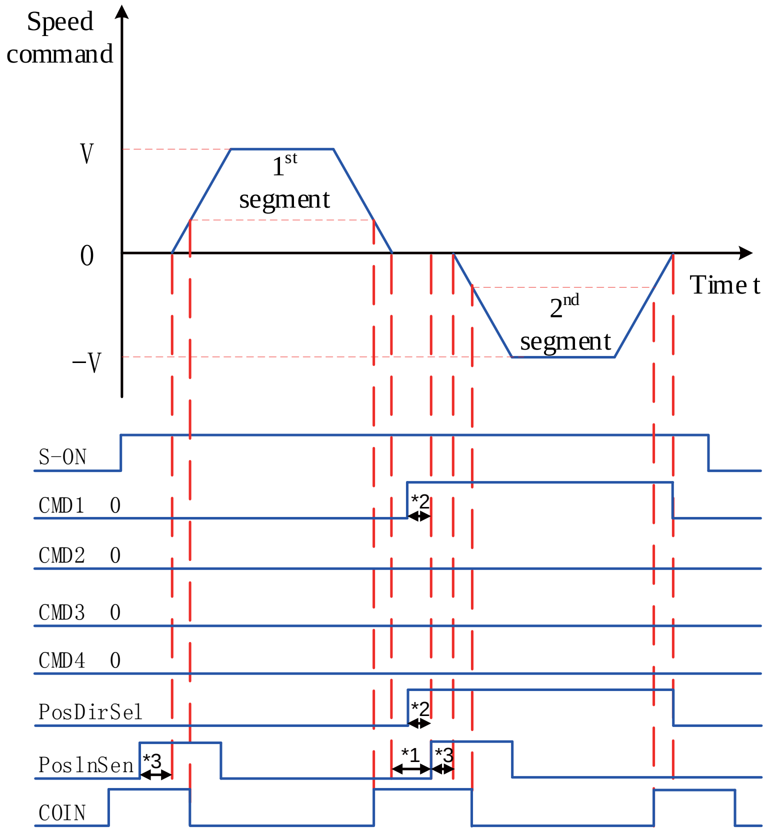


Figure 6-30 Multi-segment position timing diagram

- The area that can be used to switch segment numbers: The position command of the previous segment has been sent, and the PosInSen of the next segment becomes a valid range again.
- When using a low speed DI terminal, it remains valid for at least 3ms.
- PosInSen signals are valid for edge changes. When using ordinary DI terminals, ensure that the effective signal width is at least 3ms, and when using fast DI terminals, ensure that the effective signal width is at least 0.25ms.

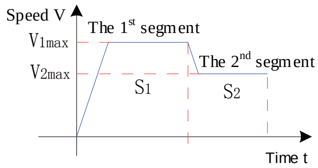
☆Associated function code:

<table>
<tr><th>Code</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.6</td><td>CMD1</td><td>Multi segment running command switching1</td><td rowspan="4">Multisegment segment numbers are 4-bit binary numbers. The corresponding relationship between CMD1 to CMD4 and segment numbers is shown in the following table
<table><tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>Segment number</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr><tr><td colspan="5">…</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr></table>The logic of the DI terminal is level valid. When the input level</td></tr>
<tr><td>FunIN.7</td><td>CMD2</td><td>Multi segment running command switching2</td></tr>
<tr><td>FunIN.8</td><td>CMD3</td><td>Multi segment running command switching3</td></tr>
<tr><td>FunIN.9</td><td>CMD4</td><td>Multi segment running command switching4</td></tr>
</table>

			is valid, the CMD value is 1, otherwise it is 0.

●Sequential running(P11-00=3)

Table 6-13 Sequence running Description

Mode description	Running curve
◆ It can run for one round and stop the machine (P11-05=0 or P11-05 ＞ P11-01); ◆ It can be operated circularly, and the starting segment number after the 1st round is P11-05; ◆ Automatic increment switching of segment number; ◆ No waiting time between segments; ◆ The multi segment position command enable (PosInSen) signal is level effective;	 V1max, V2max: maximum operating speed of the 1st and second sections; S1, S2: displacement of the 1st and second segments. ◆ After each section of running is completed, the positioning completion signal is valid; ◆ During the running of a certain segment, the multi segment position command is enabled to be OFF, and the servo discards the uncompleted displacement of the segment and stops. After the stop is completed, the positioning completion signal is valid; ◆ Reset the multi segment position command to ON, and select the corresponding segment for servo running according to P11-02 settings; ◆ When a servo enable OFF occurs during a certain section of running, the motor shuts down in the servo OFF shutdown mode. After the shutdown is completed, the positioning completion is invalid; ◆ During the running of a certain section, the position command direction switching DI (FunIN.27: PosDirSel) logic switching has no impact on the running direction of this section.

②Multi-segment position running curve setting

The multi segment position running function can set 16 different position commands, and the displacement, maximum operating speed, acceleration/deceleration time, and waiting time between each segment can be set separately. Take paragraph 1 as an example:

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P11-12	Movement displacement of the 1st segment	-1073741824～1073741824	Command unit	Set the sum of position commands for the 1st segment	running settings	Effective immediately	10000
P11-14	Maximum operating speed of the 1st	1～6000	rpm	Set the maximum operating speed of the 1st segment	running settin	Effective imme	200

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
	segment displacement				gs	diately	
P11-15	Displacement acceleration and deceleration time of the 1st segment	0～65535	ms(s)	Set the time for the 1st segment of the multi segment position motor to uniformly shift from 0 rpm to 1000 rpm.	running settings	Effective immediately	10
P11-16	Waiting time after completion of the 1st segment displacement	0～10000	ms(s)	Set the waiting time after the positioning of the 1st segment is completed	running settings	Effective immediately	10

According to the above settings, the actual running curve of the motor is shown in the following figure:

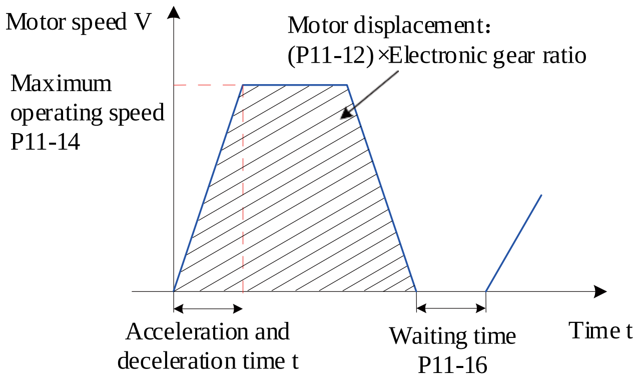


Figure 6-31 Running curve of the 1st segment motor

Therefore, the actual acceleration time to P11-14 (the maximum operating speed of the 1st segment displacement) is t:

$$t=\frac{(P11-14)}{1000}\times(P11\text{-}15)$$

Please refer to Chapter 8 for parameter settings for the remaining 15 segments.

③Multi segment position command enable

When selecting a multi segment location command as the Location command source, configure one DI terminal of the servo drive to function 28 (FunIN.28: PosInSen, multi segment position command enabled) and determine the valid logic for the DI terminal.

☆Associated function NO.:

Code	Name	Function name	Function
FunIN.28	PosInSen	Multi segment position command enable	Valid, the servo motor runs multiple position commands; Invalid, servo motor in locked state. Please note: When P11-00=0, 1, and 3, the logic of the DI terminal corresponding to the PosInSen signal is level valid; When P11-00=2, the logic of the DI terminal corresponding to the PosInSen signal is valid along the change.

2) Position command direction setting

The direction of the position command can be switched through the DI terminal, thereby changing the rotation direction of the motor. Configure one DI terminal of the servo drive as function 27 (FunIN.27: PosDirSel, position command direction setting), and determine the valid logic for the DI terminal.

☆Associated function NO.:

Code	Name	Function name	Function
FunIN.27	PosDirSel	Position command direction setting	Invalid, the actual position command direction is the same as the set position command direction; Valid, the actual position command direction is opposite to the set position command direction.

The actual motor rotation direction is related to the rotation direction selection (P02-02), position command positive and negative, and position command direction setting (FunIN. 27).

Table 6-14 Motor Rotation Direction Table

P02-02	Position command positive and negative	FunIN.27	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

3)Position command inhibition function

The servo drive has a position command inhibit function (FunIN.13: Inhibit) and a pulse command inhibit function (FunIN.37: PulseInhibit).

a）Position command inhibition function

Position command inhibition function: forcibly reset all position commands to zero, and the servo drive does not respond to any internal or external position commands. In the Position control mode, the motor is in the servo locked state. At this point, the drive can switch to another control mode to continue running.

When the position command inhibition function is effective, in the Position control mode, input the position command counter (P0B-13) to continue counting the position commands. However, the drive will not respond to the position commands counted at this time after the position command inhibition function is canceled.

When using the position command inhibit function, configure one DI terminal of the servo drive to function 13 (FunIN.13: Inhibit, position command inhibit), and determine the valid logic for the DI terminal. It is recommended to use a fast DI (DI8 or DI9) terminal.

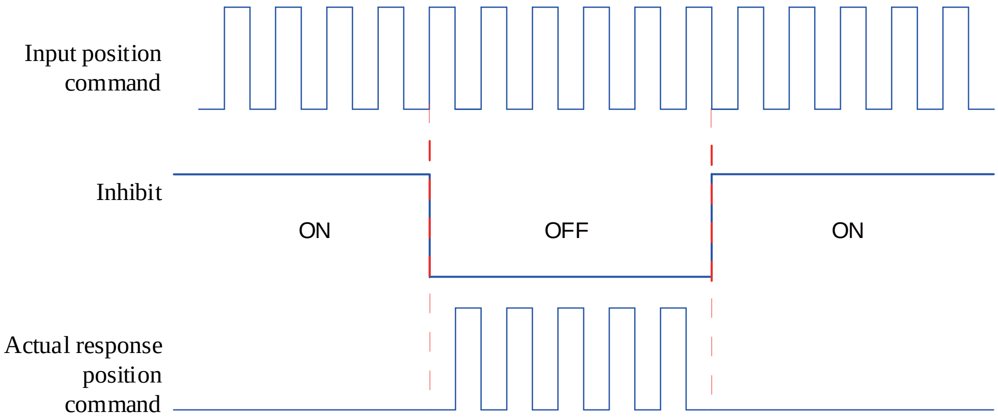


Figure 6-32 Example of Position Command Inhibit Function Waveform

☆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。

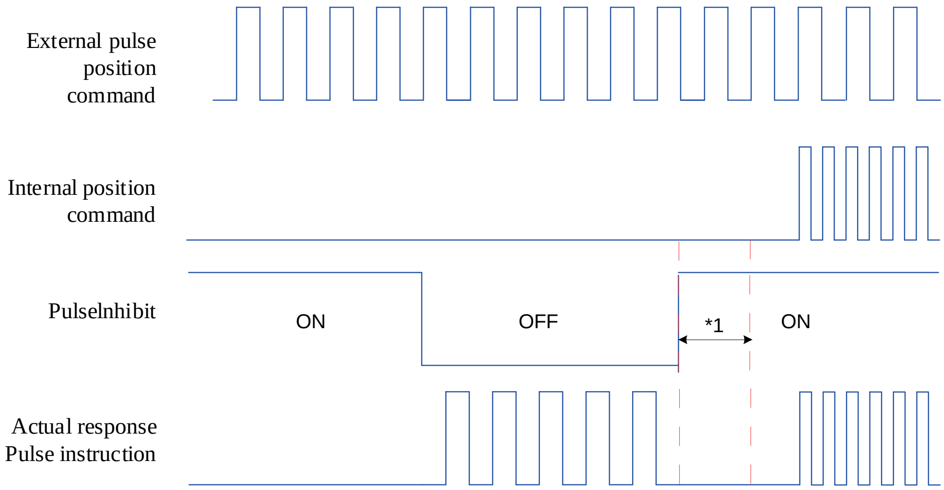


Figure 6-33 Example of Pulse Command Inhibit Function Waveform

NOTE

- When using ordinary DI, please allow at least 3ms between the time when the DI terminal logic is set to invalid and when other internal position commands are input;
- When using fast DI, please interval at least 0.25ms from the DI terminal signal input to the response.

☆Associated function NO.:

Code	Name	Function	Function
FunIN.37	PulseInhibit	Pulse command inhibition	In Position control mode, when Location command source is a pulse command (P05-00=0): Invalid, servo drive can respond to pulse command; Valid, servo drive does not respond to pulse commands.

1.28.2 Electronic gear ratio

⚠Caution：

- The electronic gear ratio setting range is: $\frac{0.001\times\text{encoder resolution}}{10000}$ < B/A < $\frac{4000\times\text{encoder resolution}}{10000}$ .Otherwise, the fault FU.B03 (electronic gear ratio setting error) will occur.
- An incorrect setting of the electronic gear will result in incorrect running. At this time, it is recommended to reset it when the servo drive is stopped.

1）Concept of electronic gear ratio

In the Position control mode, the input position command (command unit) sets the load displacement, while the motor position command (encoder unit) sets the motor displacement. To establish the proportional relationship between the motor position command and the input position command, an electronic gear ratio function is introduced.

The frequency division (electronic gear ratio<1) or frequency multiplication (electronic gear ratio>1) function of the electronic gear ratio allows you to set the actual displacement of the motor rotation or movement when the input position command is 1 command unit.

★Explanation of terms:

"Command unit": refers to the minimum value that can be resolved and input from the upper device to the servo drive.

"Encoder unit": refers to the value of the input command after electronic gear ratio processing.

2）Procedure for setting the electronic gear ratio

The electronic gear ratio varies depending on the mechanical structure. Please follow these steps to set:

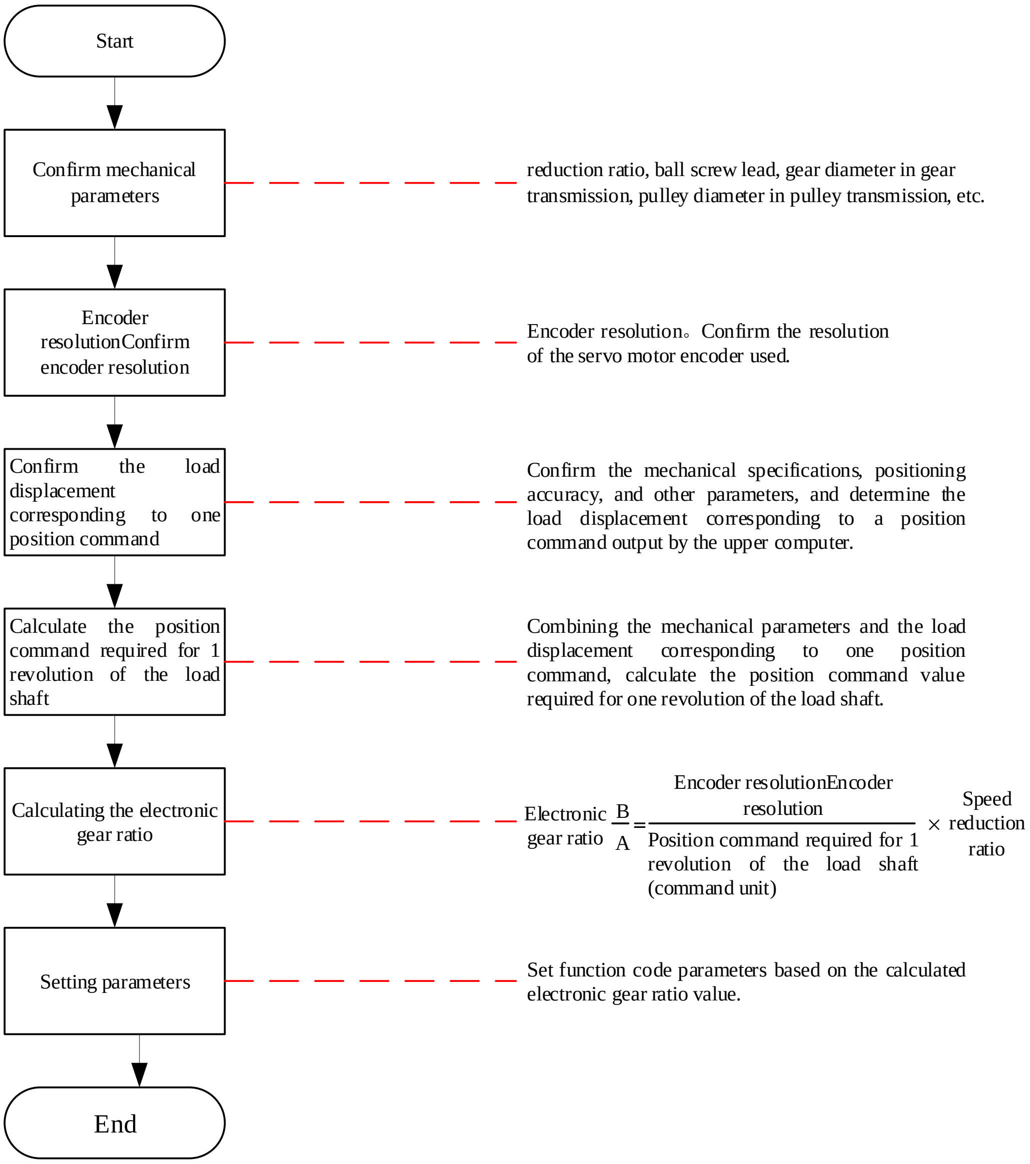


Figure 6-34 Electronic Gear Ratio Setting Steps

The running steps for setting parameters are as follows:

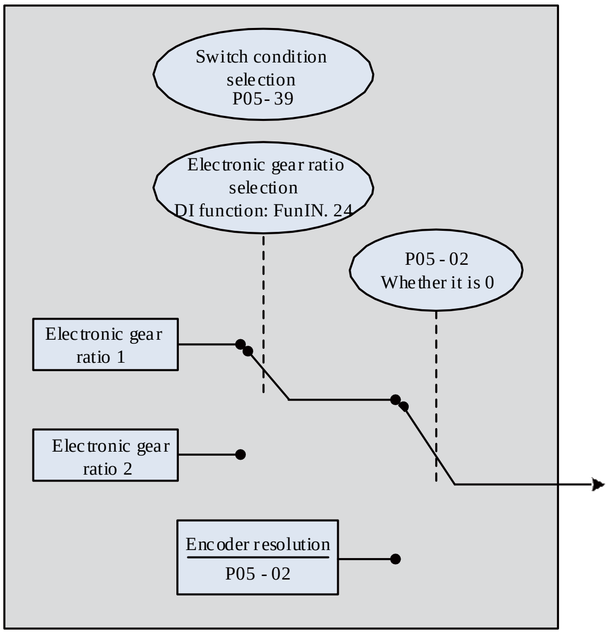


Figure 6-35 Electronic Gear Ratio Setting running Flow

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

Caution:

- When the real-time change value of the electronic gear ratio changes significantly, or when switching between two sets of electronic gear ratios has a significant difference, it will lead to significant fluctuations in the motor speed! At this time, the position command first order low-pass filtering function (P05-04) can be used to smoothly switch position commands.

When P05-02 is 0, the electronic gear ratio switching function can be used. The need to switch between gear ratio 1 and gear ratio 2 should be determined based on the mechanical running, and the electronic gear ratio switching conditions should be set. There is only one set of electronic gears available at any one time. If real-time changes to the electronic gear ratio parameters of this group are effective, their effective time is also limited by switching conditions.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P05-39	Electronic gear ratio switching conditions	0: The number of position commands is 0 (P05-02=0), and the duration is 2.5 ms before switching 1: Real time switching	Set electronic gear ratio switching conditions	Shutdown setting	Effective immediately	0

At the same time, please configure one DI terminal of the servo drive as function 24 (FunIN.24: GEAR_SEL, electronic gear ratio selection), and determine the valid logic for the DI terminal.

☆Associated function NO.:

Code	Name	Function name	Function
FunIN.24	GEAR_SEL	Electronic gear ratio selection	Invalid. In the Position control mode, select the 1st group of electronic gear ratios; Valid. In the Position control mode, select the second group of electronic gear ratios.

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	-		$\frac{Encoder\ resolution}{P\ \ 05-02}$

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 × 4。

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:

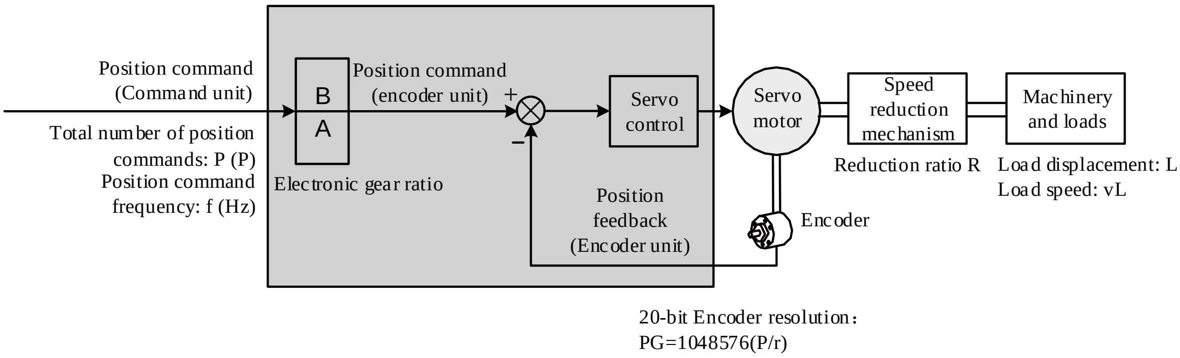


Figure 6-36 Relationship between position command (command unit), load displacement, and electronic gear ratio

Take the linear motion load ball screw as an example: the lead of the screw is (mm), the encoder resolution is, and the reduction ratio of the reduction mechanism is R.

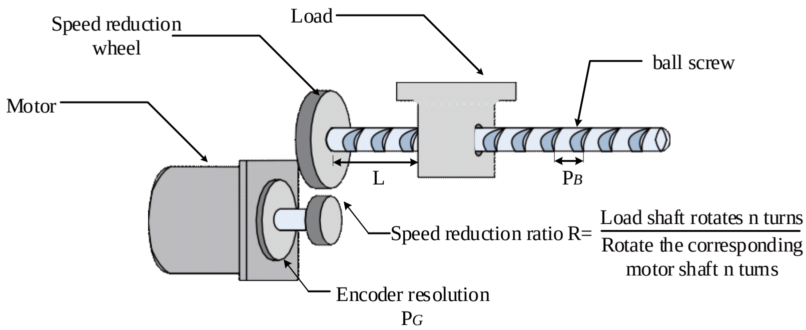


Figure 6-37 Ball screw illustration

①The load displacement corresponding to 1 pulse of the input drive is known to be Δ L(mm)

The mechanical displacement is Δ At L, the corresponding load shaft rotates and the motor shaft rotates. There are:

$$1\times\frac{B}{A}=\frac{\Delta \mathrm{L}}{\mathrm{p}_B}\times\frac{1}{R}\times \mathrm{p}_G$$

Therefore, the electronic gear ratio

$$\frac{B}{A}=\frac{\Delta \mathrm{L}}{\mathrm{p}_B}\times\frac{1}{R}\times \mathrm{p}_G$$

②Known load displacement L (mm) and total number of position commands P (P)

When the mechanical displacement is L, the corresponding load shaft rotates $\frac{\mathrm{L}}{\mathrm{p}_B}$rotation,，Motor shaft rotates$\frac{\mathrm{L}}{\mathrm{p}_B}\times\frac{1}{R}$rotation.Therefore：

$$\mathrm{P}\times\frac{B}{A}=\frac{\mathrm{L}}{\mathrm{p}_B}\times\frac{1}{R}\times \mathrm{p}_G$$

Therefore, the electronic gear ratio

$$\frac{B}{A}=\frac{\mathrm{L}}{\mathrm{p}_B}\times\frac{1}{R}\times \mathrm{p}_G\times\frac{1}{P}$$

③Known load movement speed (mm/s) and position command frequency f (Hz)

Load shaft speed：$\frac{\mathrm{V}_L}{\mathrm{p}_B}$(r/s)

Motor speed：$V_M = \frac{V_L}{p_B} \times \frac{1}{R}$(r/s)

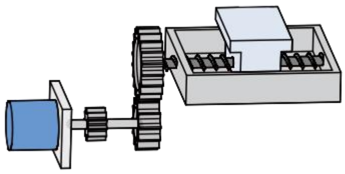
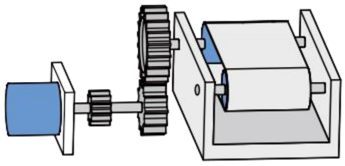
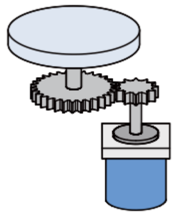
Relationship between position command frequency, electronic gear ratio, and motor speed:

$$f\times \frac{B}{A} = V_M \times p_G$$

Therefore, the electronic gear ratio$\frac{B}{A} = \frac{V_M \times p_G}{f}$

5) Example of setting the electronic gear ratio

Table 6-16 Example of Electronic Gear Ratio Setting

Step	Name	Mechanical structure		
		Ball screw drive	Pulley drive	Rotating load
				
1	Mechanical parameters	Reduction ratio R：1/1 Lead screw lead:0.01m	Reduction ratio R：5/1 Belt pulley diameter: 0.2m (Belt pulley circumference: 0.628m)	Reduction ratio R：10/1 Load shaft rotates for 1 rotation Load rotation angle: 360 °
2	Encoder resolution	17bit=1048576P/r	17bit=1048576P/r	17bit=1048576P/r
3	Load displacement corresponding to 1 position command (command unit)	0.0001m	0.000005m	0.01°
4	Value of position command (command unit) required for 1 rotation of load shaft	$\frac{0.01}{0.0001} = 100$	$\frac{0.628}{0.000005} = 125600$	$\frac{360}{0.01} = 36000$
5	Count	$\frac{B}{A} = \frac{1048576}{100} \times \frac{1}{1}$	$\frac{B}{A} = \frac{1048576}{125600} \times \frac{5}{1}$	$\frac{B}{A} = \frac{1048576}{36000} \times \frac{10}{1}$
6	Settings	P05-07=1048576 P05-09=100	P05-07=5242880 P05-09=125600	P05-07=10485760 P05-09=36000

1.28.3 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	Effective 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	Effective immediately	0.0

NOTE

- 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.

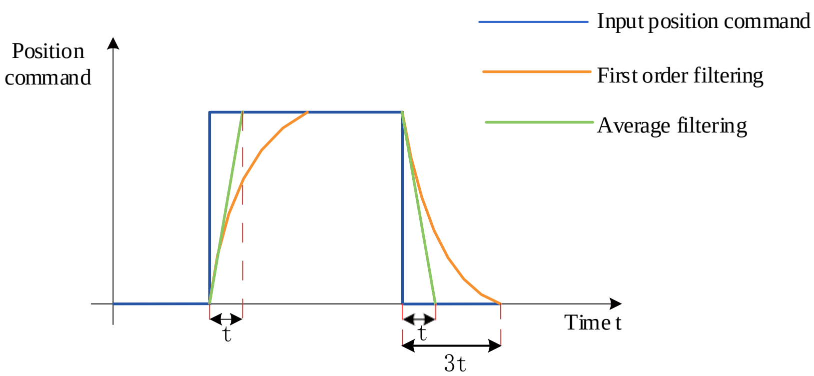


Figure 6-38 Schematic Diagram of Rectangular Position Command First Order Filtering and Average Filtering

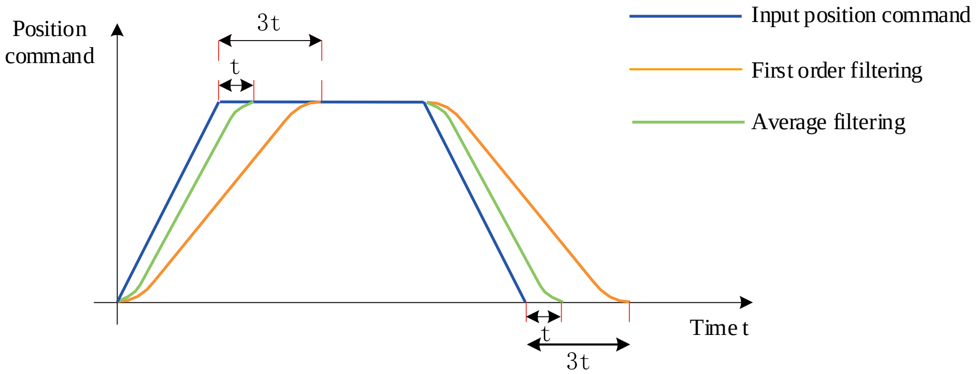


Figure 6-39 Schematic Diagram of Ladder Position Command First Order Filtering and Average Filtering

1.28.4 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

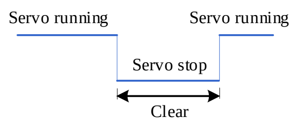
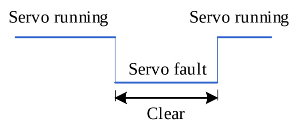
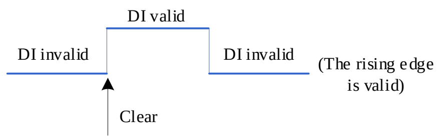
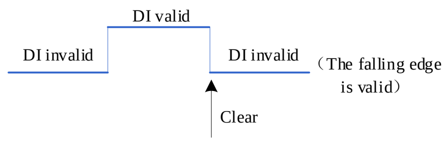
When P05-16=2, configure one DI terminal of the servo drive to function 35 (FunIN.35: ClrPosErr, clear position deviation), and determine the valid logic for the DI terminal. It is recommended to use a fast DI (DI8 or DI9) terminal.

☆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.

The setting method is as follows:

Table 6-17 Position Deviation Clearing Settings

Set value	Clear condition	Clear time
P05-16=0	When the servo is OFF or the servo status is not "run", clear the position deviation.	
P05-16=1	Servo OFF When a servo fault or warning occurs, clear the position deviation.	
P05-16=2	When servo OFF or clear position deviation DI terminal logic is valid, clear position deviation. The DI terminal is recommended to be set to be effective along the change.	 

1.28.5 Frequency division output function

⚠Caution：

- The frequency division output function cannot be used in the full closed-loop control mode, and the frequency division output terminal serves as the input terminal for the external grating scale signal.
- For applications where the accuracy of signal frequency division output requires high accuracy, it is recommended to use the effective variation edge of the Z signal output:
  ① P05-41=0 The effective change edge is the falling edge;
  ② P05-41=1 The effective change edge is the rising edge.

The frequency division output function of the servo drive refers to outputting position command pulses or position pulses fed back by the encoder in the form of A/B phase orthogonal pulses.

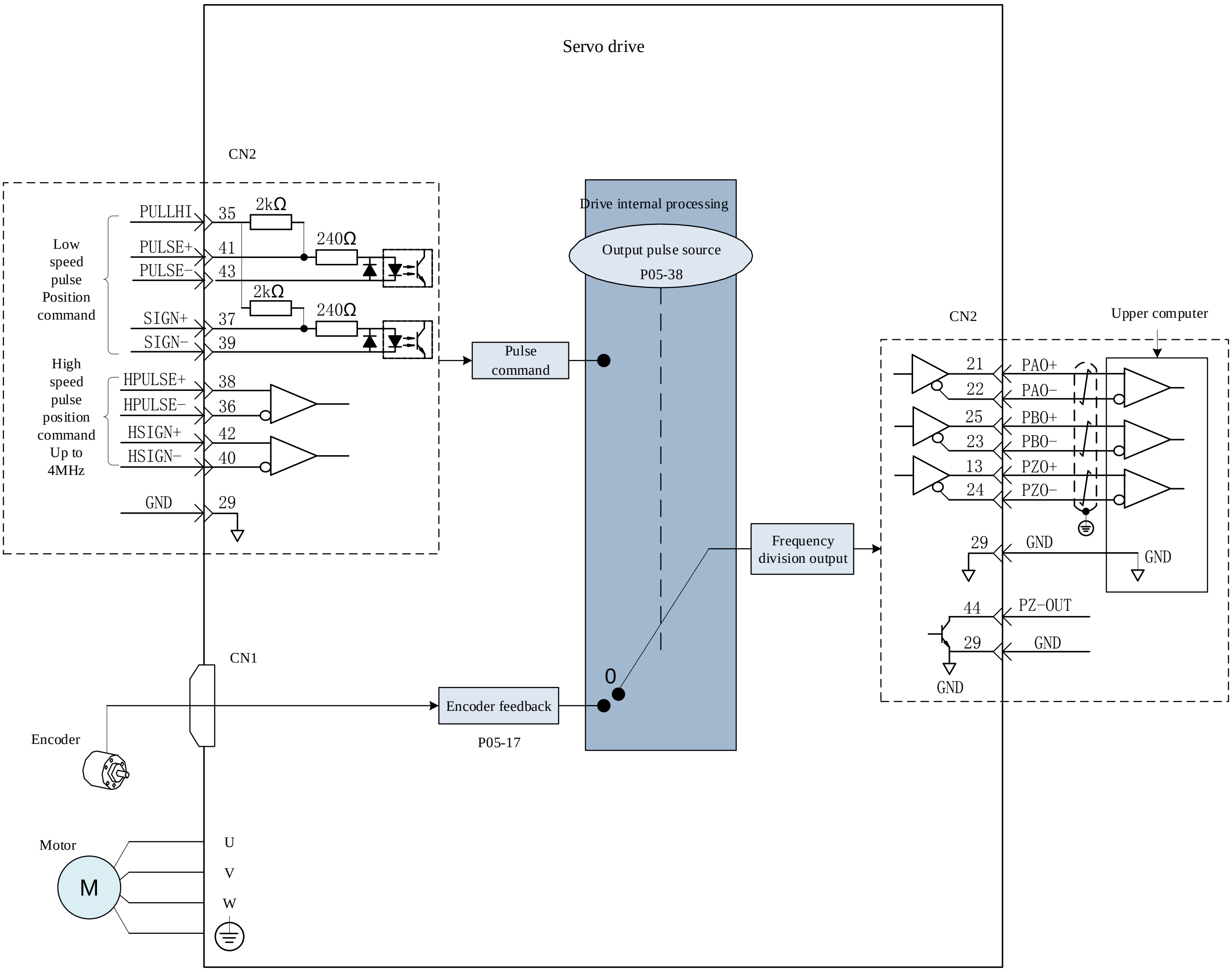


Figure 6-40 Schematic diagram of frequency division output principle

When multi axis servo pulse synchronization tracking is performed, it is recommended to use pulse command synchronization output mode, that is, P05-38=1; When the upper computer is used as closed-loop feedback, it is recommended to adopt the encoder frequency division output mode, i.e. P05-38=0;

The servo drive has 1 set of frequency division output terminals:

Phase A pulse: PAO+, PAO -, differential output, maximum output pulse frequency is 2Mpps

Phase B pulse: PBO+, PBO -, differential output, maximum output pulse frequency of 2Mpps

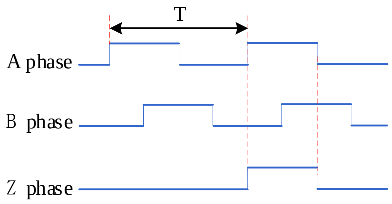
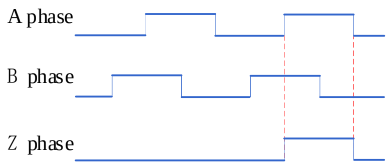
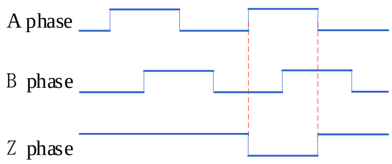
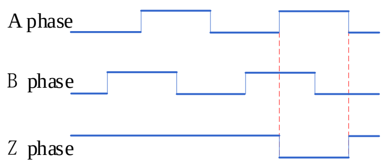
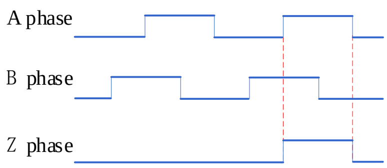
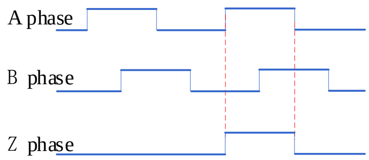
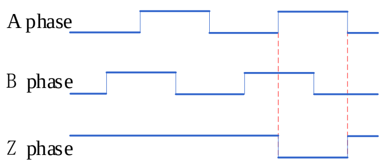
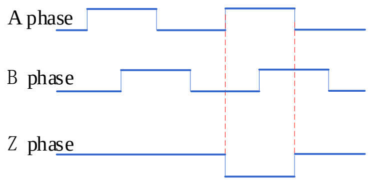
Z-phase pulse: PZO+, PZO -, differential output, maximum output pulse frequency of 2Mpps.

PZ-OUT, GND, open collector output, maximum output pulse frequency of 100kpps.

When using the frequency division output function, you should set the source (P05-38), phase (P02-03), resolution (P05-17), and Z-phase pulse polarity (P05-41) of the output pulse as needed.

When the output source is encoder feedback pulse (P05-38=0), the motor rotates for 1 rotation, and the number of A/B phase output pulses is determined by P05-17 and P05-61 (encoder frequency division pulse number); The pulse width T of phase A/B is determined by the motor speed, and phase Z is synchronized with phase A, with a width of T; The Z-phase signal is output once per rotation of the motor.

Table 6-18 Schematic diagram of encoder frequency division output (P05-38=0) pulse

P02-03 (Output pulse phase)	P05-41 (Z pulse output polarity)	Forward rotating, schematic diagram of pulse output	Reverse rotating, schematic diagram of pulse output
0	0	 Phase A leads Phase B by 90 °	 Phase B leads Phase A by 90 °
	1	 Phase A leads Phase B by 90 °	 Phase B leads Phase A by 90 °
1	0	 Phase B leads Phase A by 90 °	 Phase A leads Phase B by 90 °
	1	 Phase B leads Phase A by 90 °	 Phase A leads Phase B by 90 °

☆Associated function code：

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 setti	Re-energize	0

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 ≥ 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

1.28.6 Positioning completion/proximity function

The internal command completion function refers to the completion of command transmission when the internal multi segment position command of the servo is zero. At this time, the servo drive can output an internal command completion signal (CmdOk), and the upper computer can confirm that the internal multi segment position command transmission of the servo drive is completed after receiving the signal.

The positioning completion function refers to the position deviation meeting the conditions set by the user (P05-20), which can be considered as the completion of positioning in the Position control mode. At this time, the servo drive can output a positioning completion (COIN) signal, and the host computer can confirm that the servo drive positioning is completed after receiving the signal.

The functional principle is shown in the following figure:

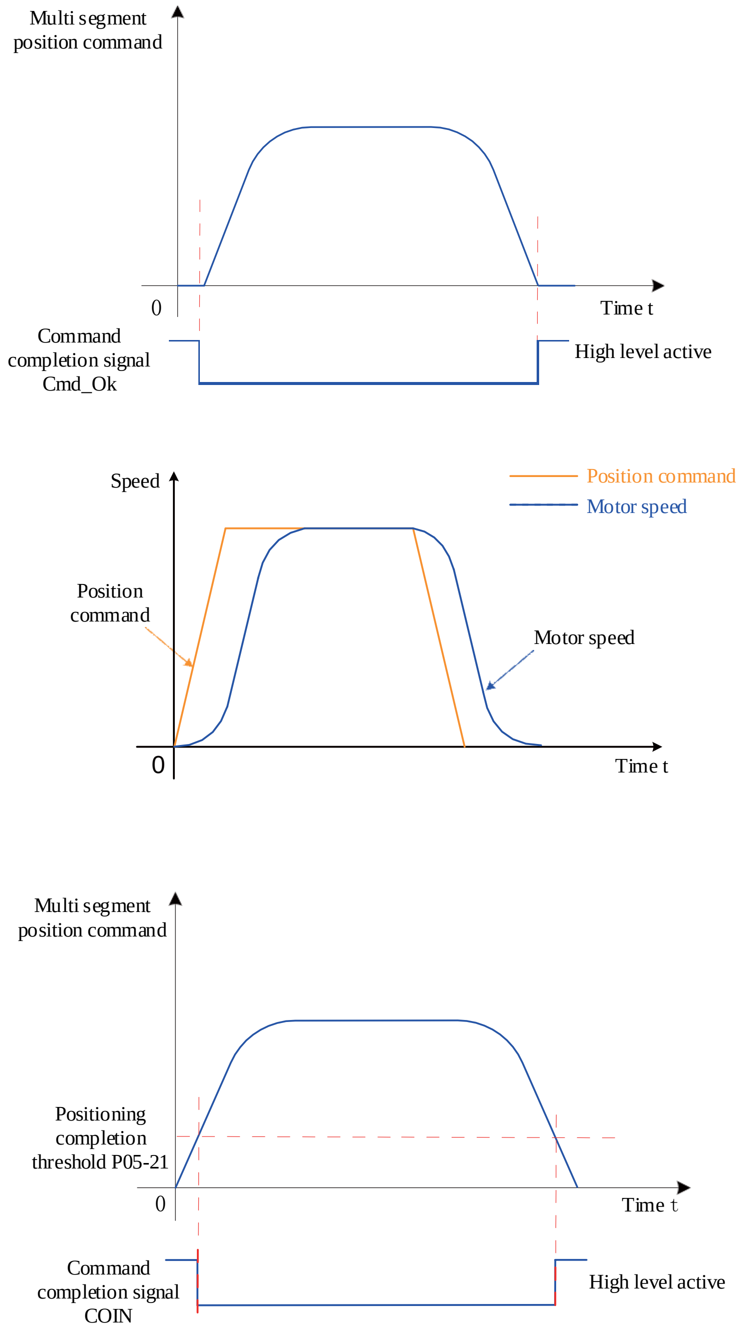


Figure 6-41 Positioning completion/proximity function description

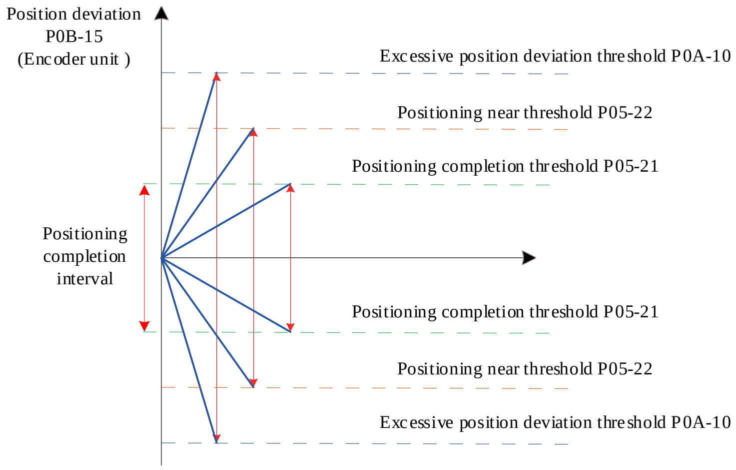
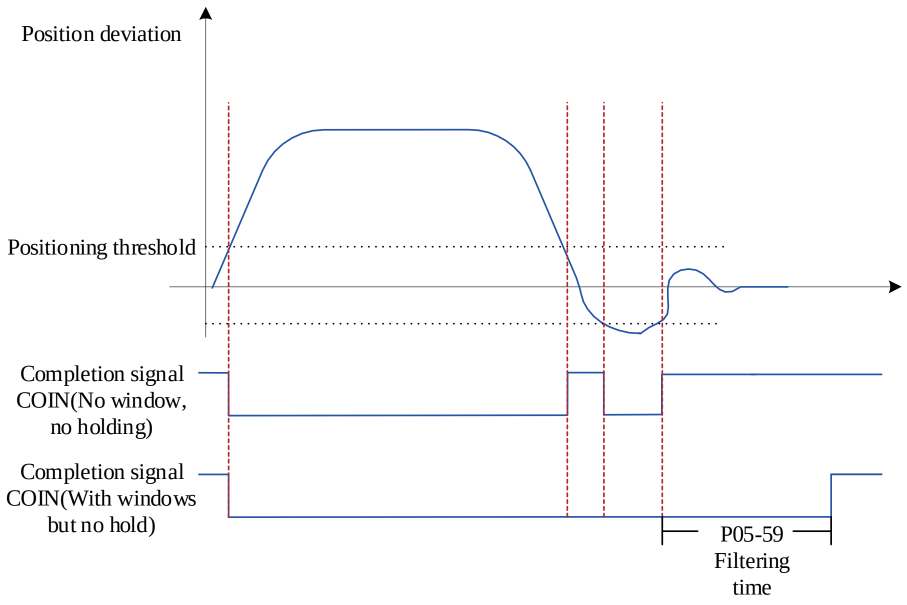


Figure 6-42 Position deviation related signals

After positioning is completed, the positioning near and the unit with excessive position deviation can be selected through the function code P0A-17 of the servo drive. When the position deviation meets the conditions (P05-20), the servo drive can also output a positioning near (NEAR) signal. Generally, the upper computer can receive the positioning near signal before confirming the completion of positioning to prepare for the positioning completion running.

Before using the positioning completion/proximity function, the output conditions, thresholds, windows, and hold times for positioning completion/proximity should be set. The principle of positioning completion window time and holding time is shown in the following figure:



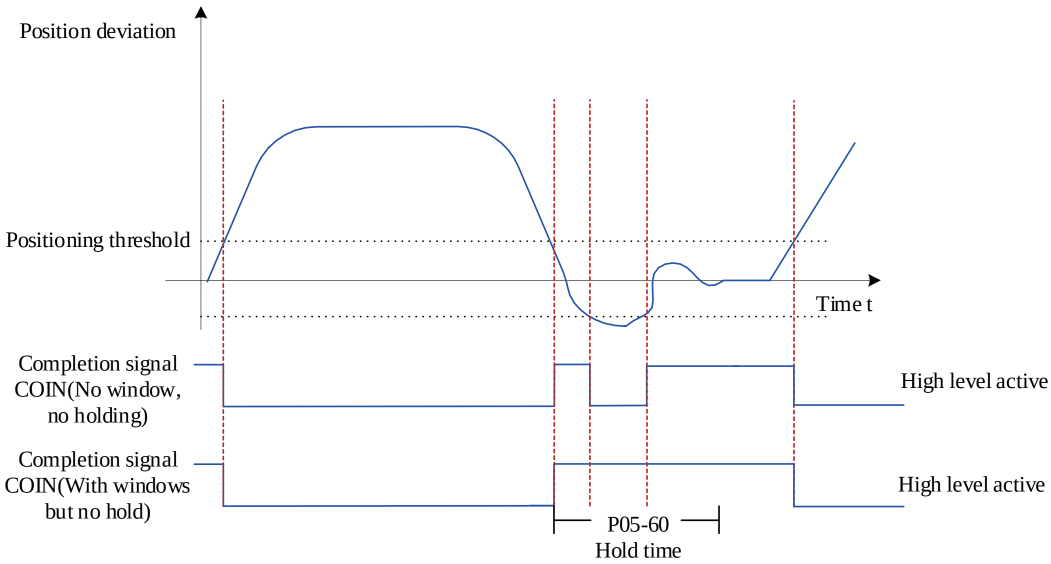


Figure 6-43 Schematic diagram of positioning completion window time and holding time

When the positioning completion output selection has a hold function, its set value of 0 indicates that the positioning completion signal remains valid until the next position command is received.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-17	Position setting unit selection	0-1		Unit selection: 0: Encoder unit 1: Command unit	Shutdown setting	Effective immediately	0
P05-20	Positioning Complete/Near Output Condition	0: Output when the absolute value of position deviation is less than the positioning completion/near threshold value 1: Output when the absolute value of position deviation is less than the positioning completion/near threshold and the filtered position command is 0 2: Output when the absolute value of position deviation is less than the positioning completion/near threshold and the position command is 0 3: When the absolute value of position deviation is less than the positioning completion/near threshold, and the position command filtering is 0, the output is valid for at least P05-60		Set the conditions for COIN/NEAR to be valid	Shutdown setting	Effective immediately	0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P05-21	Positioning completion threshold	1～65535	Encoder /command unit	Set the threshold value of the absolute value of position deviation when positioning completion (COIN) is valid	running settings	Effective immediately	734
P05-22	Positioning proximity threshold	1～65535	Encoder /command unit	Set the threshold value of the absolute value of position deviation when positioning near (NEAR) is effective	running settings	Effective immediately	65535
P05-59	Positioning window time	0-30000	ms	The positioning signal is filtered and the effective level is output after filtering	running settings	Effective immediately	0
P05-60	Positioning holding time	0-30000	ms	The minimum time that the positioning signal remains valid	running settings	Effective immediately	0

⚠Caution：

- The positioning near threshold (P05-22) generally needs to be greater than the positioning completion threshold (P05-21).
- The positioning completion threshold (P05-21) only reflects the threshold value of the absolute value of the position deviation when the positioning completion is effective, regardless of the positioning accuracy.
- When the speed feedforward gain (P08-19) setting value is too large or running at low speed, the absolute value of position deviation will be small. If the P05-21 setting value is too large, it will cause the positioning completion to be always effective. Therefore, to improve the effectiveness of positioning completion, please reduce the P05-21 setting value.
- When the positioning completion threshold (P05-21) is small and the position deviation is small, the output condition of the positioning completion/proximity signal can be changed by setting P05-20.
- When the servo enable (S-ON) is invalid, the positioning completion signal (COIN) and positioning proximity signal (NEAR) outputs are invalid.

When using internal command completion, positioning completion, and positioning proximity functions, the three DO terminals of the servo drive should be configured as DO function 22 (FunOUT. 22: CmdOk, positioning proximity), DO function 5 (FunOUT. 5: COIN, positioning completion), and DO function 6 (FunOUT. 6: NEAR, positioning proximity), respectively, and determine the valid logic for the corresponding DO terminal.

☆Associated function number

Code	Name	Function name	Function
FunOut.5	COIN	Positioning complete	Valid. In the Position control mode, the absolute value of the position deviation meets the conditions set in P05-21, indicating that the servo positioning is complete. Invalid. In Position control mode, the servo is in the process of completing positioning.
FunOut.6	NEAR	positioning near	Valid. In the Position control mode, the absolute value of the position deviation meets the conditions set in P05-22, indicating that the servo positioning is near. Invalid. In Position control mode, the servo is in the process of positioning near.

1.28.7 Interrupt fixed length function

Caution：

- When the home reset function is in progress, the interrupt fixed length trigger signal is invalid;

1）Function Introduction

The interrupt fixed length function refers to the execution of preset fixed length instructions by interrupting the current operating state of the servo in the Position control mode. In the position control mode, when the servo enable is ON, after triggering the interrupt fixed length function, the servo motor will run the position command that interrupts the fixed length function setting according to the motor rotation direction before triggering.

During interrupt fixed length running, the drive shields any other internal and external position commands (including the interrupt fixed length position command triggered again), and the input position command counter P0B-13 only counts the interrupt fixed length position command; After the interruption of fixed length running is completed, according to user settings (P05-29), the drive will maintain the position command shielding state or resume responding to the position command, but the position command entered during the interruption of fixed length running will be discarded.

After the completion of the interrupt fixed length, the servo drive simultaneously outputs the interrupt fixed length completion signal (FunOUT. 15: XintCoin) and the positioning completion signal (FunOUT. 5: COIN, positioning completion). The upper computer can confirm the completion of the interrupt fixed length after receiving the interrupt fixed length completion signal. The output of the interrupt fixed length completion signal is independent of whether the servo enable (S-ON) and DI9 terminal logic are valid.

Valid conditions for interrupting fixed length function:

●Before triggering the interrupt fixed length, the current speed of the motor is greater than or equal to 10 rpm, or P05-26 is not 0;

●The interruption fixed length displacement P05-24 is not zero;；

●DI function FunIN.33 (interrupt fixed length inhibition) is not used or the corresponding port logic is invalid.

NOTE

- When using interrupt fixed length, the average filtering function is invalid

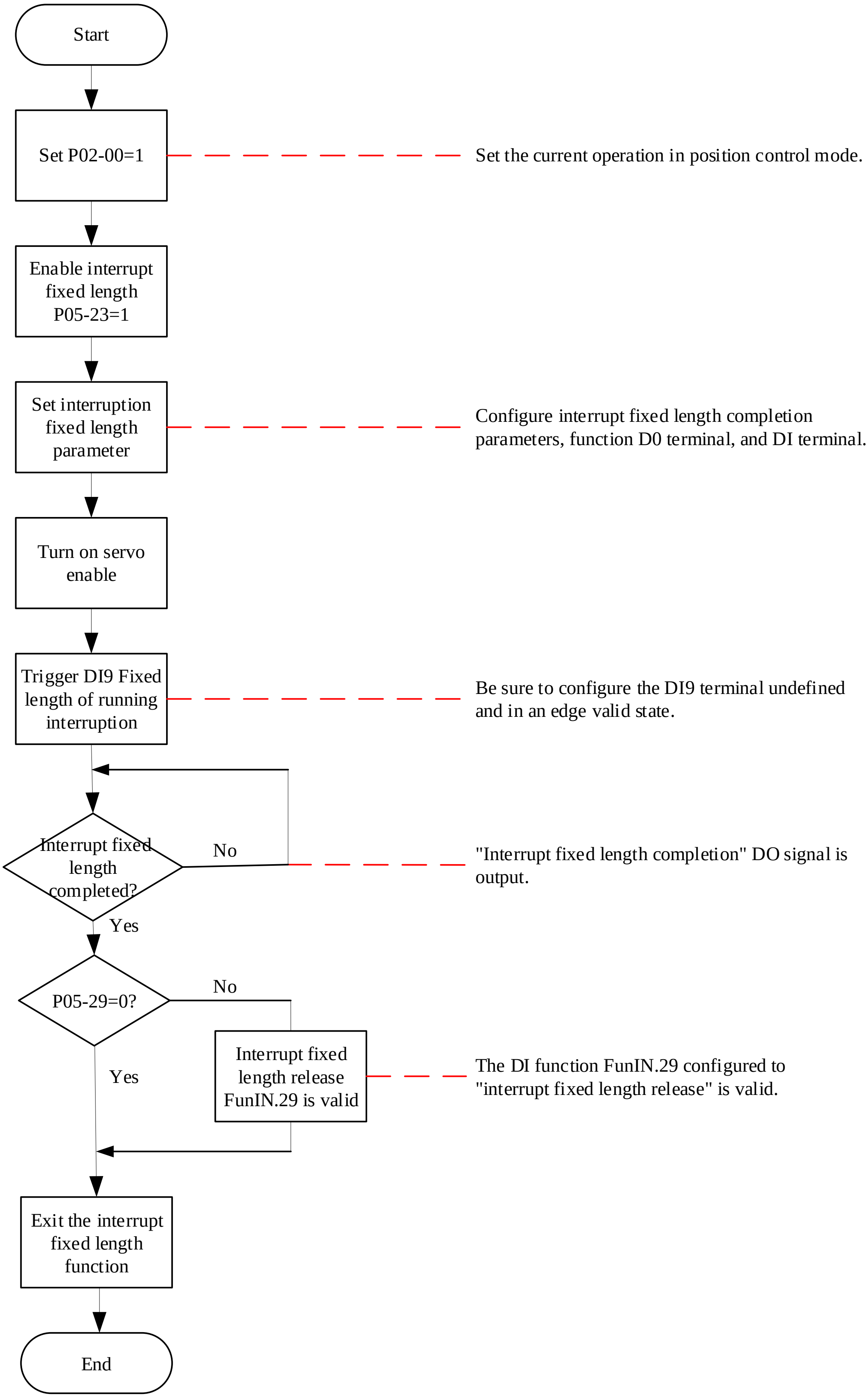


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Figure 6-44 Flow chart of interrupt fixed length function signal

2） Parameter settings

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P05-23	Interrupt fixed length enable	Inhibited to use	-	Set whether to enable interruption of fixed length function	Shutdown setting	Re-energize	0
P05-24	Interrupt fixed length displacement	0～1073741824	Command unit	Set interrupt fixed length displacement	running settings	Effective immediately	10000
P05-26	Interrupt fixed length constant speed running speed	0～6000	rpm	Sets the maximum speed of the motor when interrupting constant length running, regardless of the electronic gear ratio.	running settings	Effective immediately	200
P05-27	Interrupt fixed length acceleration and deceleration time	0～1000	ms	Set the time for the motor speed to uniformly change from 0 to 1000 rpm	running settings	Effective immediately	10
P05-29	Fixed length lock release signal enable	0: Not enabled 1: Enabled	-	After setting the interrupt fixed length running, in response to the conditions of other position commands, the DI function FunIN.29 (interrupt fixed length state release signal) must be used to release the lock state when P05-29=1	running settings	Effective immediately	1

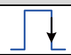
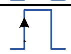
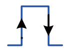
☆Associated function NO.:

Code	Name	Function name	Function
FunIN.29	XintFree	Interrupt fixed length state release	Valid, releasing the interrupted fixed length lock state, and the servo can respond to other position commands; Invalid, maintaining the interrupted fixed length lock state, and the servo does not respond to other position commands.
FunIN.33	XintInHibit	Interrupt fixed length inhibition	Valid, inhibiting interruption of fixed length function; Invalid, allowing interruption of the fixed length function.
FunOut.15	XintCoin	Interrupt fixed length completion signal	Effective, during position control, interrupt fixed length displacement running is completed. Invalid, during position control, the fixed length displacement is interrupted and the running is not completed.

Caution：

- When using the interrupt fixed length function, the drive forcibly uses the fast DI terminal DI9 as the interrupt fixed length function trigger terminal, and other DI terminals are invalid. At this time, the corresponding function (P03-18) of the DI9 terminal is inhibited from being assigned to other DI functions, and the terminal logic (P03-19) should be set to be effective along the change, otherwise the drive forces its logic to be effective along the change.

Table 6-29 DI9 Valid Logic When Interrupting the Fixed Length Function

P03-19	DI9 valid logic	Corresponding waveform
0/3	Falling edge	
1/2	Rising edge	
4	Rising and falling edges	

Interrupt fixed length constant speed running speed:

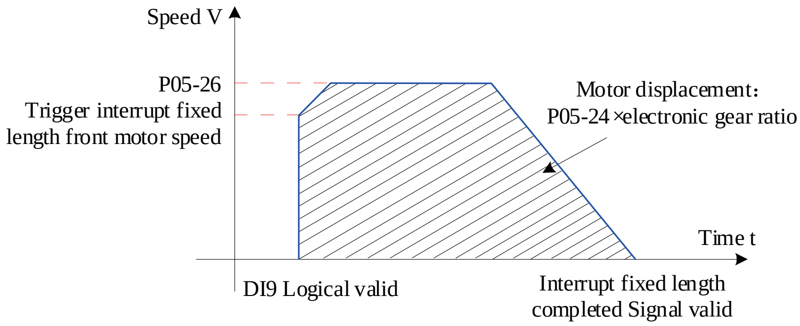


Figure 6-45 Running curve of interrupt fixed length function motor

Table 6-20 Description of Interrupted Fixed Length Motor Speed

P05-26	Trigger interrupt fixed length front motor speed	Interrupt fixed length function	Interrupt fixed length constant speed running speed
0	<10	Invalid	-
	≥10	Valid	Trigger interrupt fixed length front motor speed
1～6000	-	Valid	P05-26

1.28.8 Home reset function

Caution：

- When the fixed length function or multi segment position function is interrupted, the home reset trigger signal is shielded.

1）Function introduction

Home: refers to the mechanical home, which can represent the position of the home switch or the Z signal of the motor, and is selected and set by the function code P05-31.

Home: refers to the positioning target point, which can be expressed as the home+offset (set in P05-36). When P05-36 is set to 0, the home coincides with the home.

"Home reset function" refers to the function that when the servo enable is ON in the Position control mode and the Home reset function is triggered, the servo motor will actively find the home and complete the positioning.

During the home reset running, other position commands (including the home reset enable signal triggered again) are shielded; After the home reset running is completed, the servo drive can respond to other position commands.

The Home reset function includes two modes: home reset and electrical reset.

Zero return to zero: After receiving the trigger signal for zero return, the servo drive actively locates the relative position of the motor shaft and the mechanical home based on the preset mechanical home. First, it searches for the home, and then moves the offset based on the home to reach the zero position. The zero return of the home is usually applied when searching for a home for the first time.

Electrical zero return: After determining the absolute position of the home through the zero return running, move a relative displacement with the current position as the starting point.

After the completion of the home reset (including home return and electrical home return), the current absolute position of the motor (P0B-07) is consistent with the mechanical home offset (P05-36).

After the home reset is completed, the servo drive outputs the home reset completion signal (FunOUT. 16: HomeAttach) or the electrical reset completion signal (FunOUT. 17: ElecHomeAttach), and the upper computer can confirm the completion of the home reset after receiving this signal. The zero return and electrical zero return completion signals are independent of servo mode and servo running status.

Table 6-21 Comparison between zero return and electrical zero return

<table>
<tr><th>Homing type</th><th>Return to zero mode (P05-30)</th><th>Return to zero direction, deceleration point, home</th><th>Trigger signal</th><th>Total motor displacement</th></tr>
<tr><td rowspan="5">Zero return</td><td>0</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td rowspan="3">P05-31 Determination</td><td>HomingStart signal</td><td rowspan="3">Determined by mechanical home coordinates and offset displacement</td></tr>
<tr><td>3</td><td>Servo enable</td></tr>
<tr><td>4</td><td>Servo enable</td></tr>
<tr><td>6</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="2">Electrical return to zero</td><td>2</td><td rowspan="2">The return to zero direction is consistent with the motor displacement symbol without requiring a deceleration point and home signal</td><td>HomingStart signal</td><td rowspan="2">(P05-36-P0B-07) × Electronic gear ratio</td></tr>
<tr><td>5</td><td>Servo enable</td></tr>
</table>

NOTE

- When using the Home reset function, the mean filtering and low-pass filtering functions are invalid.

2）Zero return

⚠Caution:

- To use the Home reset function, it is necessary to set the mechanical limit switch in advance. If using the touch stop return to zero method and using the mechanical offset, please set the offset within the travel range to ensure that the machine will not be damaged at high speed during the home reset process!
- After encountering a limit switch during the homing process, the servo drive encounters FU.950 (forward overtravel warning) or FU.952 (reverse overtravel warning). If P05-40=0 or 1, the servo motor stops, and the shutdown mode is determined by P02-07!

Take the following situations as an example to illustrate Zero return:

- Forward return to zero, deceleration point and home are the home switches (P05-31=0)
- Forward return to zero, deceleration point and home are motor Z signals (P05-31=2)
- Forward return to zero, deceleration point is the home switch, and the home is the motor Z signal (P05-31=4)
- Forward return to zero, deceleration point, and home are forward override switches (P05-31=6)
- Forward return to zero, deceleration point is forward overtravel switch, home is motor Z signal (P05-31=8)
- Forward return to zero, deceleration point and home are mechanical limit positions (P05-31=10)
- Forward return to zero, deceleration point is the mechanical limit position, and home is the motor Z signal (P05-31=12)

For the remaining zero return methods, only the initial zero return method is the opposite of the above.

a） Zero return: Forward return to zero, deceleration point, and home are the home switches (P05-31=0)

① When the motor starts to move, the home switch (deceleration point) signal is invalid (0: invalid, 1: valid), and the forward override switch is not triggered during the entire process.

The servo motor first searches for the deceleration point signal in the forward direction at the high speed set at P05-32 until it encounters the rising edge of the deceleration point signal. After gradually decelerating to - (P05-33) according to P05-34, the servo motor searches for the falling edge of the deceleration point signal in the reverse direction at the low speed set at - (P05-33). When encountering the falling edge of the deceleration point signal, it reverses, and continues to search for the rising edge of the home signal at the low speed set at P05-33. During forward acceleration or forward uniform speed running, Stop the machine immediately when encountering the rising edge of the home signal.

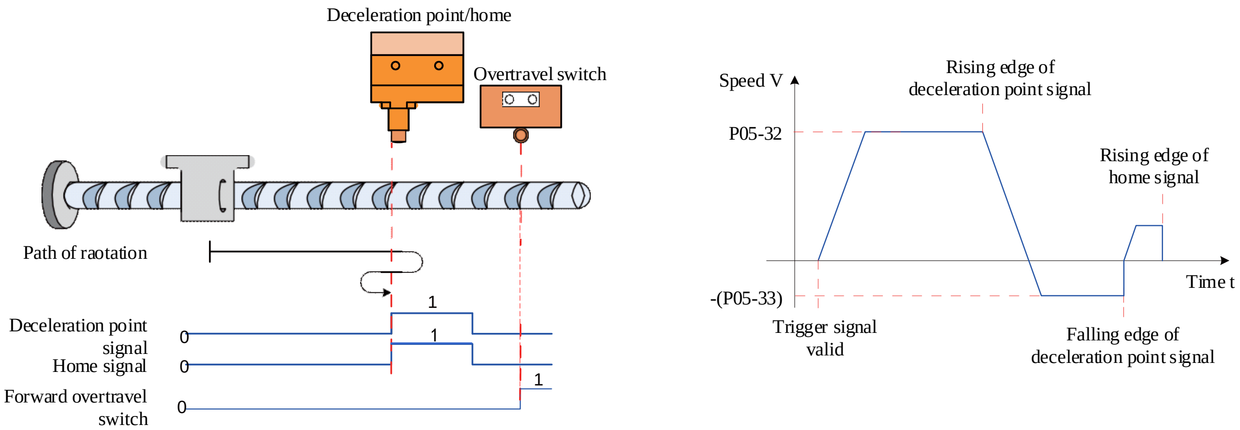


Figure 6-46 Mode 0 Zero return motor running curve ① and rotational speed description

② When the motor starts to move, the home switch (deceleration point) signal is valid, and the forward override switch is not triggered during the entire process

The servo motor directly searches for the falling edge of the deceleration point signal at the low speed set point of - (P05-33). When encountering the falling edge of the deceleration point signal, it reverses (i.e., forward), and continues to search for the rising edge of the home signal at the low speed set point of P05-33. During forward acceleration or forward uniform speed running, it immediately stops when encountering the rising edge of the home signal.

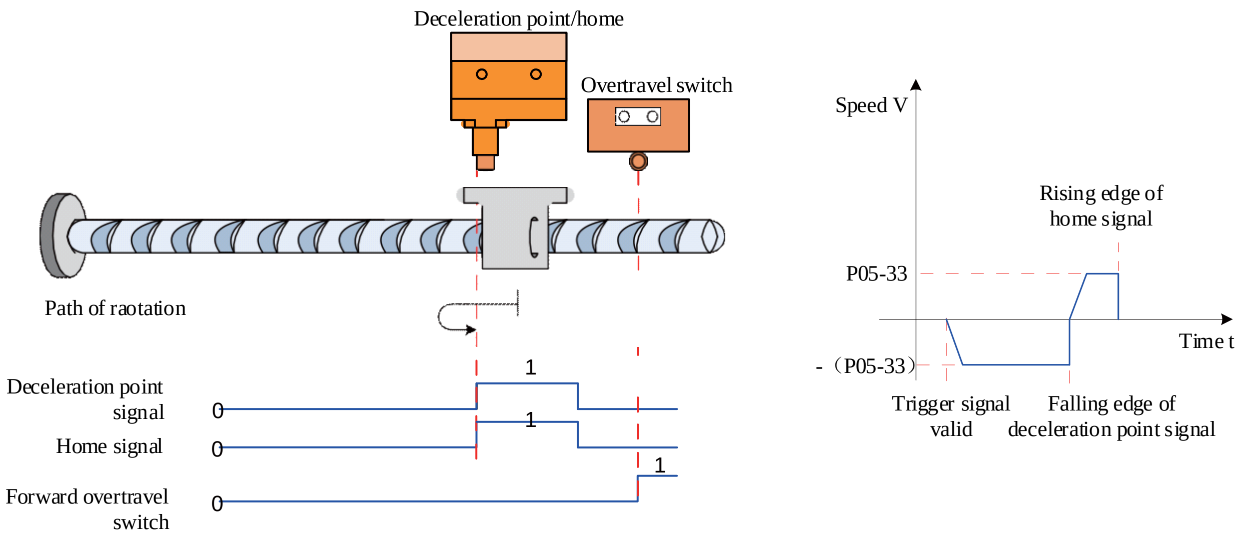


Figure 6-47 Mode 0 Zero return motor running curve ② and rotational speed description

③ When the motor starts to move, the home switch (deceleration point) signal is invalid, and the forward override switch triggered during the process is valid

The servo motor first searches for the deceleration point signal at the high speed set by P05-32. After encountering the forward overtravel switch, the drive decides to immediately reverse return to zero (P05-40=2 or 3) according to P05-40 settings, or stops and waits for the upper computer to give a Zero return trigger signal (P05-40=0 or 1) again. After meeting the conditions, the drive searches for the deceleration point signal falling edge at the reverse speed of - P05-32. After encountering the deceleration point signal falling edge, According to the set value of P05-34, decelerate in the reverse direction (i.e., return to the forward direction), and the servo motor searches for the rising edge of the home signal at a forward low speed of P05-33. During forward acceleration or forward uniform speed running, when encountering the rising edge of the home signal, it immediately stops.

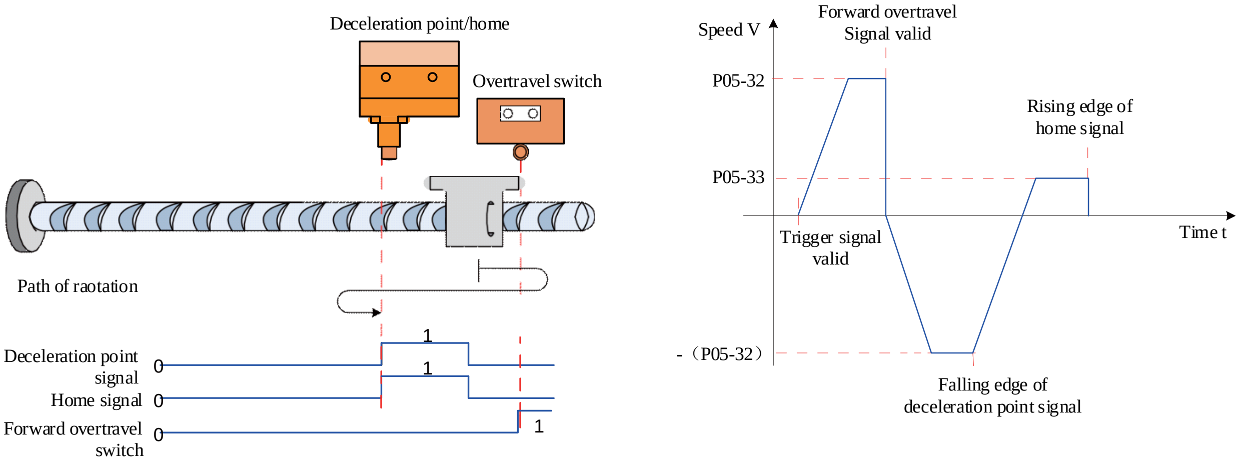


Figure 6-48 Mode 0 Zero return motor running curve ③ and rotational speed description

b） Zero return: positive return to zero, deceleration point and home are motor Z signals (P05-31=2)

⚠Caution:

- In the Zero return method (P05-31=2 or 3) using the Z signal as the deceleration point and home, after returning to zero, the actual stop position of the motor may not be on the rising edge on the same side of the Z signal, and there may be a deviation of ± 1 pulse (encoder unit) in the stop position.

① When the motor starts to move, the Z signal is invalid (0: invalid, 1: valid), and the forward override switch is not triggered during the entire process

The servo motor first searches for the Z signal at the high speed set at P05-32. After encountering the rising edge of the Z signal, it decelerates and reverses according to the set value at P05-34, accelerating to - (P05-33). During reverse acceleration or reverse uniform speed running, it immediately stops when encountering the rising edge of the other side of the motor Z signal.

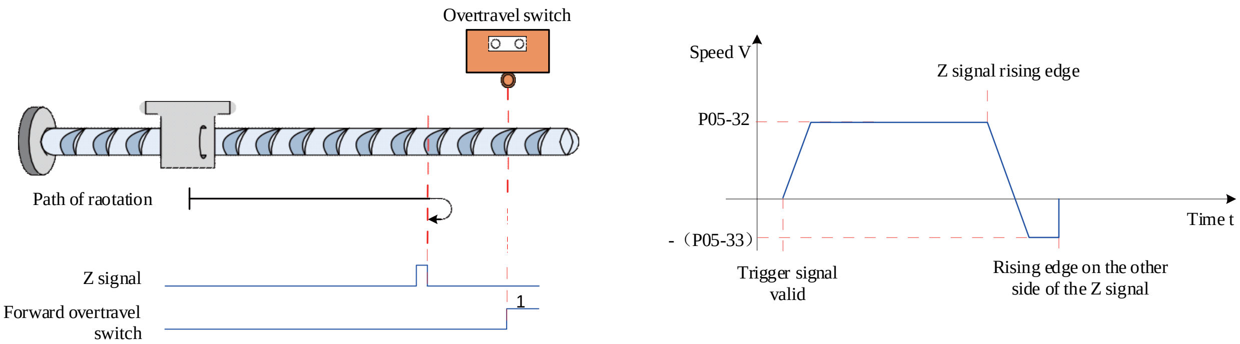


Figure 6-49 Mode 2 Zero return motor running curve ① and rotational speed description

② The Z signal is valid when the motor starts moving, and the forward overtravel switch is not triggered during the entire process

The servo motor directly searches for the falling edge of the Z signal at the high speed set at P05-33. When encountering the falling edge of the Z signal, it reverses, and continues to search for the rising edge of the Z signal at a low speed of - (P05-33). During reverse acceleration or reverse uniform speed running, it immediately stops when encountering the rising edge of the Z signal.

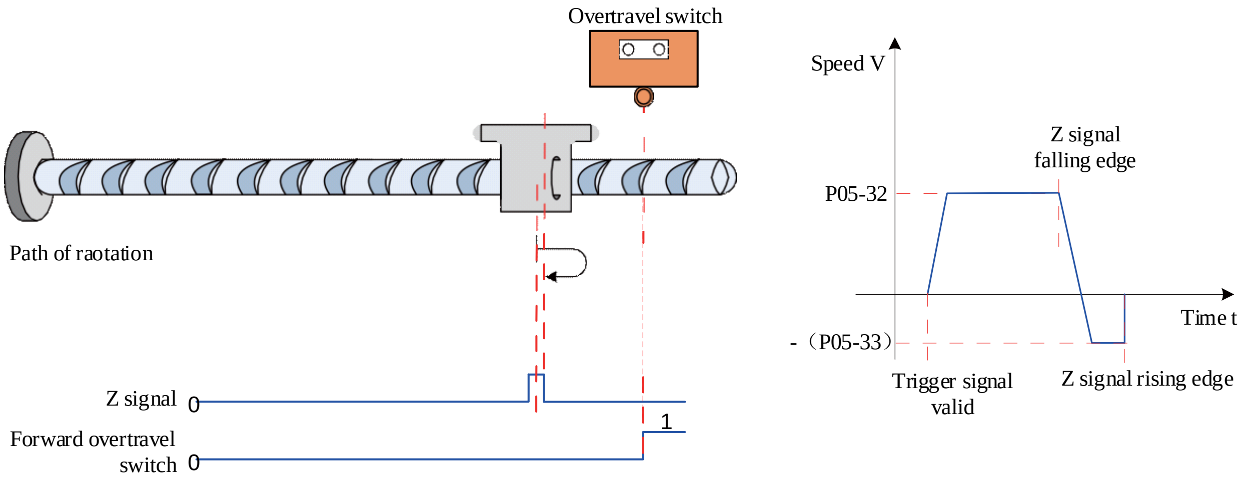


Figure 6-50 Mode 2 Zero return motor running curve ② and rotational speed description

③ The Z signal is invalid when the motor starts moving, and the forward override switch triggered during the process is valid

The servo motor first searches for the Z signal at the high speed set by P05-32. After encountering the forward overtravel switch, the drive decides to immediately reverse to zero (P05-40=2 or 3) according to P05-40 settings, or stops and waits for the upper computer to give a Zero return trigger signal (P05-40=0 or 1) again. When the conditions are satisfied, the drive searches for the Z signal at the high speed set by - (P05-32) in the reverse direction until encountering the rising edge of the Z signal, and gradually decelerates the reverse direction according to the set value set by P05-34 (i.e., resumes the forward direction), The servo motor searches for the rising edge on the other side of the Z signal at a forward low speed of P05-33. During forward acceleration or forward uniform speed running, it immediately stops when encountering the rising edge on the other side of the Z signal.

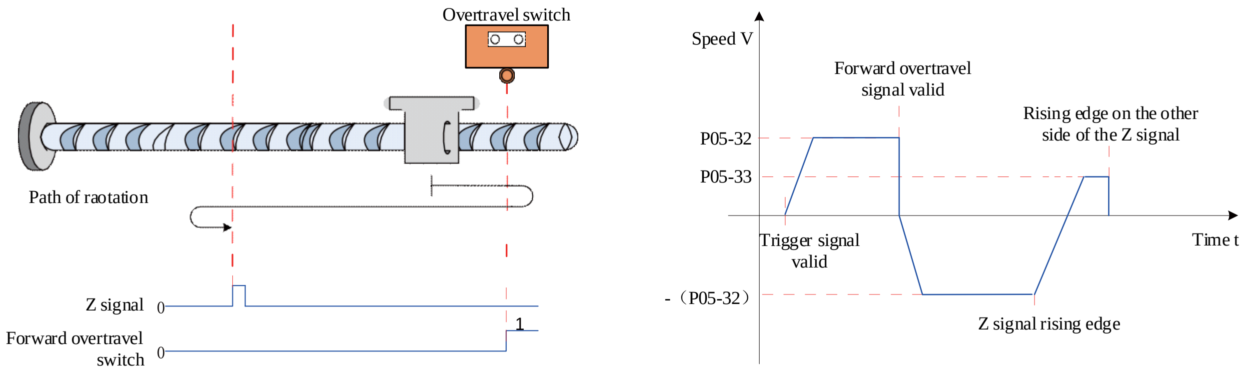


Figure 6-51 Mode 2 Zero return motor running curve ③ and rotational speed description

c） Zero return: positive return to zero, deceleration point as the home switch, and home as the motor Z signal (P05-31=4)

① When the motor starts to move, the home switch signal is invalid (0-invalid, 1-valid), and the forward override switch is not triggered during the entire process

The servo motor first searches for the home switch signal at a high speed in the forward direction using the P05-32 setting value. After encountering the rising edge of the home switch signal, it gradually decelerates and reverses according to the P05-34 setting value. The servo motor searches for the falling edge of the home switch signal at a low speed using the - (P05-33) setting value, decelerates and reverses when encountering the falling edge of the home switch signal (i.e., recovers to the forward direction), and searches for the rising edge of the home switch signal at a low speed in the forward direction using the P05-33 setting value, Continue to operate, and then immediately stop the machine when encountering the motor Z signal for the first time.

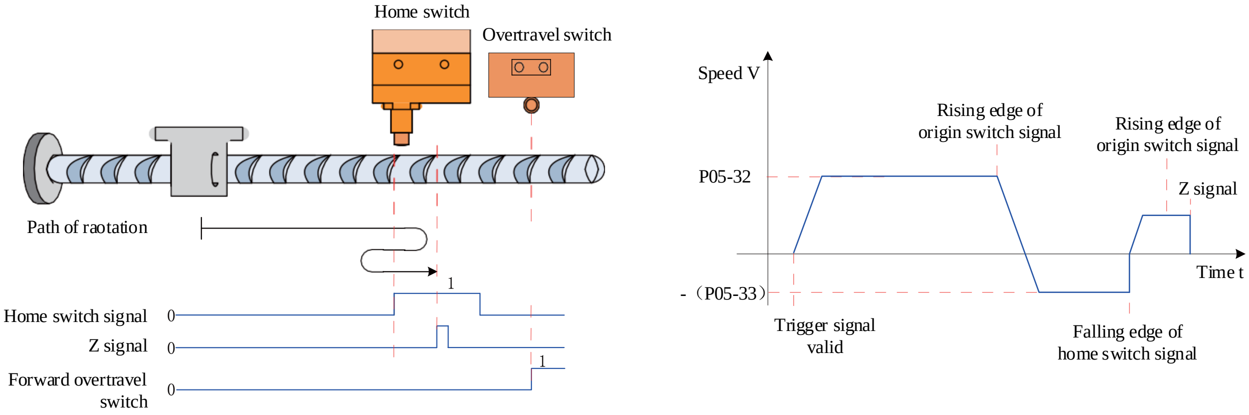


Figure 6-52 Mode 4 Zero return motor running curve ① and rotational speed description

② The home switch signal is valid when the motor starts moving, and the forward override switch is not triggered during the entire process

The servo motor directly searches for the falling edge of the home switch signal at a low speed in the reverse direction with the set value of - (P05-33). When encountering the falling edge of the home switch signal, it decelerates in the reverse direction (i.e., in the forward direction), searches for the rising edge of the home switch signal at a low speed in the forward direction with P05-33. When encountering the rising edge of the home switch signal, it continues to operate at a low speed in the forward direction with P05-33. After encountering the rising edge of the Z signal.

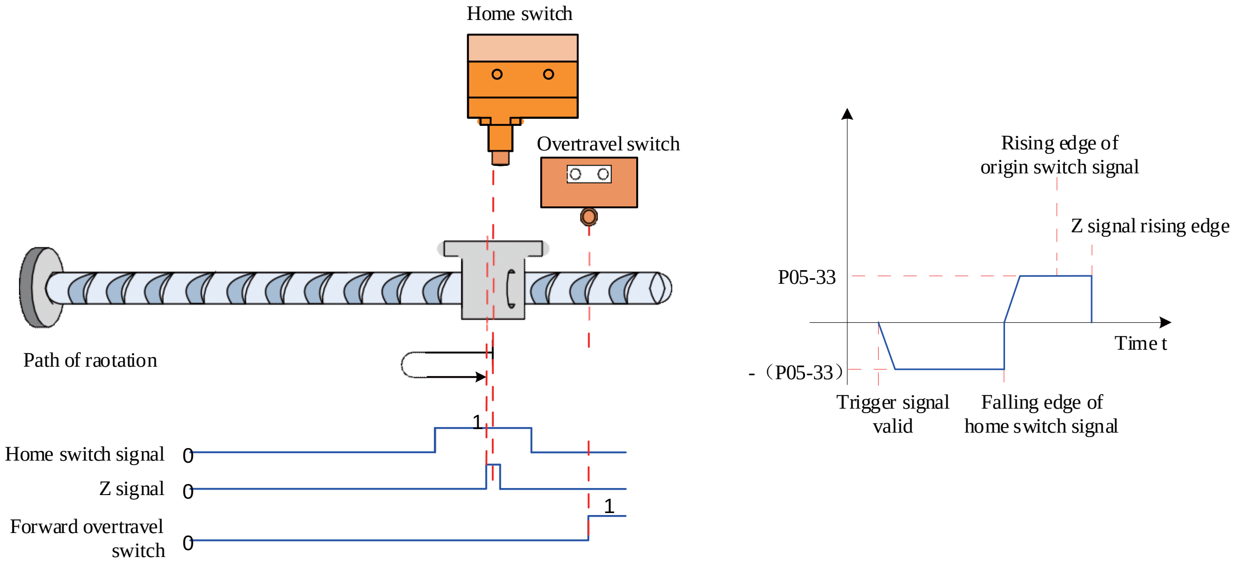


Figure 6-53 Mode 4 Zero return motor running curve ② and rotational speed description

③ The home switch signal is invalid when the motor starts moving, and the forward override switch triggered during the process is valid

The servo motor first searches for the home switch at the high speed set by P05-32. After encountering the forward overtravel switch, the drive decides to immediately reverse return to zero (P05-40=2 or 3) according to the P05-40 setting, or stops and waits for the upper computer to give a Zero return trigger signal (P05-40=0 or 1) again. When the conditions are met, the drive searches for the deceleration point at the high speed reverse speed of - (P05-32) until encountering the falling edge of the home switch signal, After gradually decelerating in the reverse direction (i.e. restoring the forward direction) according to the set value of P05-34, the servo motor searches for the rising edge of the home switch signal in the forward direction at a low speed of P05-33. After encountering the rising edge of the home switch signal, it continues to operate. After encountering the Z signal of the motor for the first time, it immediately shuts down.

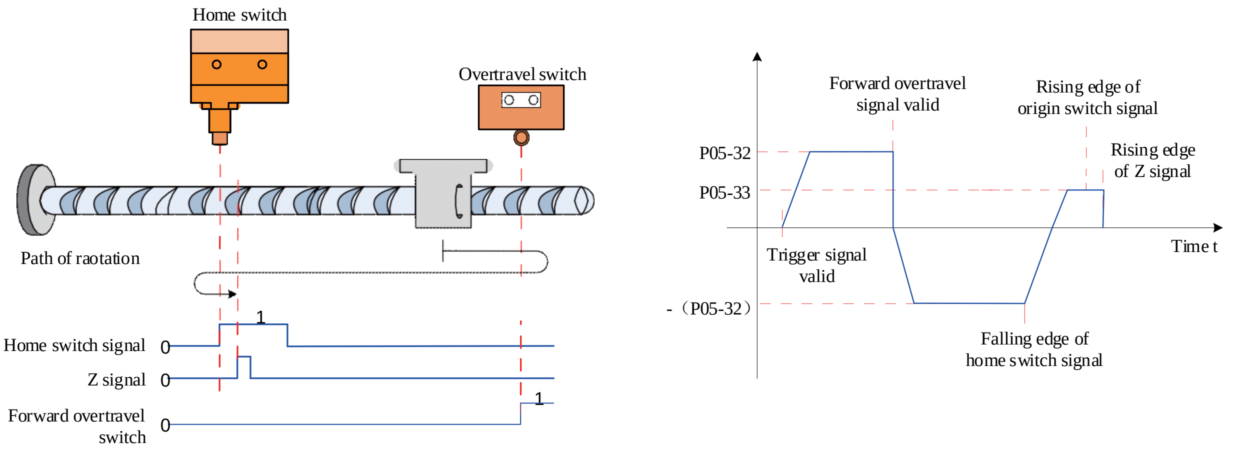


Figure 6-54 Mode 4 Zero return motor running curve ③ and rotational speed description

d） Zero return：Forward return to zero, deceleration point, and home are forward override switches (P05-31=6)

① The forward overtravel switch signal is invalid when the motor starts moving (0: invalid, 1: valid)

The servo motor first searches for the forward override switch at a high forward speed using the setting value P05-32. After encountering the rising edge of the forward override switch signal, it gradually decelerates in the reverse direction using the setting value P05-34. The servo motor searches for the falling edge of the forward override switch signal at a low speed setting of - (P05-33), decelerates in the reverse direction when encountering the falling edge of the forward override switch signal (i.e., restores the forward direction), and searches for the rising edge of the forward override switch signal at a low forward speed using the setting value P05-33, When encountering the rising edge of the forward overtravel switch signal during forward acceleration or forward constant speed running, immediately stop the machine.

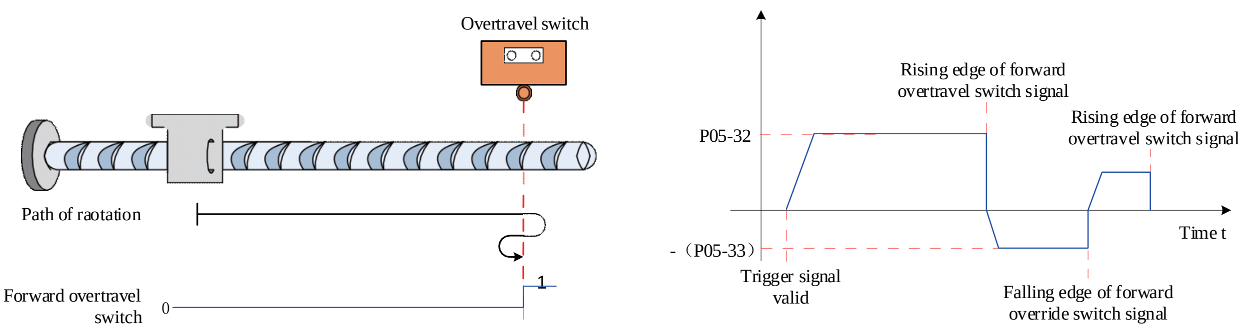


Figure 6-55 Mode 6 Zero return motor running curve ① and rotational speed description

② The forward overtravel switch signal is valid when the motor starts moving

The servo motor directly searches for the falling edge of the forward override switch signal at a low speed in the reverse direction with the set value of - (P05-33). When encountering the falling edge of the forward override switch signal, it decelerates in the reverse direction (i.e., in the forward direction) and searches for the rising edge of the forward override switch signal at a low speed in the forward direction with P05-33. During forward acceleration or forward uniform speed running, it immediately stops when encountering the rising edge of the forward override switch signal.

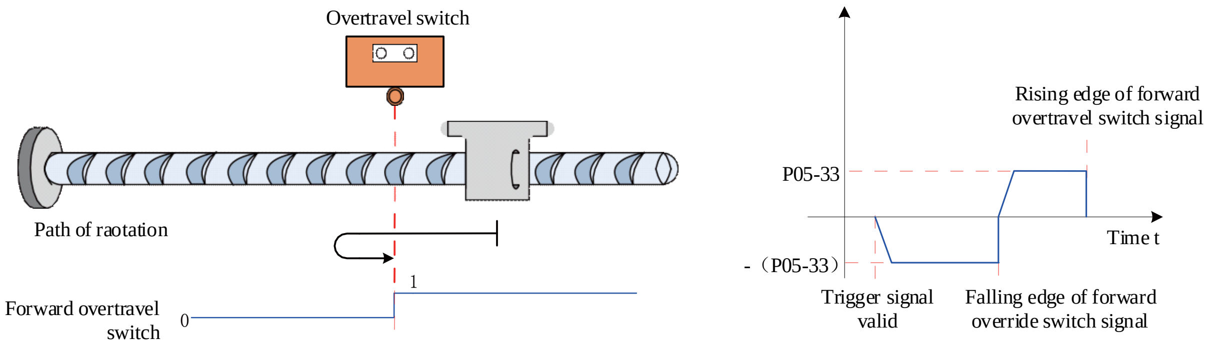


Figure 6-56 Mode 6 Zero return motor running curve ② and rotational speed description

e） Zero return: positive return to zero, deceleration point is positive overtravel switch, home is motor Z signal (P05-31=8)

① The forward overtravel switch signal is invalid when the motor starts moving (0: invalid, 1: valid)

The servo motor first searches for the forward override switch at a high forward speed using the setting value P05-32. After encountering the rising edge of the forward override switch signal, it gradually decelerates in the reverse direction using the setting value P05-34. The servo motor searches for the falling edge of the forward override switch signal at a low speed setting of - (P05-33), decelerates in the reverse direction when encountering the falling edge of the forward override switch signal (i.e., restores the forward direction), and searches for the rising edge of the forward override switch signal at a low forward speed using the setting value P05-33, After encountering the rising edge of the forward overtravel switch signal, continue to operate, and then immediately stop the machine when encountering the Z signal of the motor for the first time.

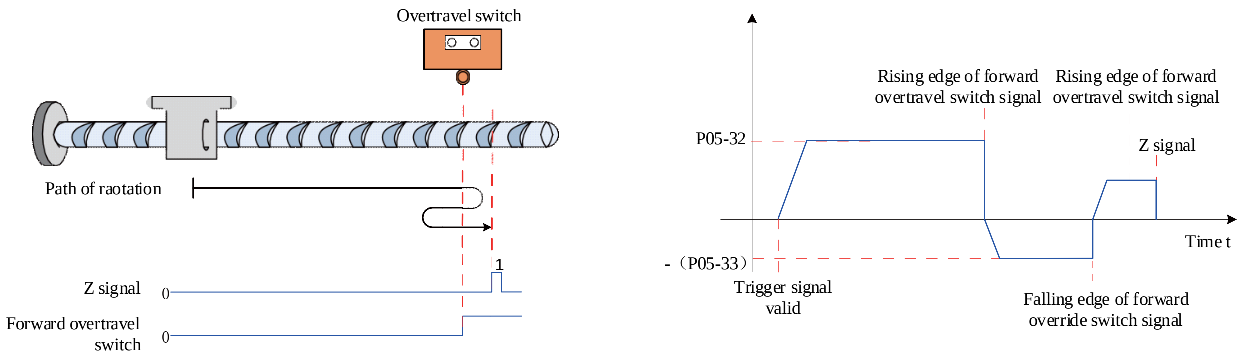


Figure 6-57 Mode 8 Zero return motor running curve ① and rotational speed description

② The forward overtravel switch signal is valid when the motor starts moving

The servo motor directly searches for the falling edge of the forward override switch signal at a negative low speed with the set value of - (P05-33). When encountering the falling edge of the forward override switch signal, it decelerates in the reverse direction (i.e., in the forward direction), searches for the rising edge of the forward override switch signal at a low speed with P05-33. When encountering the rising edge of the forward override switch signal, it continues to operate at a low speed with P05-33. After encountering the rising edge of the Z signal for the first time, it immediately shuts down.

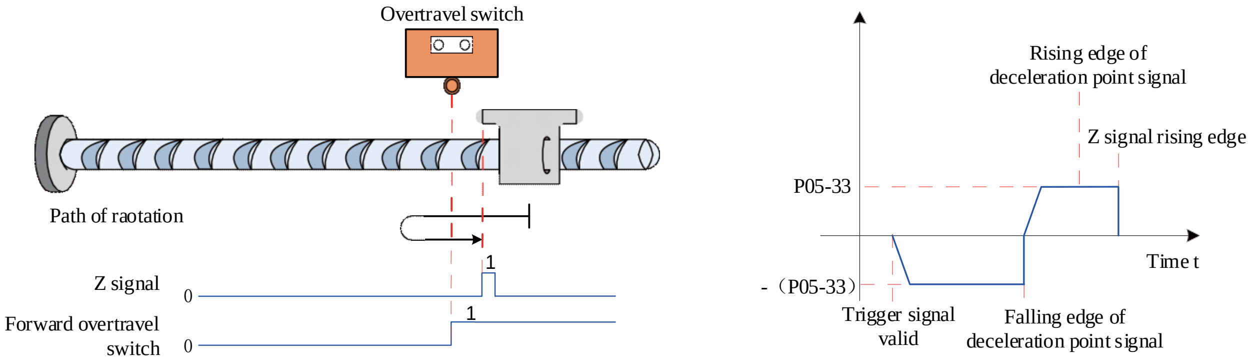


Figure 6-58 Mode 8 Zero return motor running curve ② and rotational speed description

f） Zero return: Forward return to zero, with the deceleration point and home at the forward mechanical limit position (P05-31=10)

The servo motor first operates at a forward low speed at the set value of P05-33. After hitting the mechanical limit position, if the torque reaches the upper limit of P05-58 and the speed is lower than the set value of P05-56, after maintaining this state for a certain time, it is judged that the mechanical limit position has been reached, and the motor immediately stops.

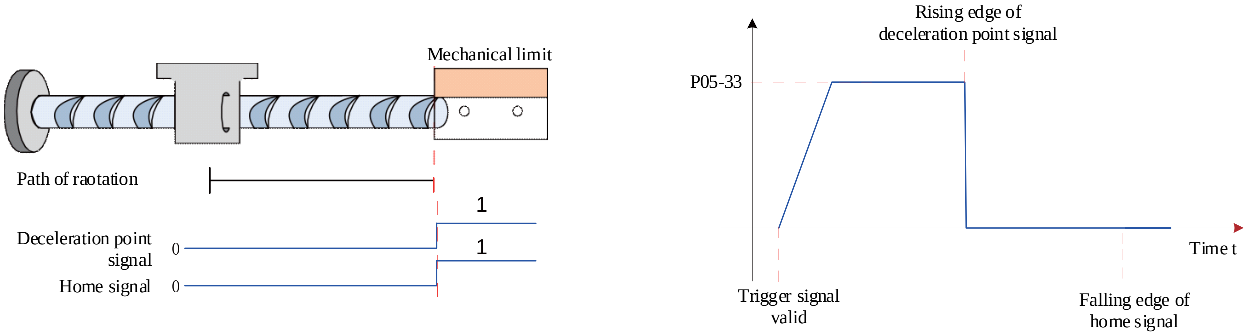


Figure 6-59 Mode 10 Zero return motor running curve and rotational speed description

g) g) Zero return: Forward return to zero, the deceleration point is the forward mechanical limit position, and the home is the motor Z signal (P05-31=12). The servo motor first operates at a forward low speed at the P05-33 set value. After hitting the mechanical limit position, if the torque reaches the P05-58 torque limit and the speed is lower than the P05-56 set value, if this state is maintained for a certain time, it is judged that the mechanical limit position has been reached, and the motor operates in reverse direction, running in reverse direction at the P05-33 speed, After that, the machine stops when encountering the rising edge of the Z signal for the first time.

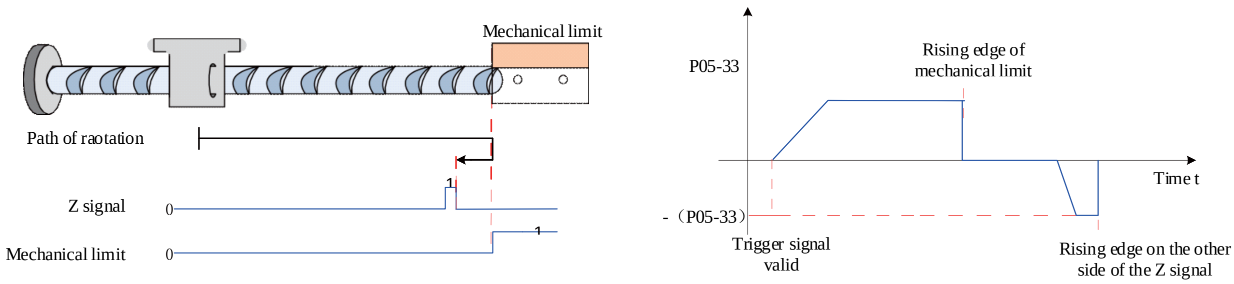


Figure 6-60 Mode 12 Zero return motor running curve and rotational speed description

3）Electrical zero return: Start the electrical zero return command (P05-30=5)

After the Zero return is completed, the mechanical zero position of the servo system is known. At this time, after setting P05-36, the servo motor can be moved from the current absolute position (P0B-07) to the specified position (P05-36). In the electrical zero return mode, the servo motor runs at the high speed set by P05-32 throughout the entire process. The total displacement of the motor is determined by the difference between P05-36 and P0B-07, and the running direction is determined by the positive or negative value of the total displacement of the motor. After the displacement command is completed, the motor immediately stops.

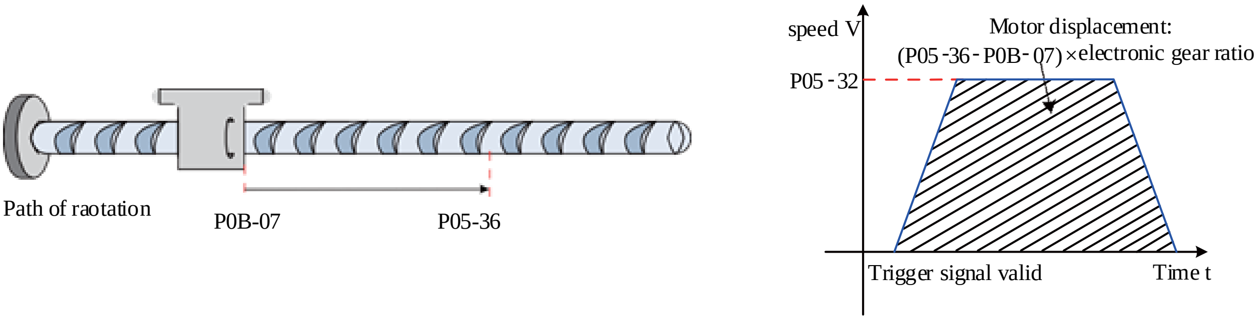
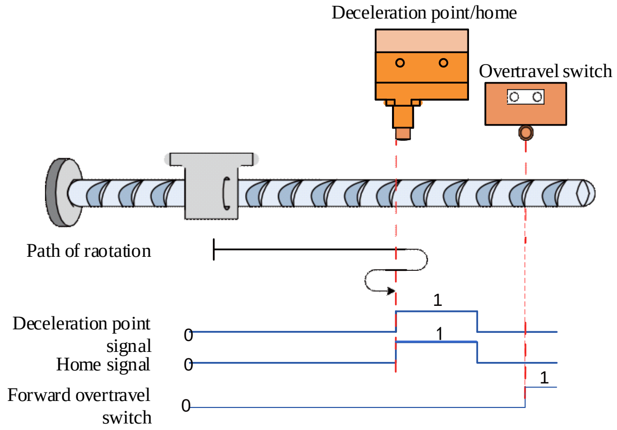
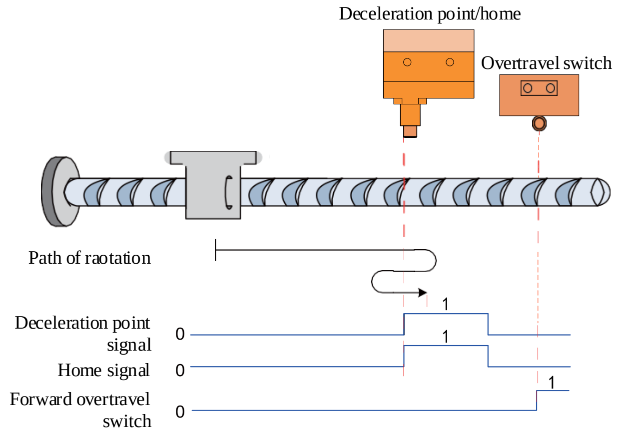


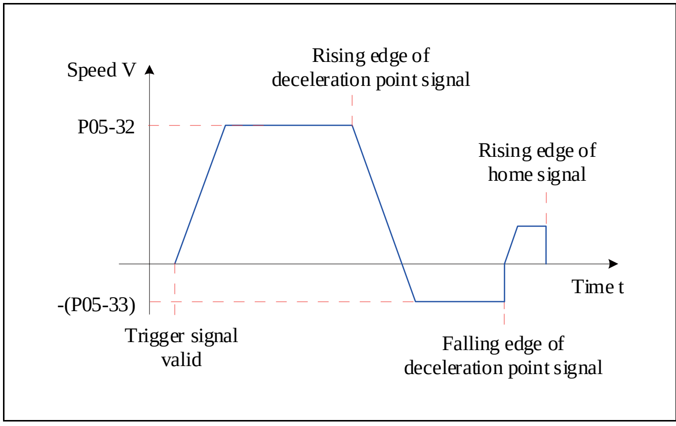
Figure 6-61 Electrical Zero Return Motor Running Curve and Rotation Speed Description

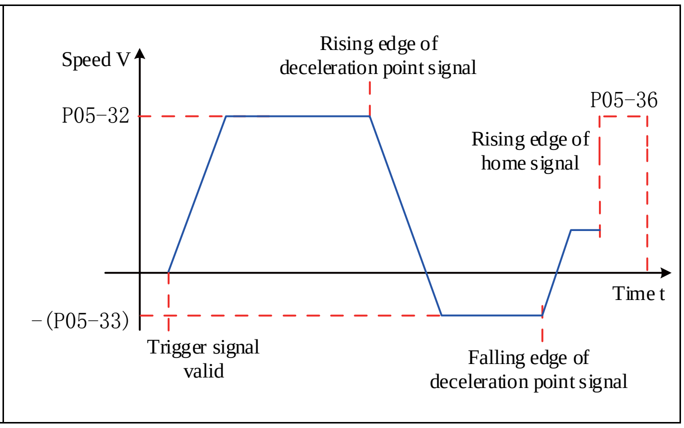
4）Mechanical home and mechanical home

Take P05-30=0 as an example to illustrate the difference between mechanical home and mechanical home.

Table 6-22 Example of Mechanical Home and Mechanical home Description

<table>
<tr><th>Mechanical home and mechanical home do not coincide</th><th>Mechanical home and mechanical home coincide</th></tr>
<tr><td>If the home offset (P05-36 ≠ 0) is set and the mechanical home and mechanical home do not coincide (P05-40=0/2), during forward acceleration or forward uniform speed running, the machine will immediately stop when encountering the rising edge of the home signal, and after stopping, the current absolute position P0B-07 of the motor will be forced to P05-36.</td><td>If the home offset (P05-36 ≠ 0) is set and the mechanical home and mechanical home coincide (P05-40=1/3), during forward acceleration or forward uniform speed running, the motor continues to move after encountering the rising edge of the home signal until the current absolute position P0B-07 is P05-36.</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>





NOTE

● Positive and negative limit switches have no effect on return to zero modes 10-13.

5）Parameter settings

a） Home reset mode setting

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P05-30	Home reset enable control	0: Close Home reset function 1: Enable Home reset function through DI input of HomingStart signal 2: Enable the electrical return to zero function through DI input of the HomingStart signal 3: Start the home reset immediately after powering on 4: Immediately perform home reset 5: Start the electrical zero return command 6: Take the current position as the home	Set the home reset mode and trigger signal source	running settings	Effective immediately	0
P05-31	Home reset mode	0: Forward return to zero, deceleration point, and home are home switches 1: Reverse return to zero, deceleration point and home are the home switches 2: Forward return to zero, deceleration point and home are motor Z signals 3: Reverse return to zero, deceleration point and home are motor Z signals 4: Forward return to zero, deceleration point is the home switch, and home is the motor Z signal 5: Reverse return to zero, the deceleration point is the home	Set the zero return direction, deceleration point, and home when setting zero return	Shutdown setting	Effective immediately	0

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
		switch, and the home is the motor Z signal 6: Forward return to zero, deceleration point and home are forward overtravel switches 7: Reverse return to zero, deceleration point and home are reverse overtravel switches 8: Forward return to zero, the deceleration point is the forward overtravel switch, and the home is the motor Z signal 9: Reverse return to zero, the deceleration point is the reverse overtravel switch, and the home is the motor Z signal 10: Forward return to zero, deceleration point and home are mechanical limit positions 11: Reverse return to zero, deceleration point and home are mechanical limit positions 12: Forward return to zero, deceleration point is the mechanical limit position, and home is the motor Z signal 13: Forward return to zero, deceleration point is the mechanical limit position, and home is the motor Z signal				
P05-36	Mechanical home offset	-1073741824～1073741824	When the home reset mode is 10-12, when P05-36>0, No. 10 and No. 12 cannot be started to return to zero, and when P05-36<0, No. 11 and No. 13 cannot be started to return to	Shutdown setting	Effective immediately	0

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
			zero			
P05-40	Selection of home offset and limit handling method	P05-36 is the coordinate after the home reset. When encountering a limit, the home reset enable is triggered again, and then the home is found in the reverse direction ● P05-36 is the relative offset after the home reset. When encountering a limit, the home reset enable is triggered again, and then the home is found in the reverse direction ● P05-36 is the coordinate after the home point is reset, and automatically reverses the zero finding when encountering a limit position ● P05-36 is the relative offset after the home point is reset, and when encountering a limit, it will automatically reverse the zero finding	Whether the mechanical home is offset when setting Zero return, whether additional distance needs to be moved after zero return, and how to handle overtravel	Shutdown setting	Effective immediately	0

b） Home reset running curve setting

If the deceleration point signal becomes effective and the home signal becomes effective without sufficient deceleration, it may lead to unstable final positioning. The displacement required for deceleration should be fully considered before setting the deceleration point and the home signal input position. The acceleration and deceleration time (P05-34) when searching for the home can also affect the positioning stability, so it should be considered during setting.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P05-32	The speed of the high-speed search home switch signal	0～3000	rpm	When setting Zero return, search for the high speed value of the deceleration point signal. When returning to zero electrically, the motor always runs at a high speed of P05-32	Shutdown setting	Effective immediately	100
P05-33	Speed of low speed search home switch	0～1000	rpm	Set the low speed value when searching for the home when setting Zero return. The speed setting should be low enough to prevent	Shutdown setting	Effective immediately	10

				mechanical shock during shutdown.			
P05-34	Acceleration and deceleration time when searching for the home	0～1000	ms	Set the time for the motor to uniformly shift from 0 to 1000 rpm during zero reset.	Shutdown setting	Effective immediately	1000
P05-35	Limit the time to find the home	0～65535	ms	Limit the total time for home reset, and if it expires, a warning FU.601 (Home reset timeout fault) will occur.	Shutdown setting	Effective immediately	10000
P05-36	Mechanical home offset	-1073741824 ～ 1073741824	Comm and unit	Set the absolute position (P0B-07) value of the motor after home reset.	Shutdown setting	Effective immediately	0

☆Associated function NO.:

<table>
<tr><th>Code</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.31</td><td>HomeSwitch</td><td>Home switch</td><td>Valid, current position is the home:
<table>
<tr><th>DI terminal logic for HomeSwitch settings</th><th>Actual effective level</th></tr>
<tr><td>0 (low level)</td><td>Low level</td></tr>
<tr><td>1 (High level)</td><td>High level</td></tr>
<tr><td>3 (rising edge)</td><td>High level</td></tr>
<tr><td>4 (falling edge)</td><td>Low level</td></tr>
<tr><td>5 (edge variation)</td><td>Low level</td></tr>
</table>
The DI terminal logic corresponding to the home switch should be set to high/low level effective according to the output of the upper computer.</td></tr>
<tr><td>FunIN.32</td><td>HomingStart</td><td>Home reset enable</td><td>Valid, enable Home reset function. During the running of home reset, repeated enable is invalid; Invalid, Home reset function is inhibited.</td></tr>
<tr><td>FunOut.16</td><td>HomeAttain</td><td>Zero return completed</td><td>Valid, Zero return is completed when position control is performed. Invalid, Zero return not completed.</td></tr>
<tr><td>FunOut.17</td><td>ElecHomeAttain</td><td>Electrical zero return completed</td><td>Effective, electrical zero return is completed during position control. Invalid, electrical zero return is not completed.</td></tr>
</table>

c） Working sequence:

① P05-30=1 or 2

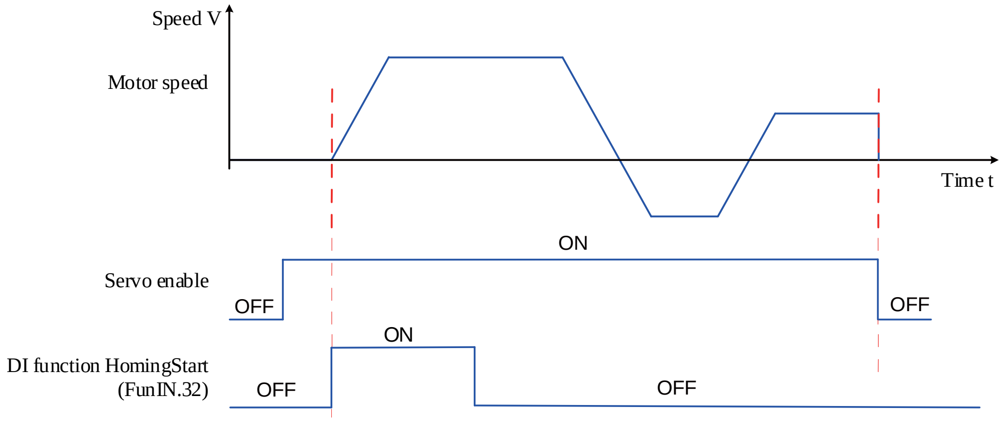


Figure 6-62 Example of timing diagram

- The servo enable signal must be turned on first, and then the HomingStart signal must be turned on;
- During the process of home reset, the servo enable signal is set to invalid, the servo motor stops rotating, and the home reset is restarted. Please turn on the servo enable signal first, and then turn on the HomingStart signal;
- When an home reset timeout occurs (FU.601), the servo motor stops rotating, keeps the servo enable signal valid, and triggers the HomingStart signal valid again to reset FU.601 and re perform the home reset;
- The home reset can be repeatedly triggered;

② P05-30=3

- Only after powering on, when the servo enable signal is set to valid for the first time, can the zero point be reset；
- When the zero point reset timeout (FU.601) occurs, the servo motor stops rotating, and the FU.601 can be reset after the servo enable signal is set to invalid;
- Before re powering on, it is not allowed to repeatedly trigger the home reset;

③ P05-30=4 or 5

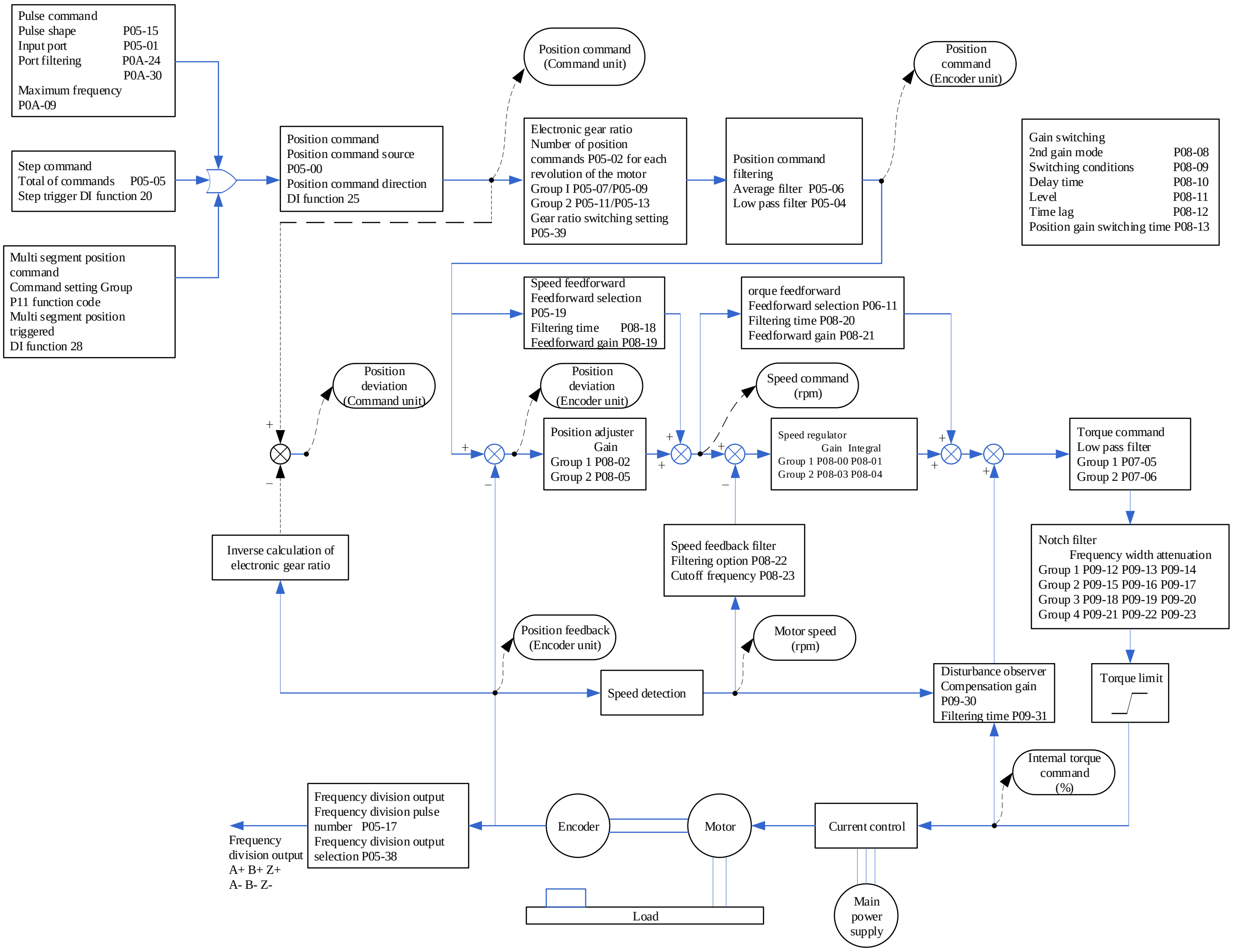
- After powering on, set the servo enable signal to be valid and immediately perform the home reset;
- During the process of home reset, if the servo enable signal is set to invalid, the servo motor stops rotating, and the servo enable signal is set to valid again, the home reset can be triggered again;
- When an home reset timeout occurs (FU.601), P05-30 is set to 0, the servo motor stops rotating, and the servo enable signal is set to invalid to reset FU.601. To reset the home, P05-30 must be reset; After the home point reset is completed, P05-30=0. If you want to reset the home point, you must reset P05-30;

④ P05-30=6

- When using the "Take the Current Position as the Home" function and you need to achieve an home offset (P05-40=0 or 2, P05-36 ≠ 0), you must first set P05-36 and P05-40, and then set P05-30=6. Otherwise, P0B-07 is the previous P05-36 value, not the modified P05-36 value;

- After the home point reset is completed, P05-30=0. To perform the home point reset again, you must rewrite P05-36 and set P05-30=6.

1.28.9 Position control mode function code block diagram



1.29 Speed control mode

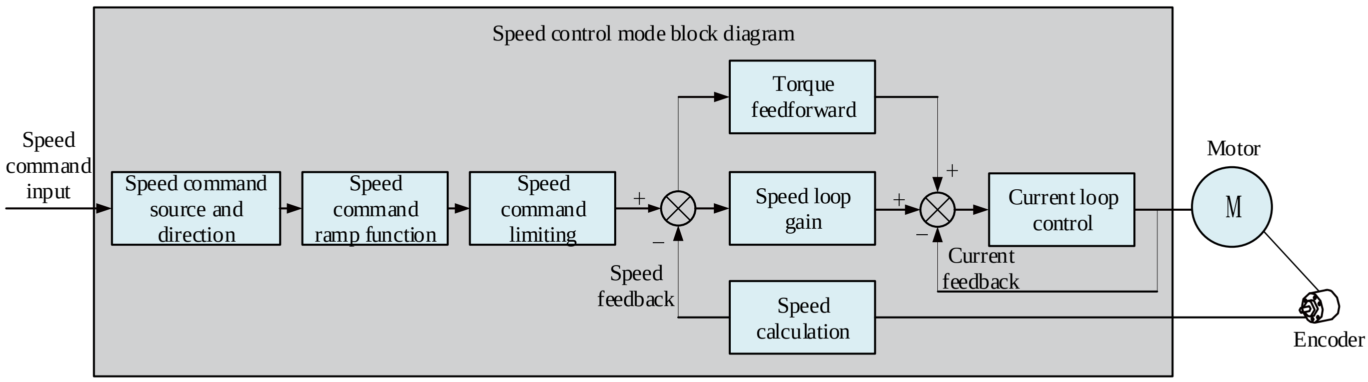


Figure 6-63 Speed Control Block Diagram

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.

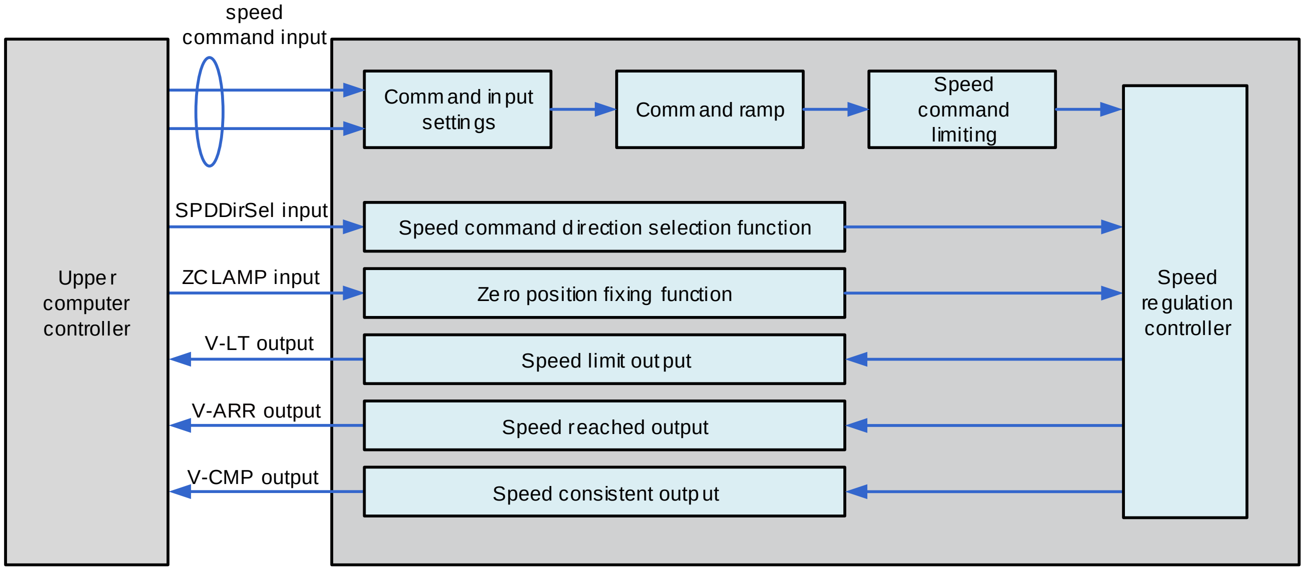


Figure 6-64 Signal Interaction diagram between servo drive and host computer

1.29.1 Speed command input setting

1) Speed command source

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

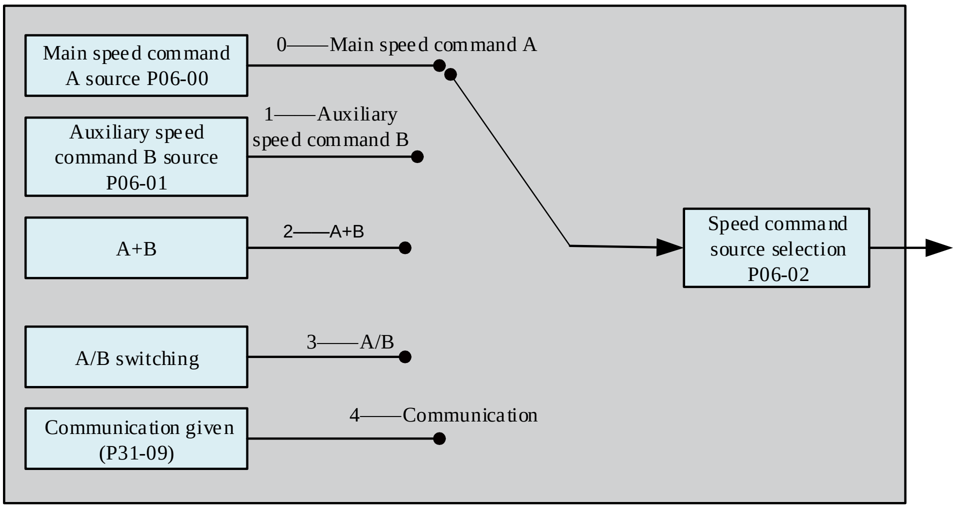


Figure 6-65 Speed command source diagram

☆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.

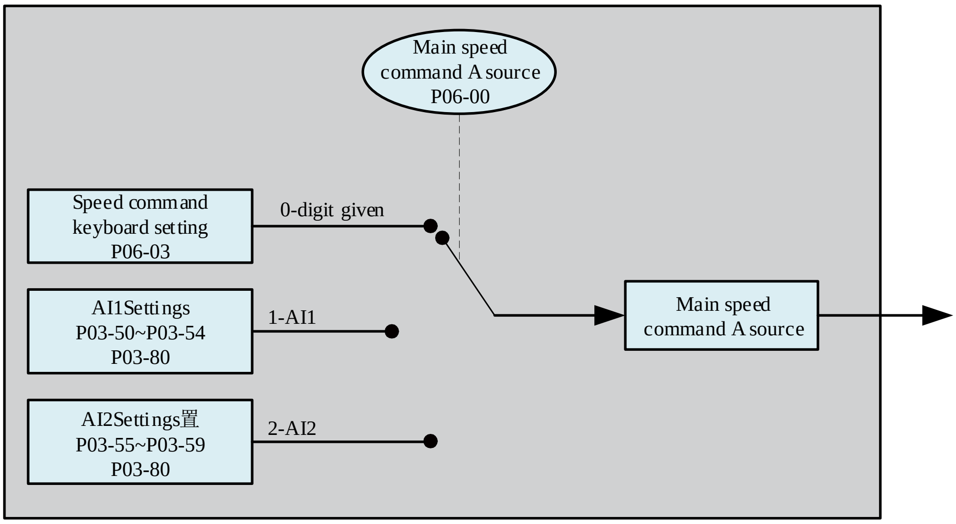


Figure 6-66 Source diagram of main speed command A

☆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

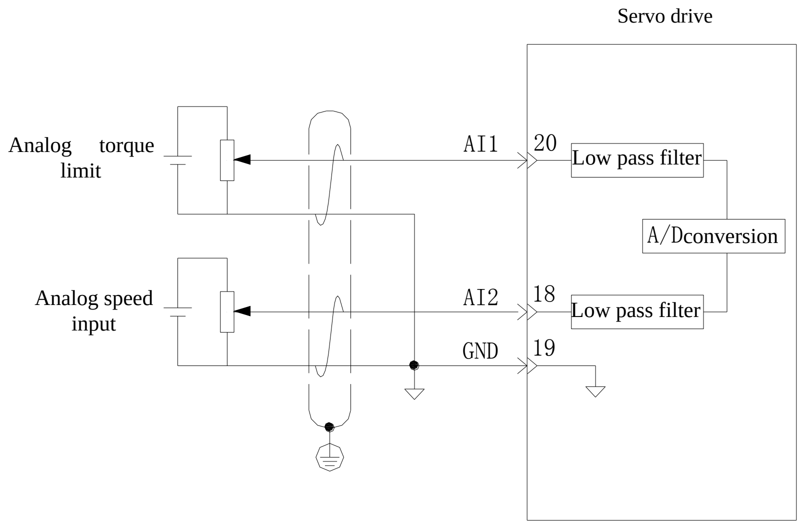
② Analog voltage setting

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 ±10Vdc and an input impedance of about 9k Ω.

Analog input circuit:



- Operation method：

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

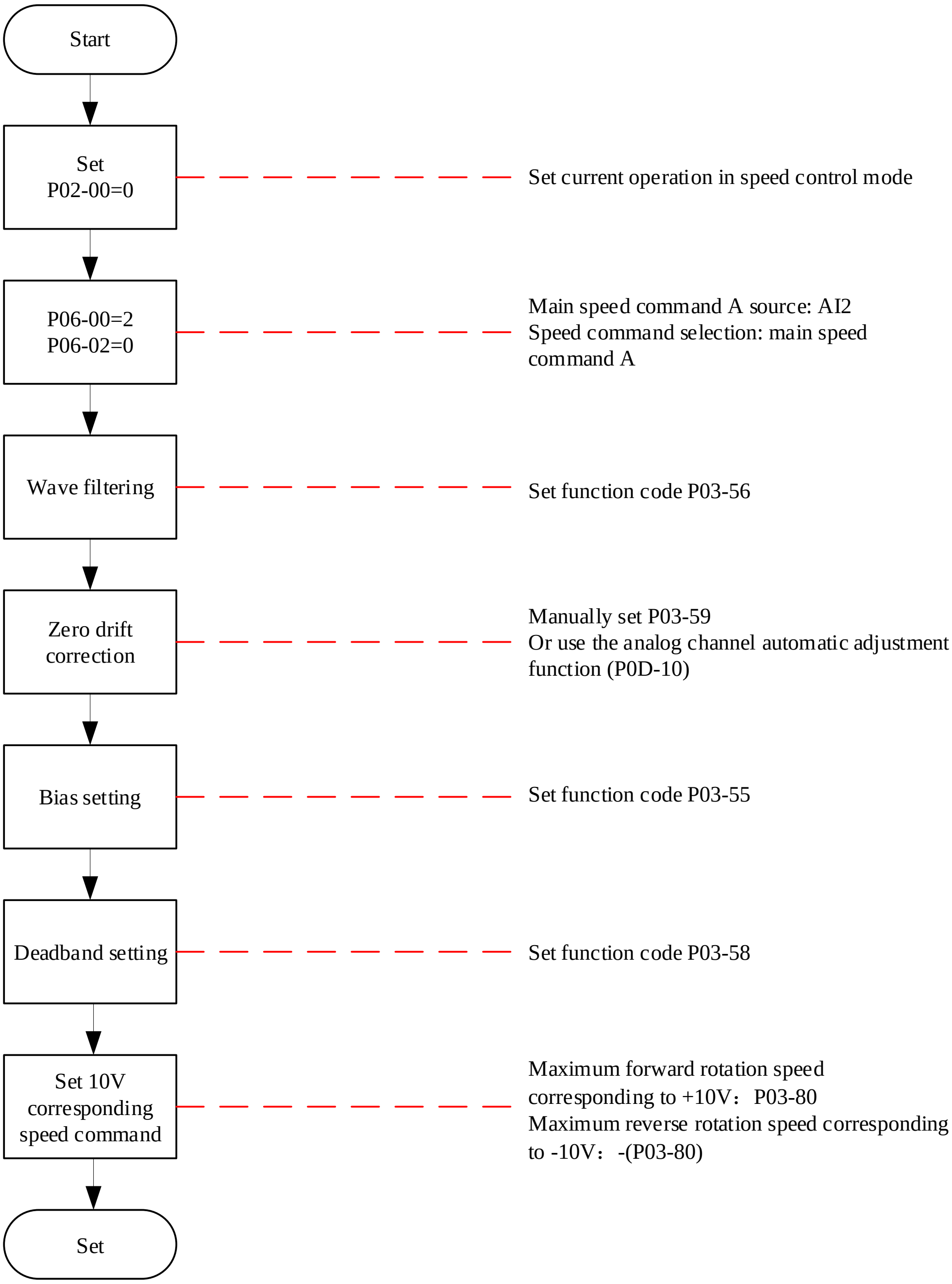


Figure 6-67 Analog Voltage Speed Command running Flow Chart

★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 6-65y_1. After internal processing by the servo drive, the final speed command y_6 is obtained.

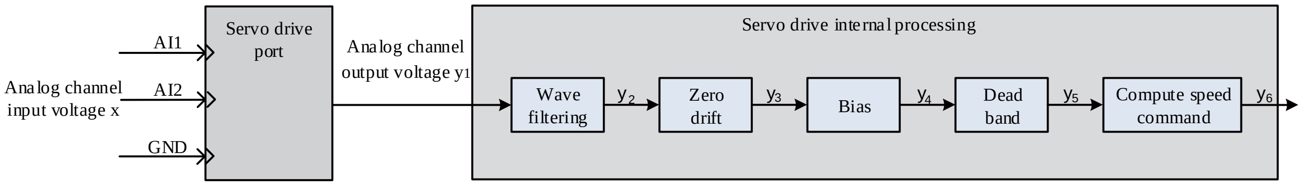


Figure 6-68 Servo drive AI processing flow

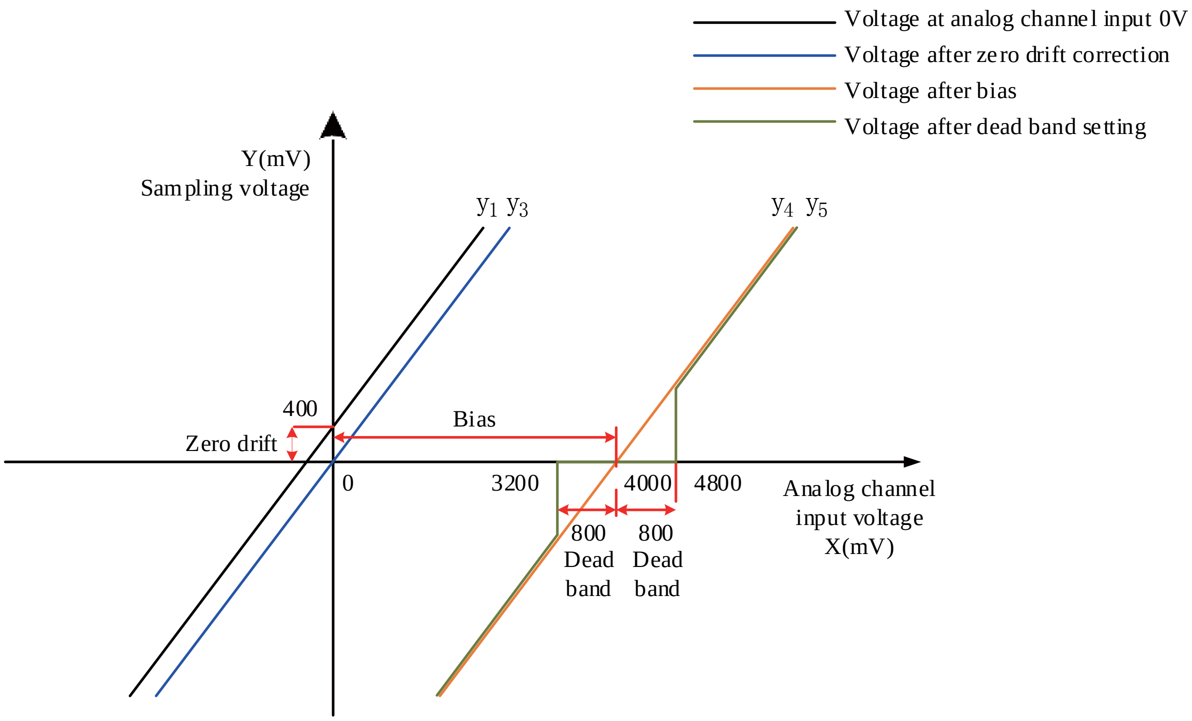


Figure 6-69 Example of servo drive AI processing corresponding sampling voltage

●Wave filtering:

The servo drive provides an analog channel filtering function. By setting the filtering time constant P03-56, it can prevent motor command fluctuations caused by unstable analog input voltage, and also reduce motor misrunning caused by interference signals. The filtering function has no effect on eliminating or suppressing zero drift and dead bands.

●Zero drift correction:

When the actual input voltage is corrected to be 0V, the analog channel output voltage deviates from the value of 0V.

In the figure, the analog channel output voltage without internal processing by the drive is shown in y1. Taking the filtering time constant P03-56=0.00ms as an example, the filtered sampling voltages y1 and y2 y_2 and y_1 are consistent.

It can be seen that when the actual input voltage x=0, the output voltagey_1=400mV,which is called zero drift.

Manually set P03-59=400.0 (mV), and after zero drift correction, the sampling voltage is shown iny_3.y_3=y_1-400.0

The zero drift can also be automatically corrected through the analog channel automatic adjustment function (P0D-10).

●Offset settings:

Set the actual input voltage value when the sampling voltage is 0.

As shown in the figure, when the preset sampling voltage isy_4=0, the corresponding actual input voltage x=4000mV is called offset.

Manually set P03-55=4000 (mV), after offset, sample voltagey_4=x-4000=y_3-4000

●Deadband correction:

Define the valid input voltage range when the drive sampling voltage is not 0.

After the offset setting is completed, when the input voltage x is within 3200mV and 4800mV, the sampling voltage value is both 0, and this 800mV is called the dead band.

Set P03-58=800.0, and after dead band correction, the sampling voltage is as shown iny_5.

$$y_5=\begin{cases} 0 & 3200\leqslant x\leqslant 4800 \\ y_4 & 4800< x\leqslant 10000\text{或}-10000\leqslant x< 3200 \end{cases}$$

●Calculation speed command:

After setting zero drift, offset, and dead band, it is necessary to set the corresponding speed command value of 10V (10000mV) in the sampling voltage through P03-80, and the actual speed command y_6:

$$y_6=\frac{y_5}{10000}\times\text{（P03-80）}$$

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

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.

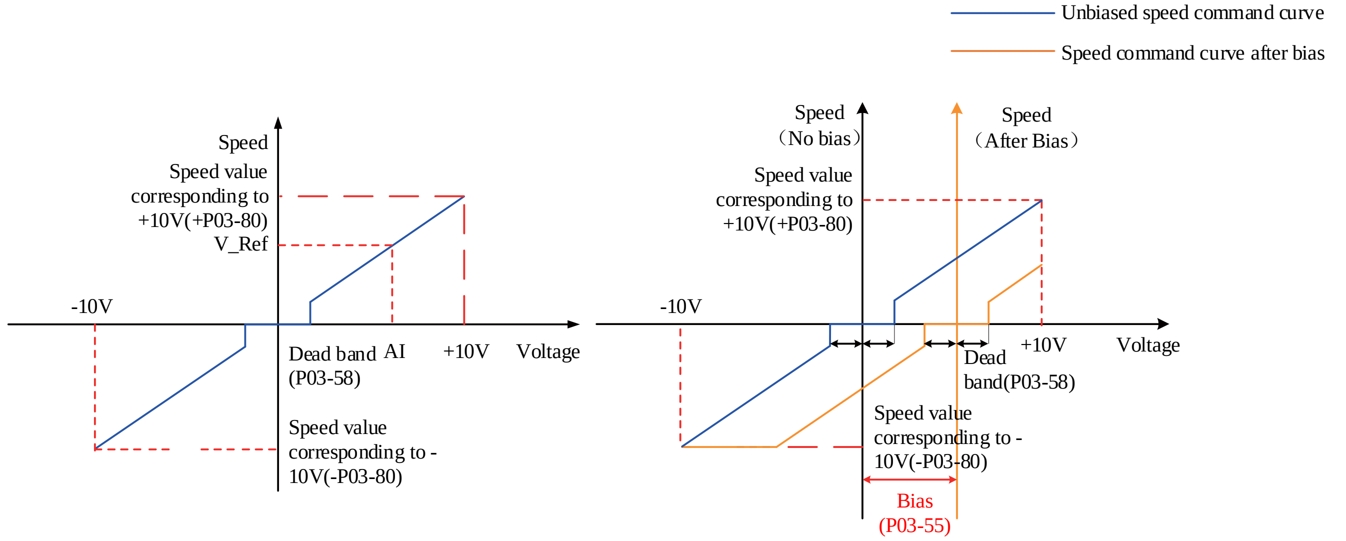


Figure 6-70 Schematic diagram of unbiased AI2

Figure 6-71 Schematic diagram of AI2 after bias

Relationship between final speed command value and input voltage x:

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

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

NOTE

- When selecting to use the analog quantity AI1 input channel, its setting method is similar to the above analog quantity AI2 setting method. For relevant function codes, please refer to the parameter descriptions for P03-50～P03-59 in Chapter 8.

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.

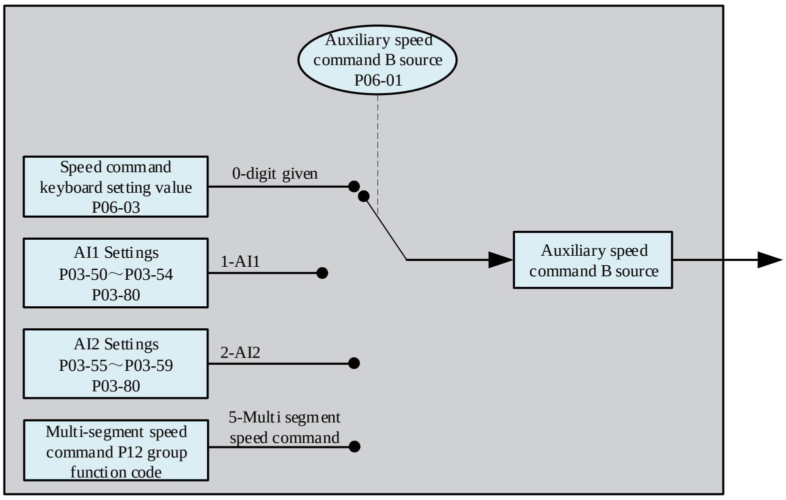


Figure 6-72 Auxiliary Speed Command B Source Diagram

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-01	Auxiliary speed command B source	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

The digital setting and analog voltage setting methods are the same as the main speed command A source. The following mainly describes the multi segment speed command.

The servo drive has a multi segment speed running function. It refers to 16 segments of speed commands stored inside the servo drive, and the maximum operating speed and operating time of each segment can be set separately. It is also equipped with 4 sets of acceleration and deceleration times to choose from. The setting process is as follows:

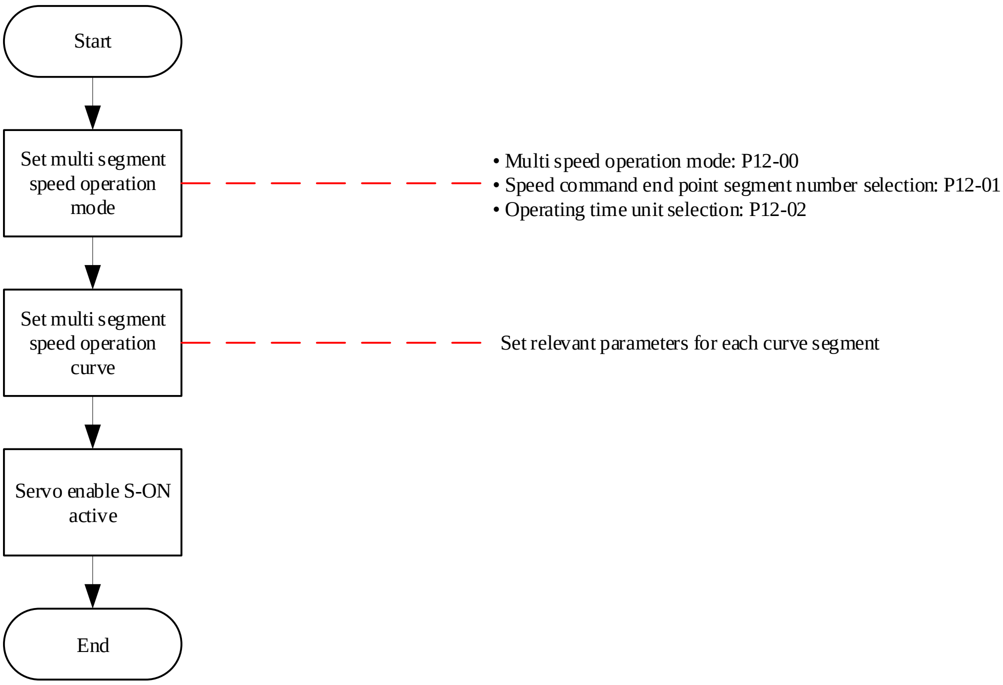


Figure 6-73 Flow Chart for Multistage Speed Setting

①Set multi segment speed running mode

☆Associated function code:

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P12-00	Multi speed running mode	0: Single run end shutdown (P12-01 segment number selection) 1: Cyclic running (P12-01 segment number selection) 2: Switching through external DI	-	Set the running mode of multi segment speed command	Shutdown setting	Effective immediately	1
P12-01	Speed command end point segment number selection	1～16	-	Set the number of segments required for multi segment speed commands	Shutdown setting	Effective immediately	1
P12-02	Runtime unit selection	0-Sec 1-Min	-	Select the unit for running time of multi segment speed command	running settings	Effective immediately	1

The external DI terminal can be configured and collocated as the function FunIN. 5: DIR-SEL for selecting the direction of multi segment running instructions.

☆Associated function code:

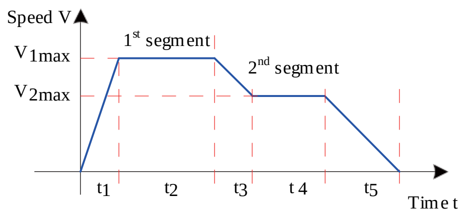
Function code	Name	Function name	Function
FunIN.5	DIR-SEL	Multi-segment running command direction selection	Invalid, default command direction Valid, command reverse direction

Take P12-01=2 as an example to illustrate each mode.

●Shutdown at the end of a single running (P12-00=0)

Function code P12-00 is set to 0 to select the single running shutdown mode. After setting the function codes P12-01 and P12-02 according to the total number of execution segments and the execution time unit, and setting the command values, running time, acceleration and deceleration time, and other parameters for the corresponding segments according to the requirements, the drive will operate in the manner of segment codes from the 1st segment to the nth segment until the last segment is completed and the machine stops.

Table 6-24 Description of shutdown after single running

Mode description	Running curve
◆ 1 round of running; ◆ Automatic increment switching of segment number;	◆ V_{1max}、V_{2max}: Command speed of the first and second segments; ◆ t_1: Actual acceleration and deceleration time of the 1st segment; ◆ t_3、t_5: Acceleration and deceleration time of the second period;  A certain period of running: the shift time when the previous speed command is switched to this period of speed command+the constant speed running time of this period (e.g., in the figure, the first period of running time is+, the second period of running time is+, and so on) Do not set a certain running time to 0, and the drive will skip this speed command and perform the next section; The actual rotational speed of the motor reaches the maximum operating speed set in this section, and the speed arrival signal is valid; When a certain section of running occurs, the servo enable OFF occurs, and the motor shuts down in the servo OFF shutdown mode (P02-05).

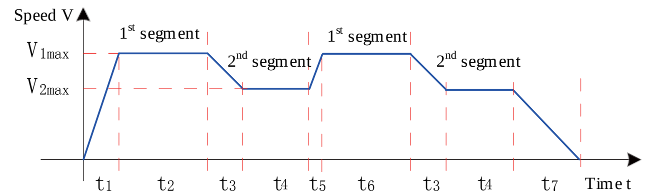
★Explanation of terms:

The total number of segments of the multi segment speed command set by P12-01 for the complete running of the drive once is called completing one round of running.

●Cycle running(P12-00=1)

Function code P12-00 is set to 1 to select the cyclic running mode. After setting the function codes P12-01 and P12-02 according to the total number of execution segments and the execution time unit, and setting the command values, running time, acceleration and deceleration time and other parameters for the corresponding segments as required, the module will set the command running time and acceleration and deceleration time for each segment, and the drive will operate from the 1st segment to the nth segment according to the segment code. After running the last segment, it will automatically jump to the first cycle running.

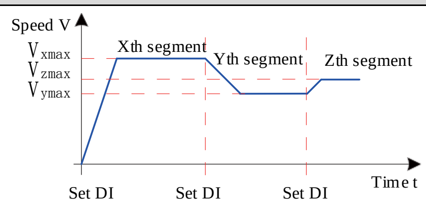
Table 6-25 Cycle Running Description

Mode description	Running curve
◆ Cycle running, with the starting segment number of each round being 1 ◆ Automatic increment switching of segment number ◆ If the servo enable is effective, the cycle running state is always maintained	 ◆ V_{1max}、V_{2max}：Maximum operating speed of the 1st and second sections; ◆ A certain operating time: the shift time from the previous speed command to this speed command+the constant speed operating time of this section (for example, the first running time in the figure ist_1+t_2,The second run time ist_3+t_4,and so on) ◆ Do not set a certain running time to 0, and the drive will skip this speed command and perform the next section; ◆ The actual rotational speed of the motor reaches the maximum operating speed set in this section, and the speed arrival signal is valid; ◆ When a certain section of running occurs, the servo enable OFF occurs, and the motor shuts down in the servo OFF shutdown mode (P02-05).

●DI switching running (P12-00=2)

Function code P12-00 is set to 2, and external DI switching mode is selected. After setting the function codes P12-01 and P12-02 according to the total number of execution segments and the execution time unit, and setting the command value, running time, acceleration and deceleration time and other parameters for the corresponding segment according to the demand, the drive will select the speed command to run the corresponding segment number based on the ON/OFF combination of the external DI (CMDx).

Table 6-26 DI Switching Running Description

Mode description	Running curve
◆ Continuous running with updated segment numbers ◆ The segment number is determined by the DI terminal logic ◆ The interval time between segments is determined by the	 X. Y: Segment number. The logical relationship between segment number and DI terminal is described below;

<table>
<tr><th>Mode description</th><th>Running curve</th></tr>
<tr><td>command delay time of the upper computer
◆ The multi segment position enable is effective for edge changes</td><td>A certain period of running time is not affected by the set value of the function code.
During the running of a certain speed command, if the segment number changes, immediately switch to a new segment number for running;
The actual rotational speed of the motor reaches the maximum operating speed set in this section, and the speed arrival signal is valid;
When the servo is enabled to be OFF during a certain section of running, the motor stops in the servo OFF mode (P02-05);</td></tr>
</table>

When the multi segment speed running mode is set to DI switching running, the four DI terminals of the servo drive must be configured for functions 6 to 9 (FunIN. 6 to FunIN.9Multi segment running command switching) and determine the valid logic for the DI terminal. At the same time, one DI terminal of the servo drive can be configured as function 5 (FunIN. 5: DIR-SEL, multi speed DI switching running direction setting) to switch the speed command direction.

☆Associated function code:

<table>
<tr><th>Code</th><th>Name</th><th>Function name</th><th>Function</th></tr>
<tr><td>FunIN.5</td><td>DIR-SEL</td><td>Multi-segment speed DI switching running direction setting</td><td>Used to set the speed command direction only in the multi segment speed DI switching mode:
Invalid - maintain the home command direction;
Valid - Command reverse.</td></tr>
<tr><td>FunIN.6</td><td>CMD1</td><td>Multi segment running command switching1</td><td rowspan="4">Multisegment segment numbers are 4-bit binary numbers, and the corresponding relationship between CMD1 to CMD4 and segment numbers is shown in the following table.
<table>
<tr><th>CMD4</th><th>CMD3</th><th>CMD2</th><th>CMD1</th><th>Segment No.</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td colspan="5">……</td></tr>
<tr><td>^1</td><td>1</td><td>1</td><td>1</td><td>16</td></tr>
</table>
When the input level of the DI terminal is valid, the CMD value is 1, otherwise it is 0</td></tr>
<tr><td>FunIN.7</td><td>CMD2</td><td>Multi segment running command switching2</td></tr>
<tr><td>FunIN.8</td><td>CMD3</td><td>Multi segment running command switching3</td></tr>
<tr><td>FunIN.9</td><td>CMD4</td><td>Multi segment running command switching4</td></tr>
</table>

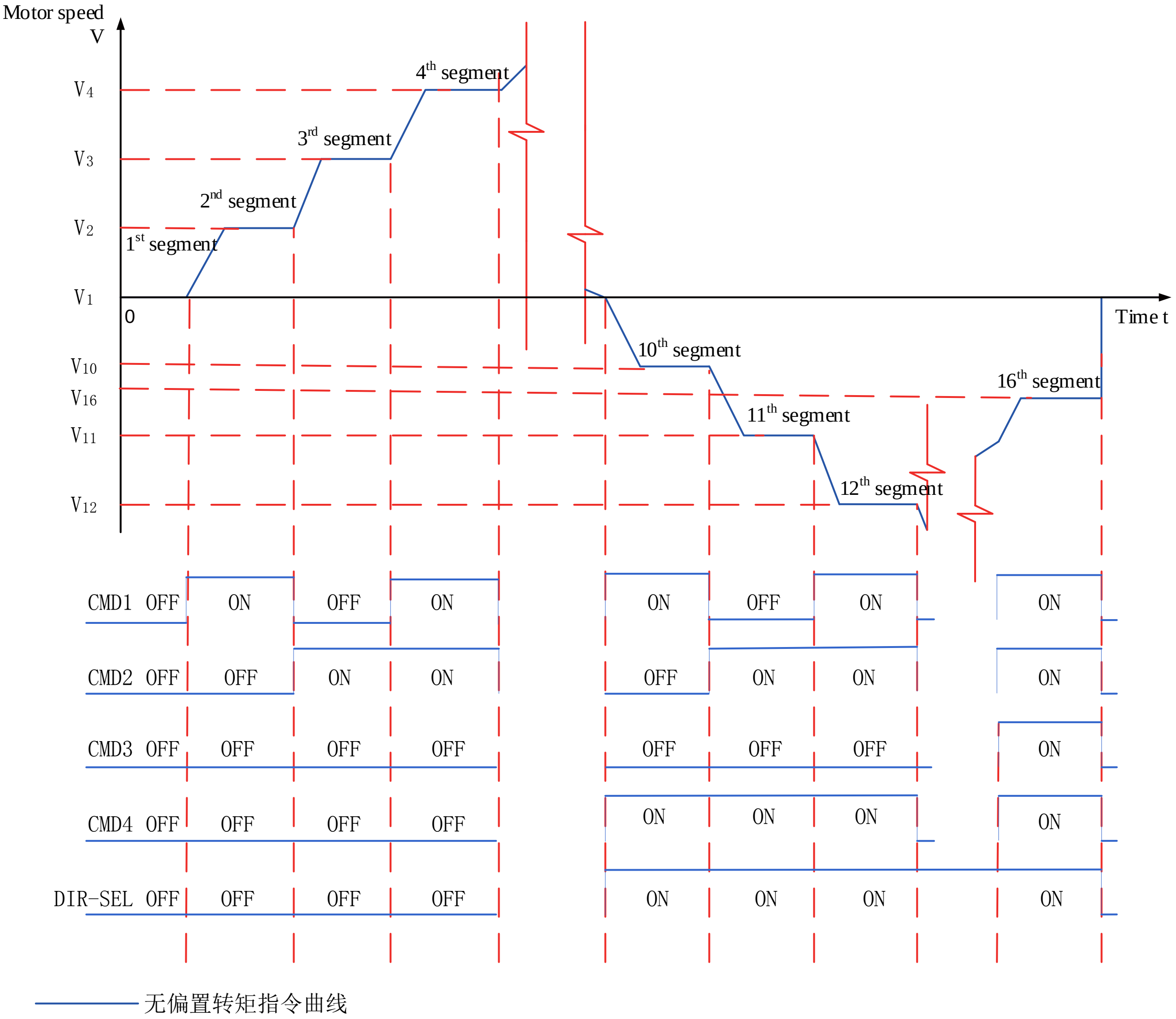


Figure 6-74 Example of Multisegment Speed Curve

②Multi-segment speed Running curve setting

Taking the 1st segment of speed command as an example, the relevant function codes are as follows:

☆Associated function code:

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P12-03	Acceleration time1	0～65535	ms	Set the acceleration and deceleration time of the 1st group	Shutdown setting	Effective immediately	10
P12-04	Deceleration time 1	0～65535	ms		Shutdown setting	Effective immediately	10
P12-09	Acceleration time 4	0～65535	ms	Set the acceleration and deceleration time of the 4th group	Shutdown setting	Effective immediately	150
P12-10	Deceleration time 4	0～65535	ms		Shutdown setting	Effective immediately	150
P12-20	Speed command of the 1st segment	-6000～6000	rpm	Set the speed command value of the 1st segment	Shutdown setting	Effective immediately	0
P12-21	Running time of the 1st segment command	0～6553.5	s(min)	Set the running time of the 1st segment of command	Shutdown setting	Effective immediately	5.0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P12-22	Acceleration and deceleration time of the 1st segment	Zero acceleration/ deceleration time Acceleration and deceleration time 1 Acceleration and deceleration time 2 Acceleration and deceleration time 3 Acceleration and deceleration time 4	-	Select the acceleration and deceleration mode of the 1st segment	Shutdown setting	Effective immediately	0

In addition to the command values of 1-16 segments and the command run time, there are four groups of acceleration and deceleration times to choose from among the multi segment speed command parameters. The default mode is no acceleration and deceleration time. Taking P12-01=1 single running end in multi segment speed as an example, the actual acceleration/deceleration time and running time are described as follows:

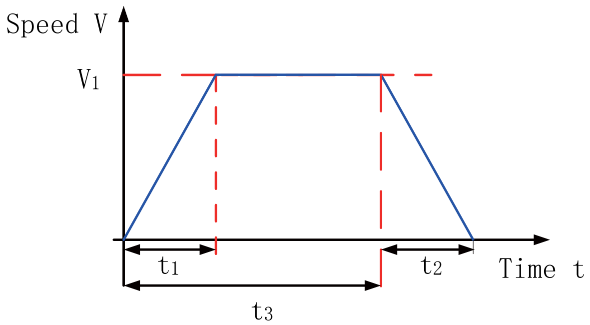


Figure 6-75 Example of Multisegment Speed Curve

As shown in the figure above, the speed command in this section is V_1, the actual acceleration time t_1 is:

$$t_1 = \frac{V_1}{1000} \times \text{Acceleration time set for this section of speed}$$

Actual deceleration time t_2:

$$t_2 = \frac{V_1}{1000} \times \text{The deceleration time set for this section of speed}$$

Running time: the shift time when the previous speed command is switched to this speed command+the constant speed running time of this section, as shown in the figure t_3.

c）A/B Switch Source

When "A/B switching" is selected for the speed command, that is, function code P06-02=3, it is necessary to assign the DI function FunIN. 4 to the corresponding DI terminal, and determine whether the current A command source input is valid or the B command source input is valid based on the input signal on this DI terminal.

☆Associated function code:

Code	Name	Function name	Function
FunIN.4	CMD-SEL	Switching of main and auxiliary running instructions	Invalid - current running command is A Valid - current running command is B

d）Communication given

When function code P06-02 is set to 4, the speed command value comes from the set value of function code P31-09, and the function code P31-09 must be modified through communication, making the control panel invisible.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P31-09	Communication given speed command	-6000.000 ～ 6000.000	rpm	Set the speed command value in the given form of communication with an accuracy of 0.001 rpm	running settings	Effective immediately	-

2) 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

1.29.2 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.

⚠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.

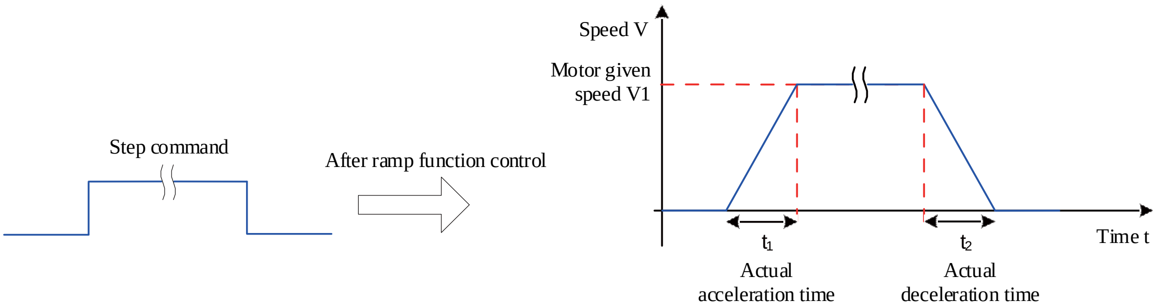


Figure 6-76 Schematic diagram of slope function definition

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:

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

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

☆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

1.29.3 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.

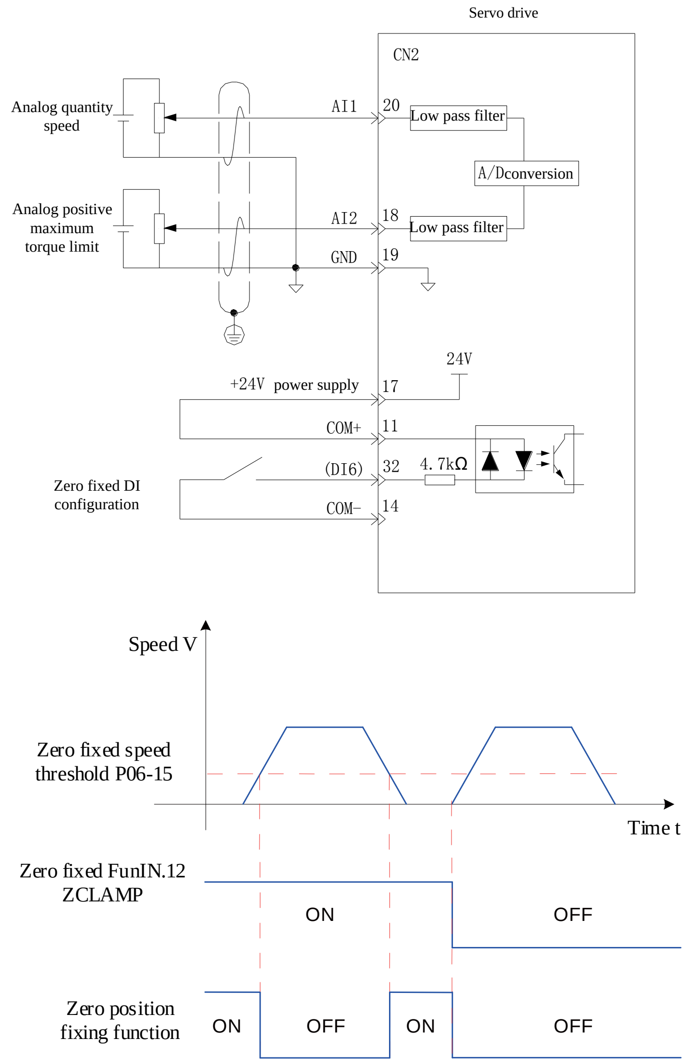


Figure 6-77 Wiring and Waveform Diagram for Zero Position Fixation

☆Associated function code:

Function	Name	Setting	Unit	Function	Setting	Effective time	Factory

code		range			method		setting
P06-15	Zero fixed speed threshold	0～6000	rpm	Set the speed threshold of the zero speed inlay function	running settings	Effective immediately	10

☆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

1.29.4 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.

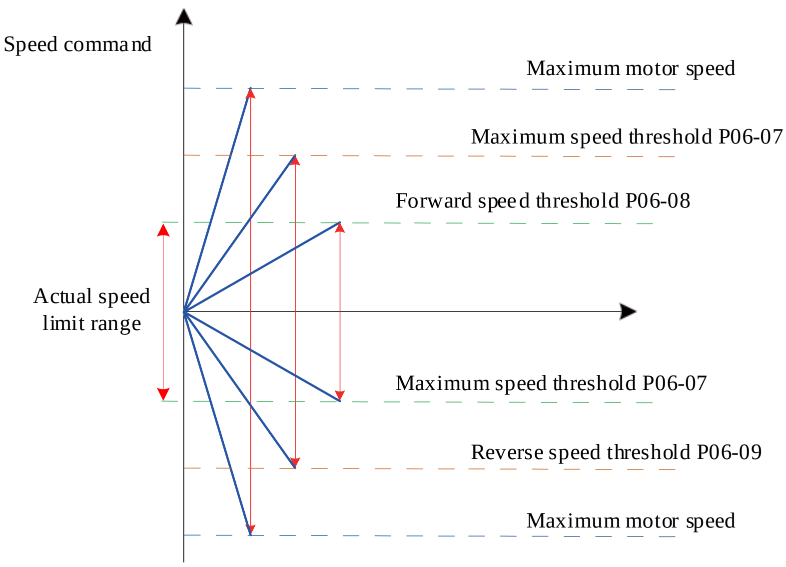


Figure 6-78 Example of Speed command limiting

The actual motor speed limit range meets the following requirements:

|Amplitude of forward speed command | ≤ min {maximum motor speed, P06-07, P06-08}

|Amplitude of negative rotational speed command | ≤ min {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

1.29.5 Speed dependent DO output function

After filtering the speed feedback value and comparing it with different thresholds, a DO signal can be output for use by the upper computer. The corresponding filtering time parameters are set by P0A-27.

1）Motor rotation signal DO output

When the absolute value of the filtered actual motor speed reaches P06-16 (motor rotation speed threshold), the motor can be considered to be rotating. At this time, the servo drive can output a motor rotation (FunOUT. 2: TGON) signal to confirm that the motor has rotated. On the contrary, when the absolute value of the actual rotational speed of the filtered motor is less than P06-16, it is considered that the motor is not rotating.

The judgment of the motor rotation (FunOUT. 2: TGON) signal is not affected by the drive operation status and control mode.

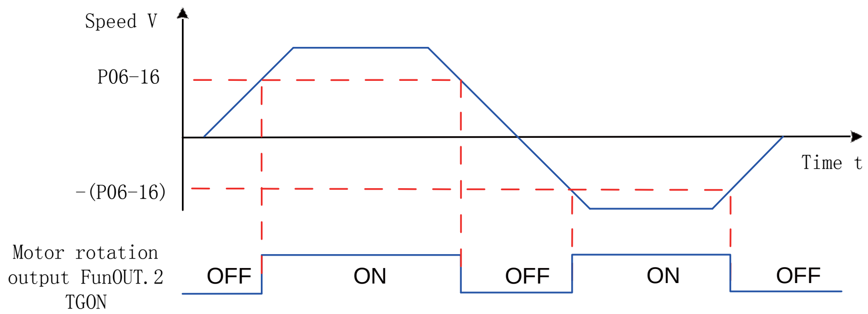


Figure 6-79 Waveform Diagram of Motor Rotation Signal

NOTE

- In the figure above, ON indicates that the motor rotation DO signal is valid, and OFF indicates that the motor rotation DO signal is invalid.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-16	Motor rotation speed threshold	0～1000	rpm	Set the motor rotation signal determination threshold	running settings	Effective immediately	20

When using the motor rotation signal output function, one DO terminal of the servo drive should be assigned as DO function 2 (FunOUT. 2: TGon, motor rotation), and the valid logic for the DO terminal should be determined.

☆Associated function code:

Code	Name	Function name	Description
FunOUT.2	TGon	Motor rotation	Invalid, after filtering, absolute value of motor speed is less than the set value of function code P06-16

			Valid, after filtering, the absolute value of motor speed reaches the set value of function code P06-16

2）Speed coincidence signal DO output

In the speed control mode, when the absolute value of the deviation between the actual rotational speed of the servo motor and the speed command after filtering meets a certain threshold (P06-17), it is considered that the actual rotational speed of the motor has reached the set value of the speed command. At this time, the drive can output a speed consistent (FunOUT. 4: V-Cmp) signal. On the contrary, if the absolute value of the deviation between the actual rotational speed of the servo motor and the speed command after filtering exceeds this threshold value, the speed coincidence signal is invalid.

When the drive is in a non running state or non speed control mode, the speed consistent (FunOUT. 4: V-Cmp) signal is always invalid.

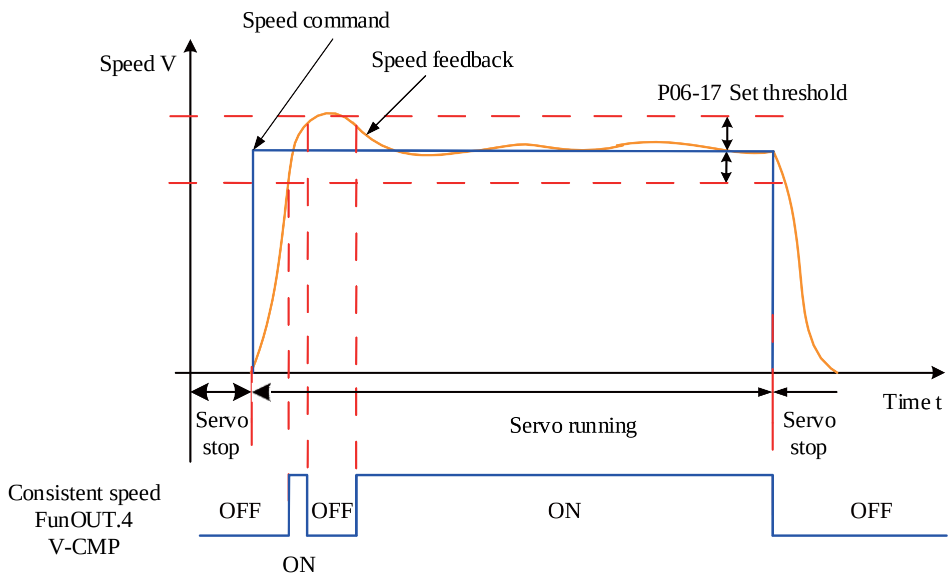
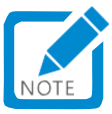


Figure 6-80 Waveform Diagram of Speed Consistent Signal



- In the figure above, ON indicates that the speed consistent DO signal is valid, and OFF indicates that the speed consistent DO signal is invalid.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-17	Speed consensus signal threshold	0～100	rpm	Set speed consensus signal threshold	running settings	Effective immediately	10

When using the speed consistent signal output function, one DO terminal of the servo drive should be assigned as DO function 4 (FunOUT. 4: V-Cmp, speed consistent), and the valid logic for the DO terminal should be determined.

☆Associated function code:

Code	Name	Function name	Description
FunOUT.4	V-Cmp	Speed is consistent	Invalid, the absolute value of the deviation between the actual motor

			speed and the speed command after filtering is greater than the function code P06-17 Valid, the absolute value of the deviation between the actual motor speed and the speed command after filtering is not greater than the function code P06-17

3）Speed arrival signal DO output

When the absolute value of the actual rotational speed of the servo motor after filtering exceeds a certain threshold value (P06-18), it is considered that the actual rotational speed of the servo motor reaches the expected value, and at this time, the servo drive can output a speed reaching (FunOUT. 19: V-Arr) signal. Conversely, if the absolute value of the actual rotational speed of the servo motor after filtering is not greater than this value, the speed arrival signal is invalid.

The judgment of the speed arrival (FunOUT. 19: V-Arr) signal is not affected by the operating status and control mode of the drive.

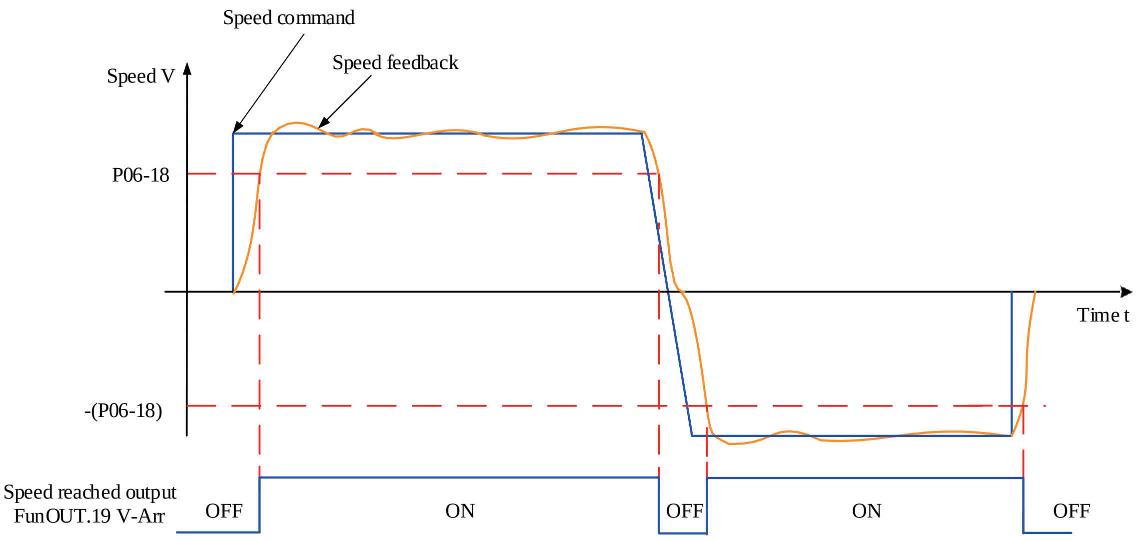


Figure 6-81 Waveform of Speed Arrival Signal

NOTE

- In the figure above, ON represents that the speed arrival DO signal is valid, and OFF represents that the speed arrival DO signal is invalid.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-18	Speed reaches signal threshold	10～6000	rpm	Set the speed to reach signal determination threshold	running settings	Effective immediately	1000

When using the motor rotation signal output function, one DO terminal of the servo drive should be assigned as DO function 19 (FunOUT. 19: V-Arr, speed arrival), and the valid logic for the DO terminal should be determined.

☆Associated function code:

Code	Name	Function name	Description
FunOUT.19	V-Arr	Speed reached	Invalid, the absolute speed feedback value of the filtered motor is

			greater than function code P06-18 Valid, the absolute speed feedback value of the filtered motor is not greater than function code P06-18

d

4）Zero speed signal DO output

When the absolute value of the actual rotational speed of the servo motor is less than a certain threshold (P06-19), it is considered that the actual rotational speed of the servo motor is close to standstill, and the servo drive can output a zero speed (FunOUT. 3: V-Zero) signal. Conversely, if the absolute value of the actual rotational speed of the servo motor is not less than this value, it is considered that the motor is not in a static state and the zero speed signal is invalid.

The judgment of the zero speed (FunOUT. 3: V-Zero) signal is not affected by the operating status and control mode of the drive.

When there is interference in the speed feedback, it can be filtered out through the speed feedback DO filter, and the corresponding filtering time parameters are set by P0A-27.

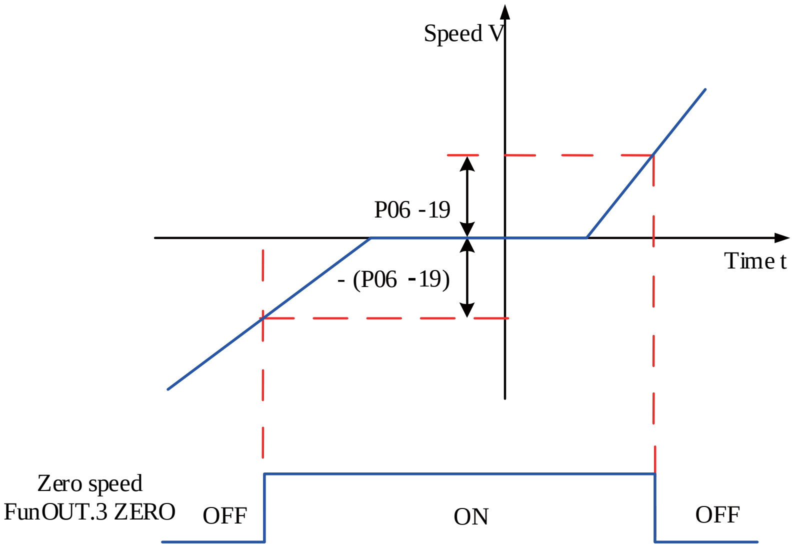


Figure 6-82 Waveform of Zero Speed Signal

NOTE

- In the figure above, ON indicates that the zero speed DO signal is valid, and OFF indicates that the zero speed DO signal is invalid.

☆Associated function code：

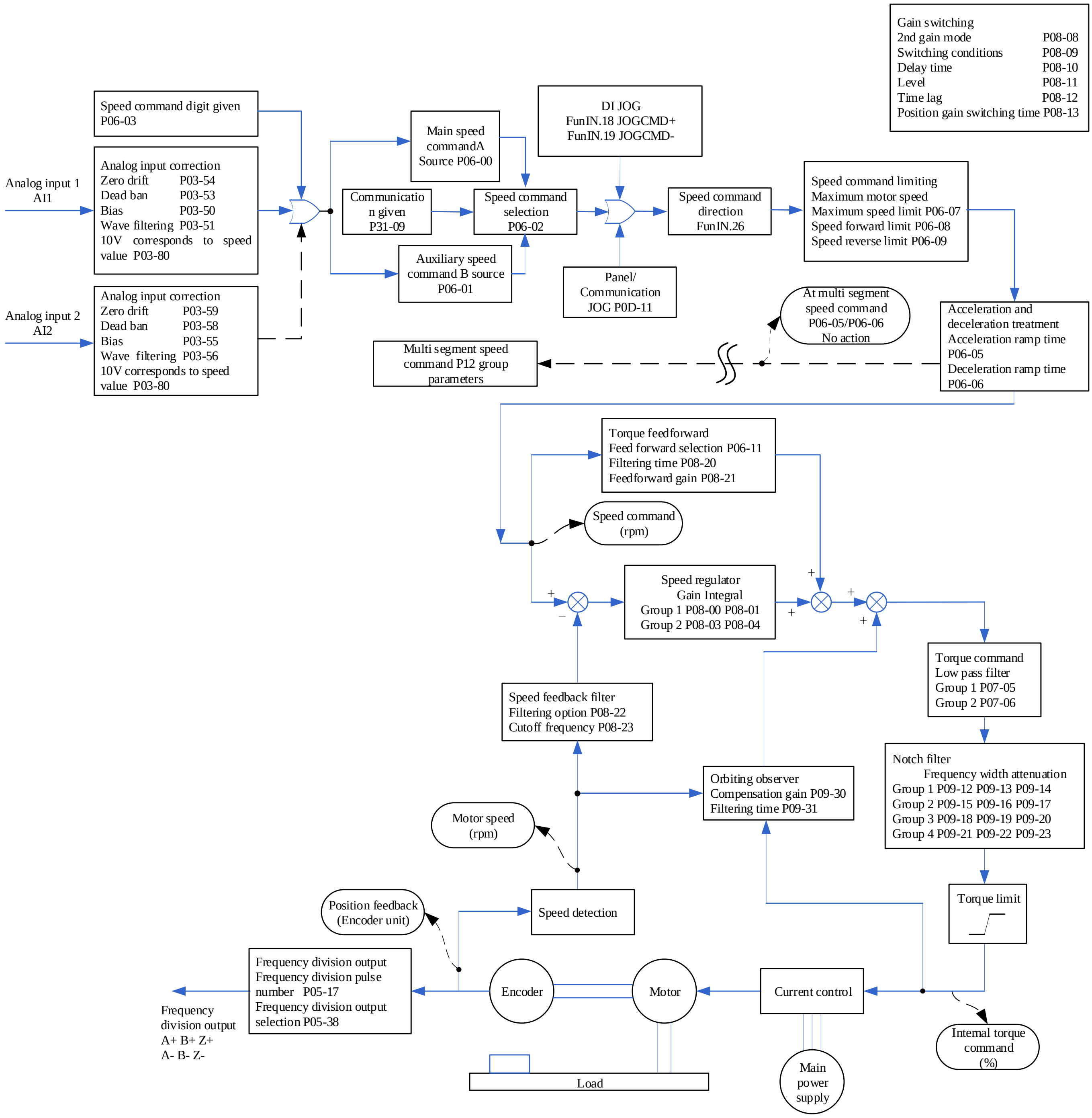
Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P06-19	Zero speed output signal threshold	1～6000	rpm	Set the zero speed output signal determination threshold	running settings	Effective immediately	10

When using the motor zero speed signal output function, one DO terminal of the servo drive should be assigned as DO function 3 (FunOUT. 3: V-Zero, zero speed), and the valid logic for the DO terminal should be determined.

☆Associated function code:

Code	Name	Function name	Description
FunOUT.3	V-Zero	zero-speed	Invalid, when the difference between the motor speed feedback and the given value is greater than the value set by function code P06-19 Valid, when the difference between the speed feedback of the motor and the given value is not greater than the value set by function code P06-19

1.29.6 Speed control mode function code block diagram



1.30 Torque control mode

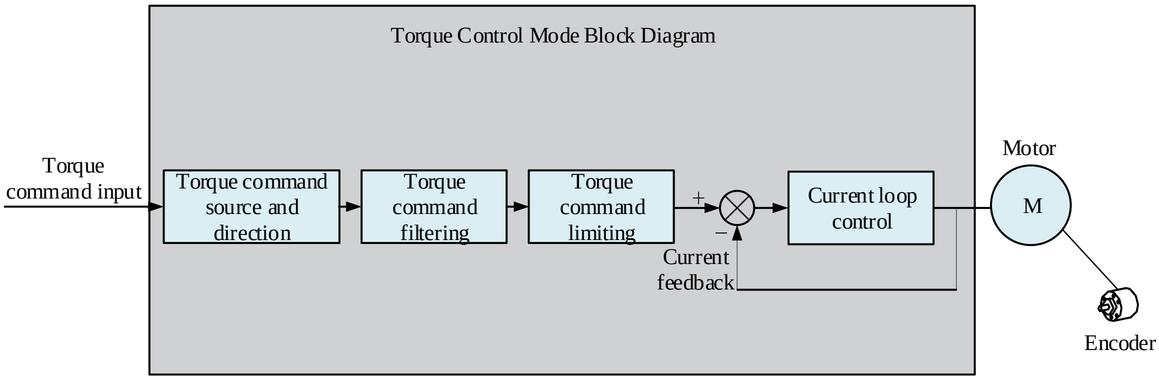


Figure 6-83 Torque Control Block Diagram

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.

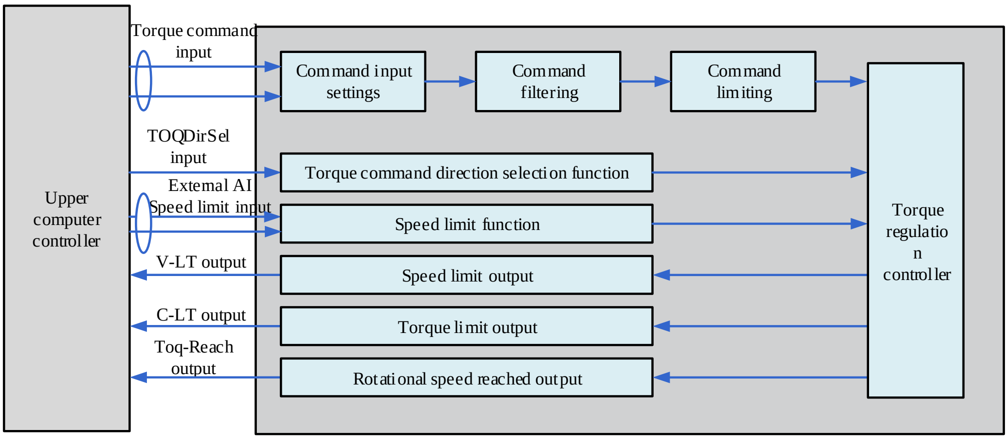


Figure 6-84 Signal Interaction Diagram between Servo Drive and Host Computer

1.30.1 Torque command input setting

1）Torque command source

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

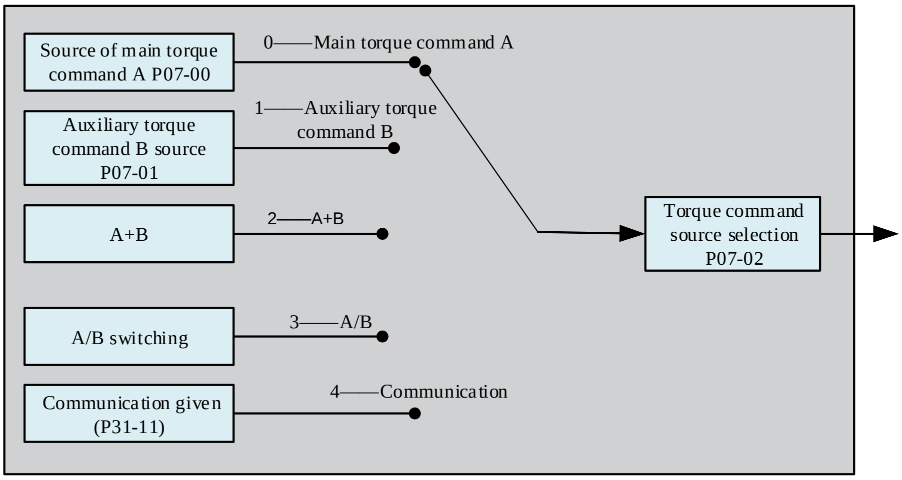


Figure 6-85 Torque command source diagram

☆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

a）Source of main torque command A

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

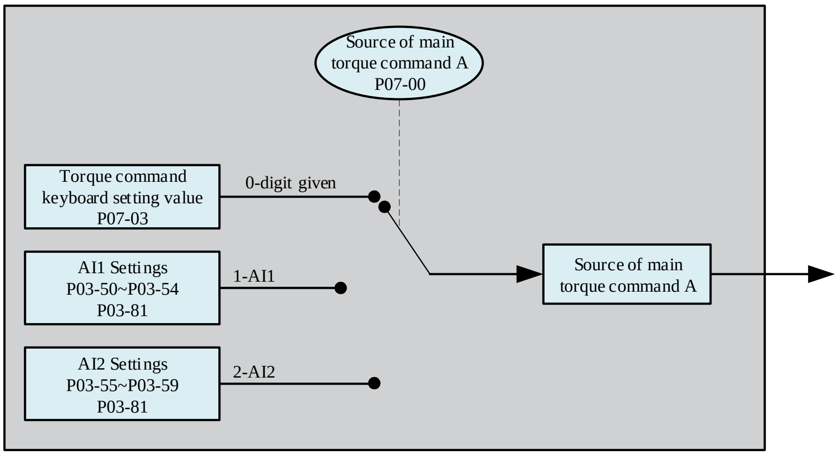


Figure 6-86 Source Description of Main Torque Command A

☆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

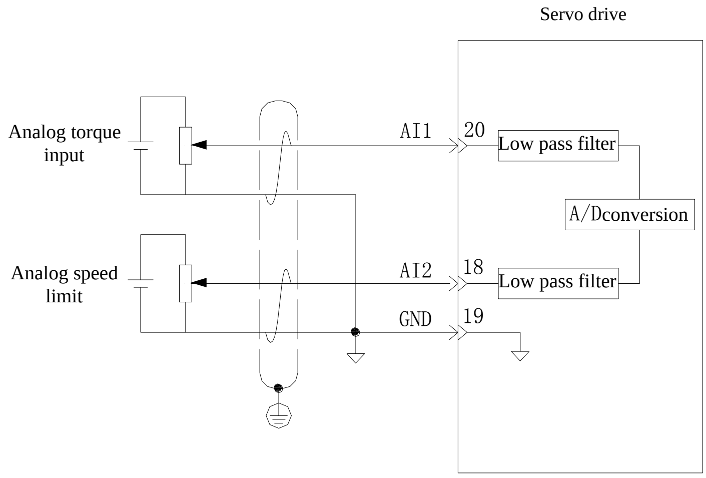
②Analog voltage setting

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 ±10Vdc and an input impedance of about 9k Ω.

Analog input circuit:



●Operation method：

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

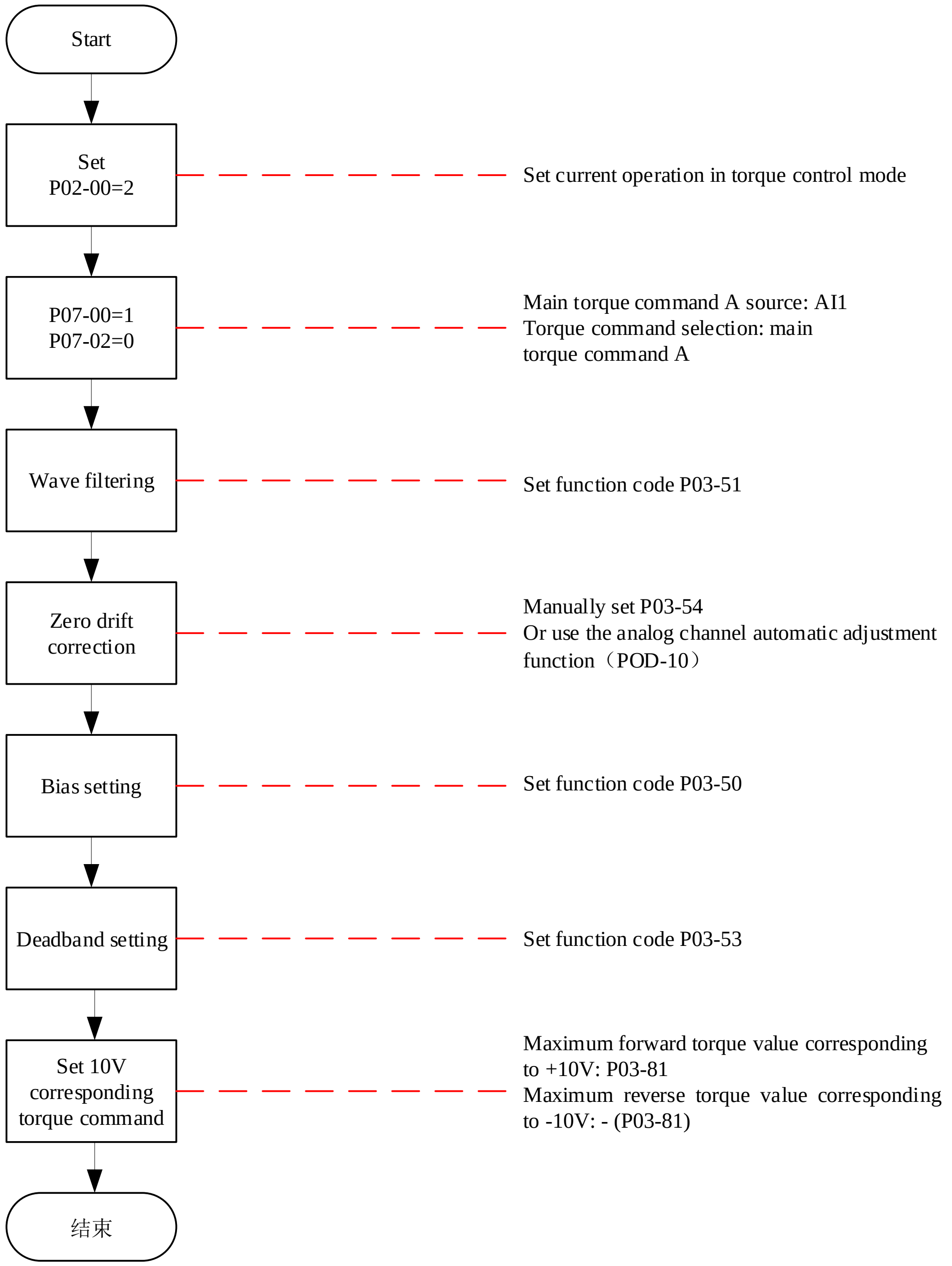


Figure 6-87 Analog Voltage Torque Command Operation Flow Chart

★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 Figure6-85y_1,. After internal processing by the servo drive, the torque command $y_6$is finally obtained.

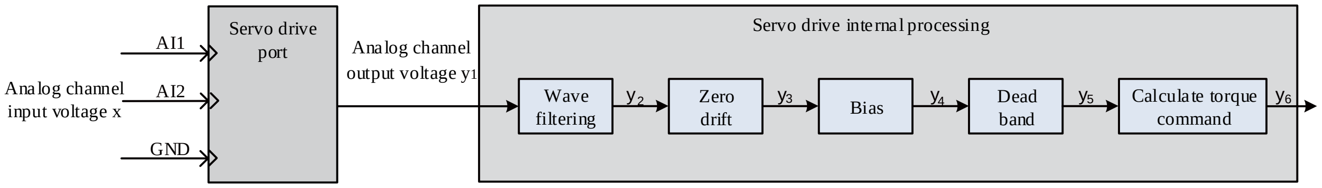


Figure 6-88 Servo drive AI processing flow

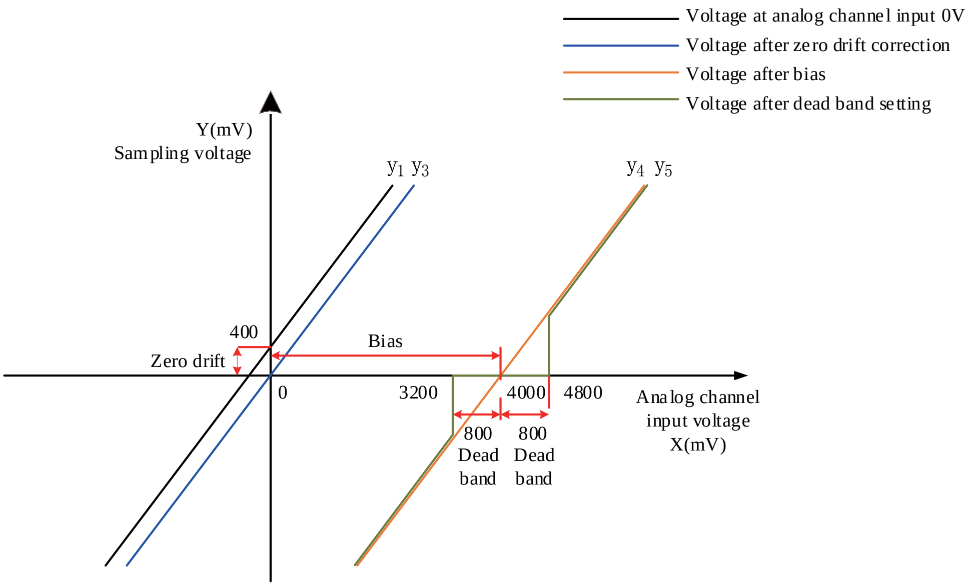


Figure 6-89 Example of servo drive AI processing corresponding sampling voltage

●Filtering：

The servo drive provides an analog channel filtering function. By setting the filtering time constant P03-51, it can prevent motor command fluctuations caused by unstable analog input voltage, and also reduce motor misoperation caused by interference signals. The filtering function has no effect on eliminating or suppressing zero drift and dead bands.

●Zero drift correction:

When the actual input voltage is corrected to be 0V, the analog channel output voltage deviates from the value of 0V.

In the figure, the analog channel output voltage without internal processing by the drive is shown in y_1. Taking the filtering time constant P03-51=0.00ms as an example, the filtered sampling voltage y_2 is consistent with y_1.

It can be seen that when the actual input voltage x=0, the output voltage y_1=400mV, which is called zero drift.

Manually set P03-54=400.0 (mV), and after zero drift correction, the sampling voltage is shown in y_3. $y_3=y_1-400.0$

The zero drift can also be automatically corrected through the analog channel automatic adjustment function (P0D-10).

●Offset settings:

Set the corresponding actual input voltage value when the sampling voltage is 0.

As shown in the figure, when the preset sampling voltage y_3=0, the corresponding actual input voltage x=4000mV, which is called bias.

Manually set P03-50=4000 (mV), and after bias, the sampling voltage is shown in y4. $y_4=y_3+4000$

●Deadband correction:

Define the valid input voltage range when the drive sampling voltage is not 0.

After the bias setting is completed, when the input voltage x is within 3200mv and 4800mv, the sampling voltage value is both 0, and this 800mV is called the dead band.

Set P03-53=800, and after dead band correction, the sampling voltage is as shown in y_5.

$$y_5=\begin{cases}0 & 3200\leqslant x\leqslant 4800\\ y_4 & 4800< x\leqslant 10000\text{或}-10000\leqslant x< 3200\end{cases}$$

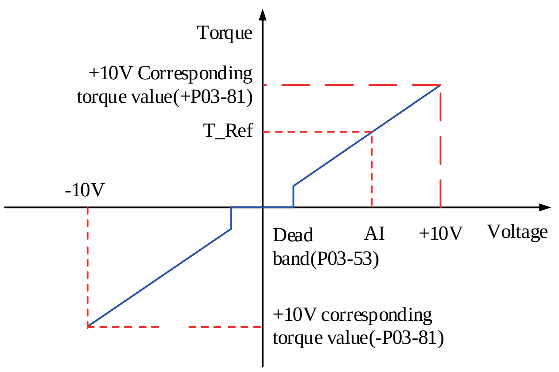
●Compute speed command：

After setting zero drift, bias, and dead band, it is necessary to set the corresponding torque command value of 10V (10000mV) in the sampling voltage through P03-81, and the actual torque command y_6:

$$y_6=\frac{y_5}{10000}\times\text{（P03-81）}$$

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.



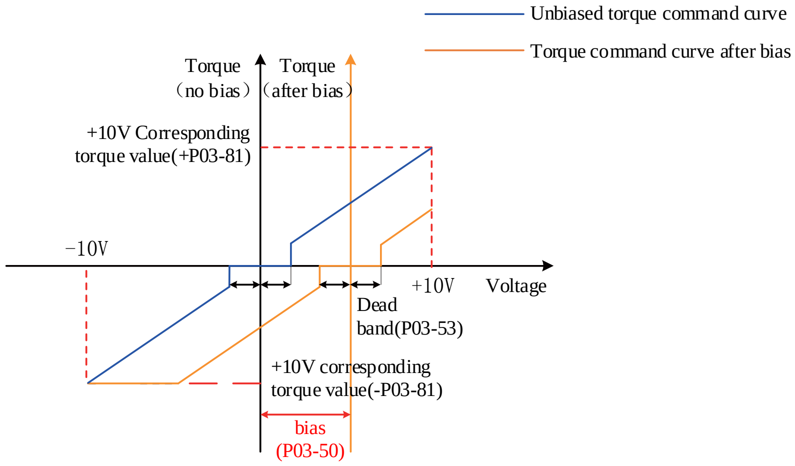


Figure 6-90 Schematic Diagram of Unbiased AI2 Figure 6-91 Schematic Diagram of AI2 After Biasing

Relationship between final torque command value y_6 and input voltage x:

$$y_6=\begin{cases}0 & B-C\leq x\leq B+C\\ (x-B)\times\dfrac{P03-80}{10} & B+C< x\leq 10000\ or\ -10000\leq x< B-C\end{cases}$$

Where: B: Offset; C: Deadband.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P03-50	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
P0D-10	Automatic adjustment of analog channel	0: No action 1: AI1 adjustment	-	Analog quantity AI1, AI2 channel zero drift automatic correction enable	Shutdown setting	Effective immediately	0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
		2: AI2 adjustment					

- When selecting to use the analog quantity AI2 input channel, its setting method is similar to the above analog quantity AI1 setting method. For relevant function codes, please refer to the description of P03-50～P03-59function codes in Chapter 8.

b)Auxiliary torque command B source

The usage method of auxiliary torque command B source is the same as that of main torque command A. For parameter details, see "Group P07: Torque control parameters" in Chapter 8.

c）A/B switching source

When the torque command selects "A/B switching", that is, function code P07-02=3, it is necessary to assign the DI function FunIN. 4 to the corresponding DI terminal, and determine whether the current A command source input is valid or the B command source input is valid based on the input signal on this DI terminal.

☆Associated function code:

Code	Name	Function name	Description
FunIN.4	CMD-SEL	Operation command switching	OFF - The current running command is A ON - The current running command is B

d）Communication given

When the function code P07-02 is set to 4, the Torque command source is set at the value of the function code P31-11, and the function code P31-11 must be modified through communication, making the control panel invisible.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P31-11	Communication given torque command	-100.000～100.000	%	Set the torque command value in the form of Communication given with an accuracy of 0.001%	running settings	Effective immediately	-

2)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).

Table 6-28 Setting of Actual Rotation Direction of Motor in Torque Control Mode

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

1.30.2 Torque command filtering

⚠Caution:

- If the set value of the filtering time constant is too large, it will reduce responsiveness. Please confirm the responsiveness while setting it!

In position, speed, torque, and hybrid control modes, the servo drive can achieve low-pass filtering of torque commands, making the commands smoother and reducing vibration.

The servo drive provides two torque command low-pass filters, using filter 1 by default;

Use the gain switching function (P08-08=1 and P08-09 ≠ 0) to switch to filter 2 when the conditions set for P08-09 are met.

☆Associated function code:

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P07-05	Torque command filtering time constant	0～30.00	ms	Set the low-pass filtering time constant of the 1st group of torque commands	running settings	Effective immediately	0.79
P07-06	Second torque command filtering time constant	0～30.00	ms	Set the low-pass filtering time constant of the 2nd group of torque commands	running settings	Effective immediately	0.79

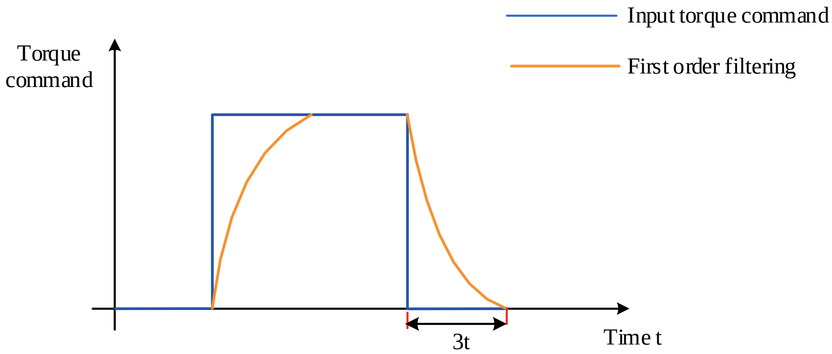


Figure 6-92 Schematic diagram of rectangle torque command first order filtering

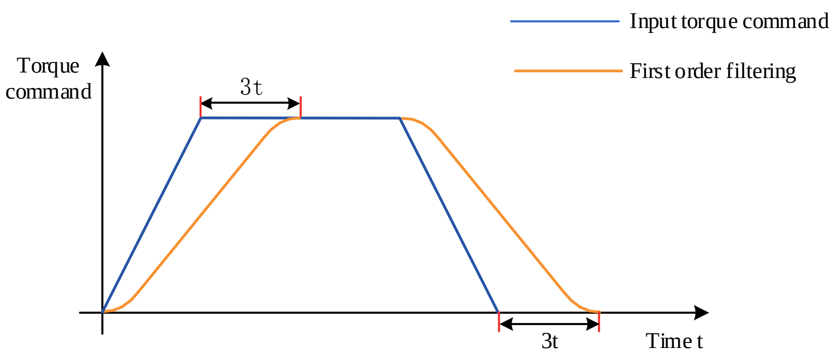


Figure 6-93 Schematic diagram of trapezoidal torque command first order filtering

1.30.3 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.

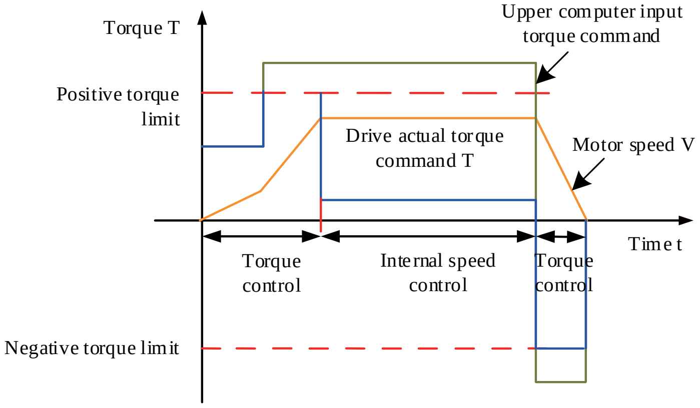


Figure 6-94 Torque setting and torque limiting

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 ± 300.0% of the rated torque.

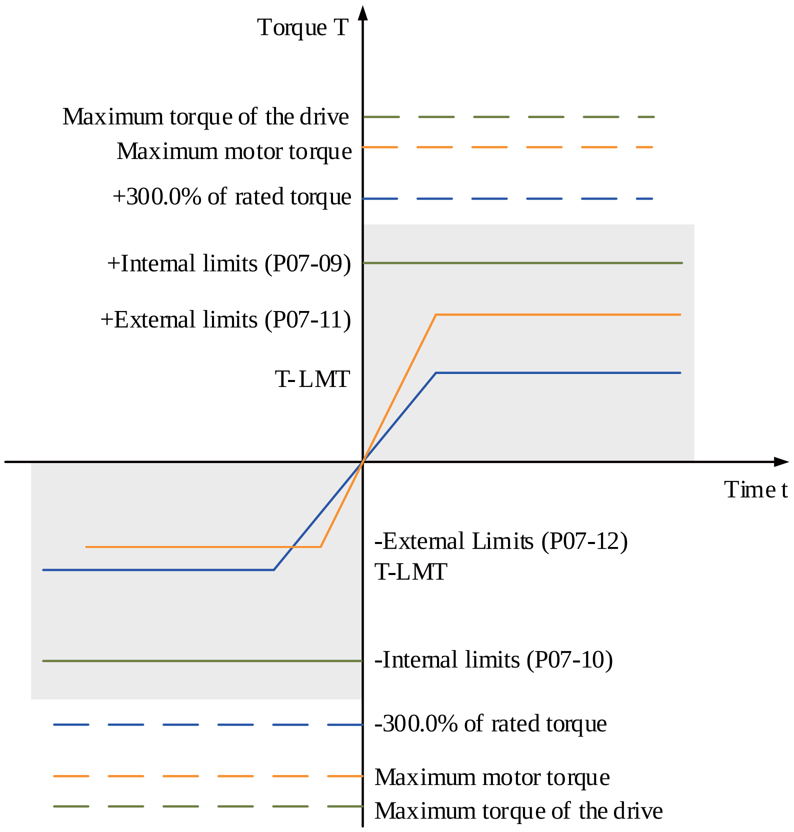


Figure 6-95 Example of torque limitation

1）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

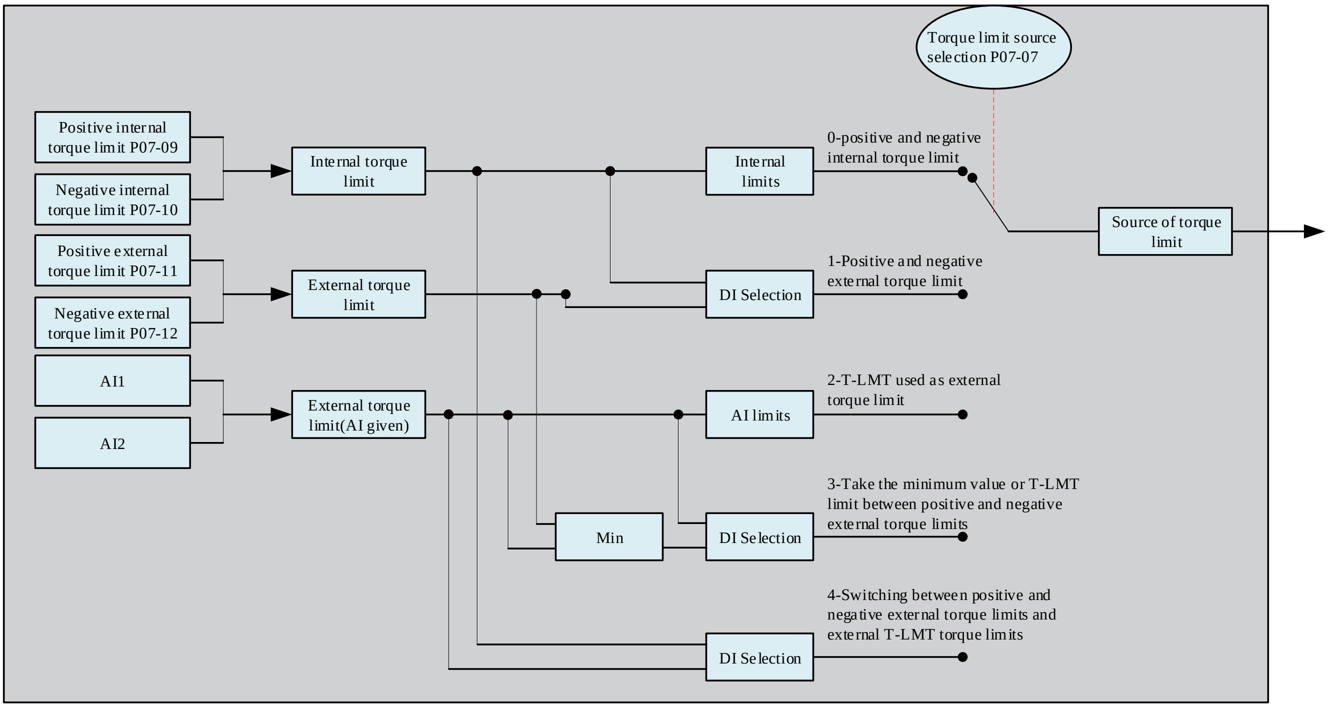


Figure 6-96 Source of torque limit

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.

a) P07-07=0: Positive and negative internal torque limit

The Torque command limit value is only determined by internal function codes P07-09 and P07-10.

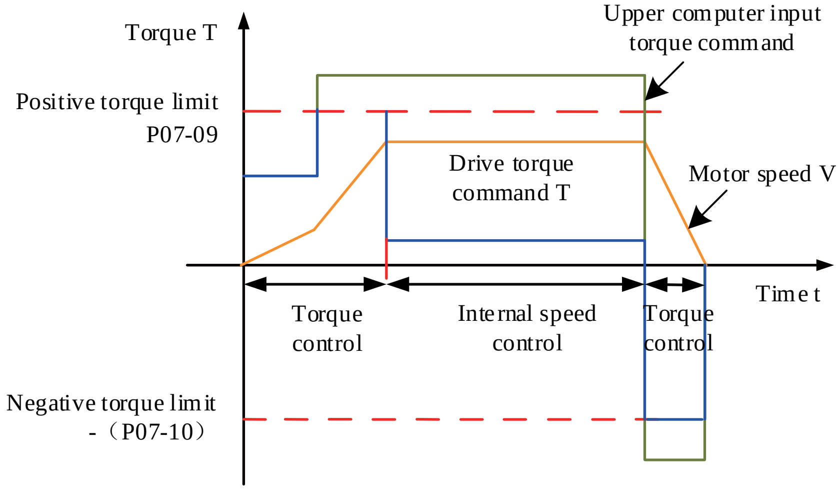


Figure 6-97 P07-07=0 Torque Limit Curve

b）P07-07=1: Positive and negative external torque limit

The Torque command limit value is selected based on the logical state of the external DI signal. The positive torque limit value is selected between function codes P07-09 and P07-11; The negative torque limit value is selected between function codes P07-10 and P07-12.

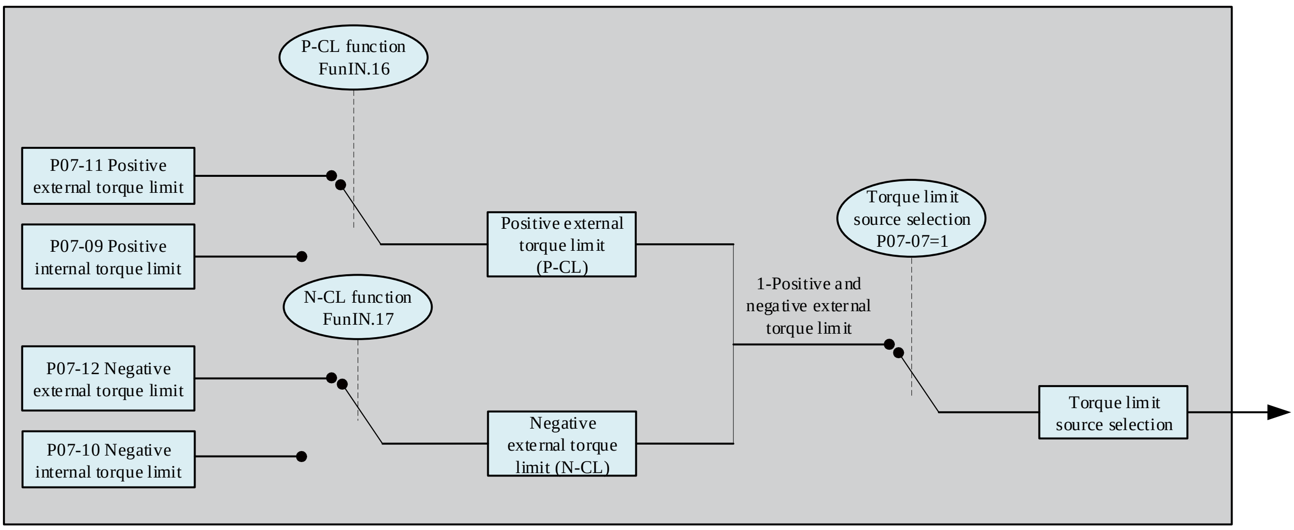
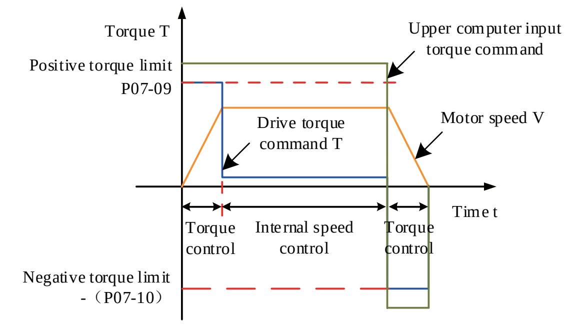
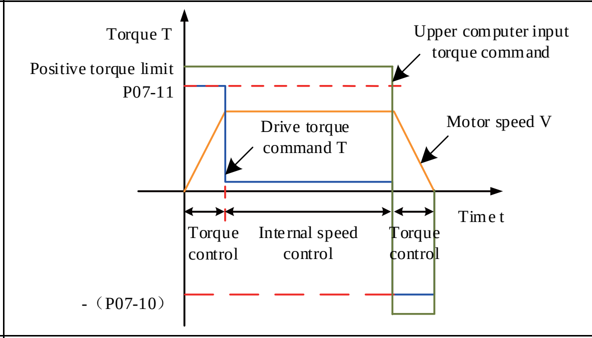
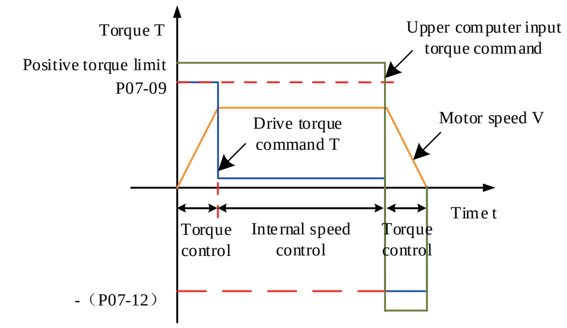
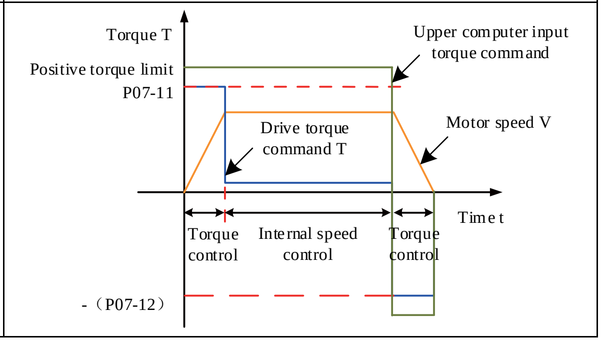


Figure 6-98 P07-07=1 Source of torque limit

Table 6-29 P07-07=1 Description

<table>
<tr><td rowspan="2" colspan="2">DI function status</td><td colspan="2">P-CL</td></tr>
<tr><td>OFF</td><td>ON</td></tr>
<tr><td rowspan="2">N-CL</td><td>OFF</td><td>
</td><td>
</td></tr>
<tr><td>ON</td><td>
</td><td>
</td></tr>
</table>

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:

<table>
<tr><th>Code</th><th>Name</th><th>Function name</th><th>Description</th></tr>
<tr><td>FunIN.16</td><td>P-CL</td><td>Positive external torque limit</td><td>Switch the torque limiting source according to the selection in P07-07.
When P07-07=1:
Valid: Forward rotation external torque limit is valid; Invalid: Forward internal torque limit is valid.
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.
When P07-07=4:
Valid: AI torque limit is valid; Invalid: Forward internal torque limit is valid.</td></tr>
<tr><td>FunIN.17</td><td>N-CL</td><td>Negative external torque limit</td><td>Switch the torque limiting source according to the selection in P07-07.
When P07-07=1:
Valid: The reverse external torque limit is valid; Invalid: The reverse internal torque limit is valid.
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.
When P07-07=4: Valid: AI torque limit is valid; Invalid: The reverse internal torque limit is valid.</td></tr>
</table>

c）P07-07=2: External T-LMT torque limit

After selecting an external analog channel according to P07-08, the Torque command limit value is determined by the torque value corresponding to the input voltage of the AI terminal.

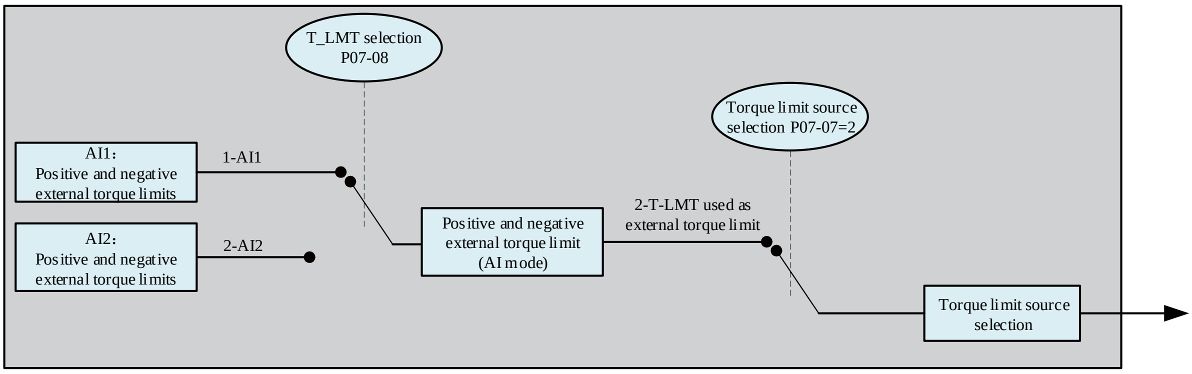


Figure 6-99 P07-07=2 Source of torque limit

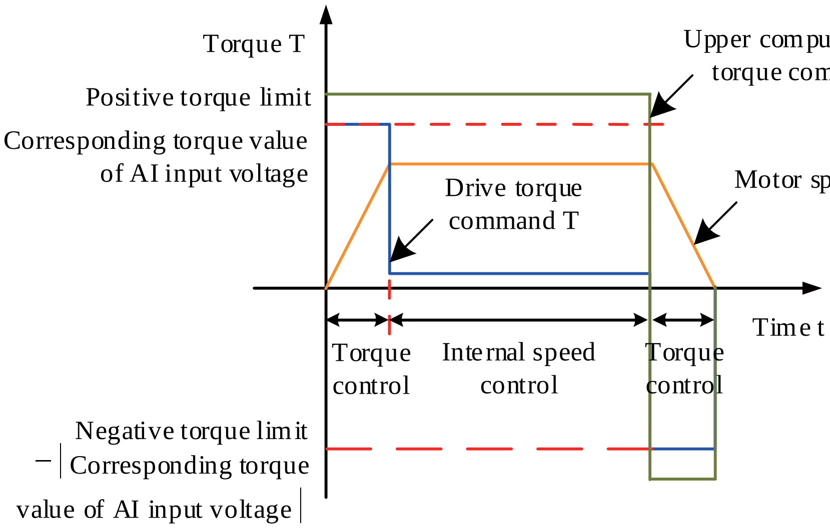


Figure 6-100 P07-07=2 Torque Limit Curve

For the settings of analog input terminals AI1 and AI2, please refer to the parameter descriptions for P03-50～P03-54 and P03-81in Chapter 8, and set the corresponding relationship between torque and analog voltage.

d）P07-07=3: Take the minimum value of positive and negative external torque limits and external T-LMT as the torque limit

Positive torque limit: After selecting an external analog channel according to P07-08,

When the external DI signal (P-CL) logic is invalid, the positive torque limit value is determined by the torque value corresponding to the input voltage of the external AI terminal;

When the external DI signal (P-CL) logic is valid, the positive torque limit value is determined by the smaller of the torque values corresponding to the function code P07-11 and the AI terminal input voltage.

Negative torque limit: After selecting an external analog channel according to P07-08,

When the external DI signal (N-CL) logic is invalid, the negative torque limit value is determined by the torque value corresponding to the input voltage of the external AI terminal;

When the external DI signal (N-CL) logic is valid, the negative torque limit value is determined by the smaller of the torque values corresponding to the function code P07-12 and the AI terminal input voltage.

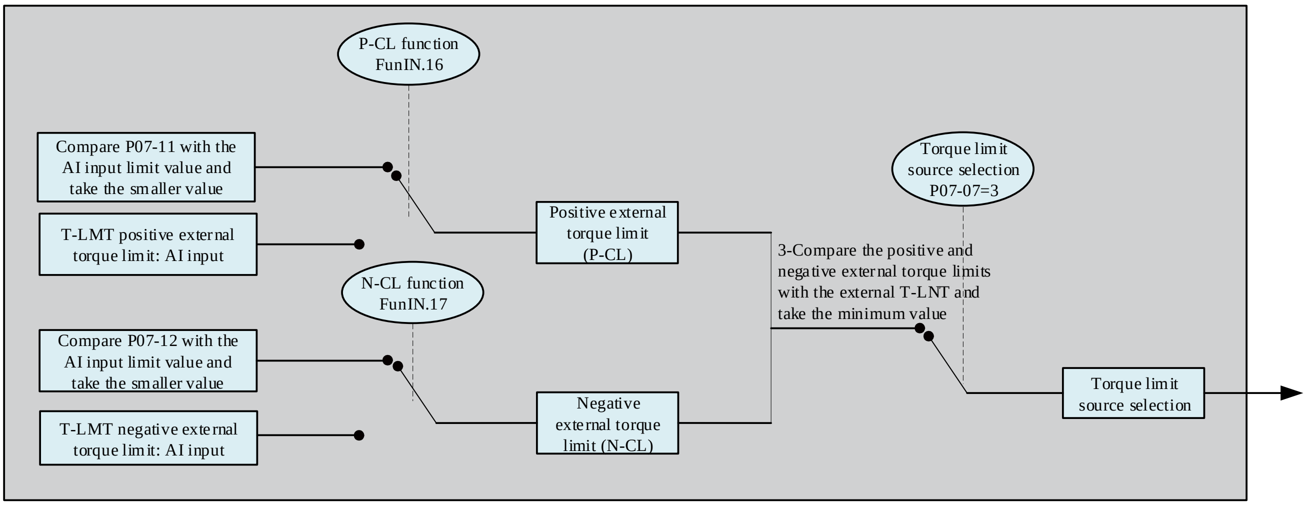
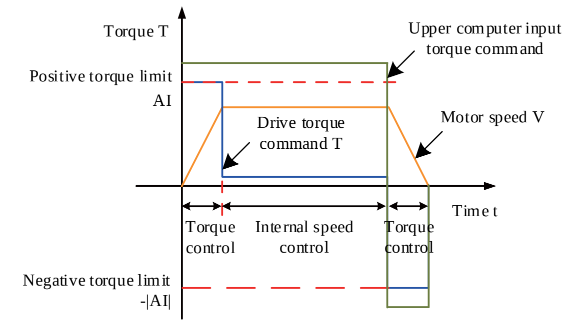
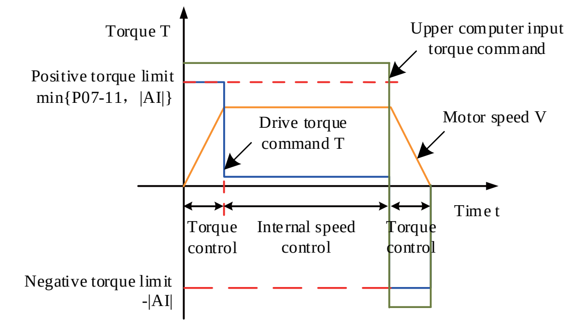
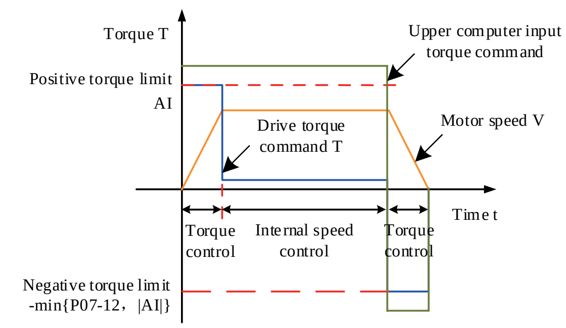
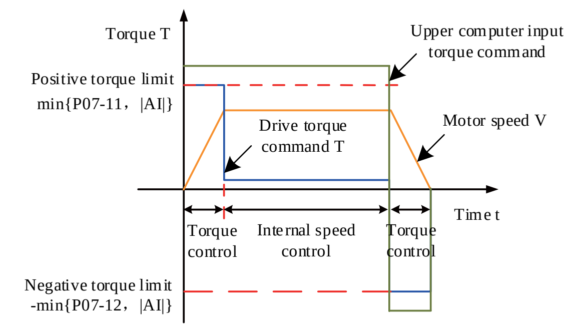


Figure 6-101 P07-07=3 Source of torque limit

Table 6-30 P07-07=3 Description

<table>
<tr><td colspan="2" rowspan="2">DI function status</td><td colspan="2">P-CL</td></tr>
<tr><td>OFF</td><td>ON</td></tr>
<tr><td rowspan="2">N-CL</td><td>OFF</td><td>
</td><td>
</td></tr>
<tr><td>ON</td><td>
</td><td>
</td></tr>
</table>

e）P07-07=4: Switching between positive and negative internal torque limits and external T-LMT torque limits

Positive torque limit: After selecting an external analog channel according to P07-08,

When the external DI signal (P-CL) logic is invalid, the positive torque limit value is determined by function code P07-09;

When the external DI signal (P-CL) logic is valid, the positive torque limit value is determined by the torque value corresponding to the input voltage at the AI terminal.

Negative torque limit: After selecting an external analog channel according to P07-08,

When the external DI signal (N-CL) logic is invalid, the negative torque limit value is determined by function code P07-10;

When the external DI signal (N-CL) logic is valid, the negative torque limit value is determined by the torque value corresponding to the input voltage at the AI terminal.

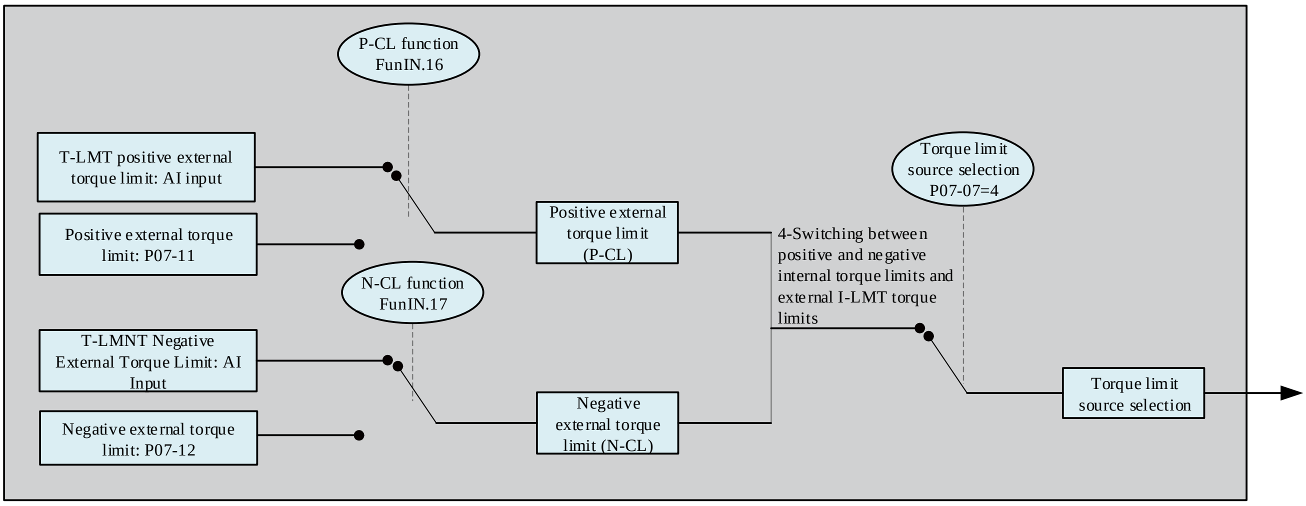
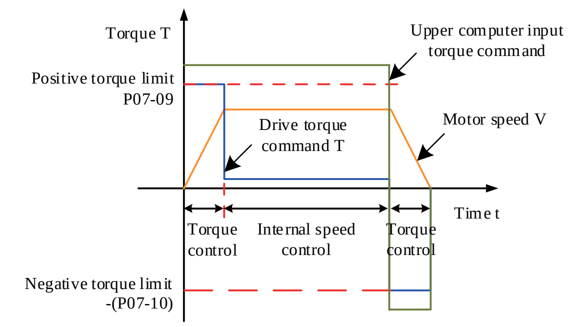
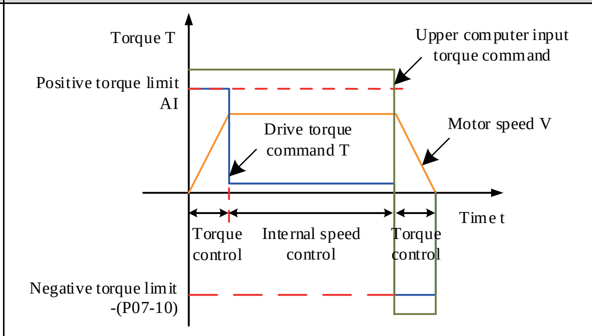
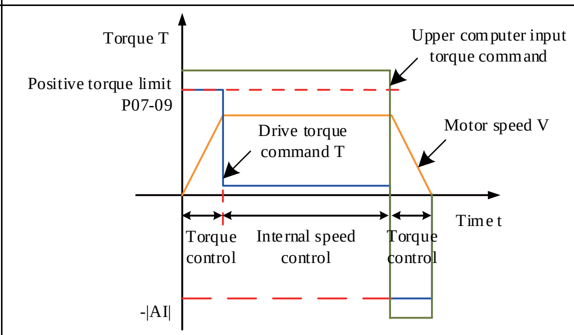
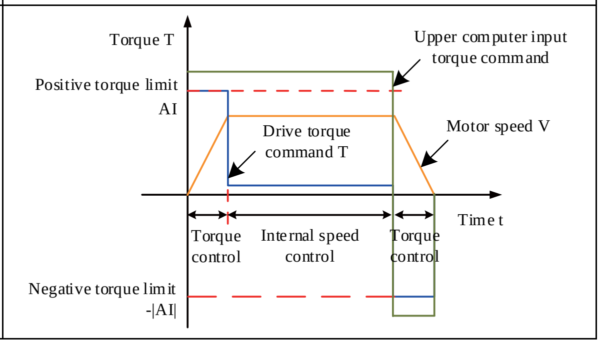


Figure 6-102 P07-07=4 Torque Limit Source

Table 6-31 P07-07=4 Description

DI function status		P-CL OFF	P-CL ON
N-CL	OFF		
	ON		

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P07-08	T-LMT selection	1：AI1 2：AI2	-	Select the analog input channel of the torque limit signal	Shutdown setting	Effective immediately	2
P07-09	Positive internal torque limit	0～300.0	%	Set internal positive and negative torque limits (100% corresponds to 1 time of rated torque)	Shutdown setting	Effective immediately	300.0
P07-10	Negative internal torque limit	0～300.0	%		Shutdown setting	Effective immediately	300.0
P07-11	Positive external torque limit	0～300.0	%	Set external positive and negative torque limits (100% corresponds to 1 time of rated torque)	Shutdown setting	Effective immediately	300.0
P07-12	Negative external torque limit	0～300.0	%		Shutdown setting	Effective immediately	300.0

2)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	Valid: The drive torque command reaches the torque limit value and is limited to the limit value Invalid: The drive torque command does not reach the limit value

1.30.4 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.

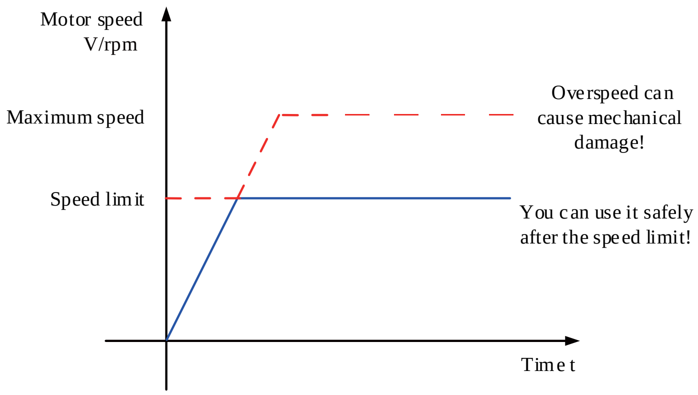


Figure 6-103 Schematic Diagram of Torque Mode Speed Limit

1）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

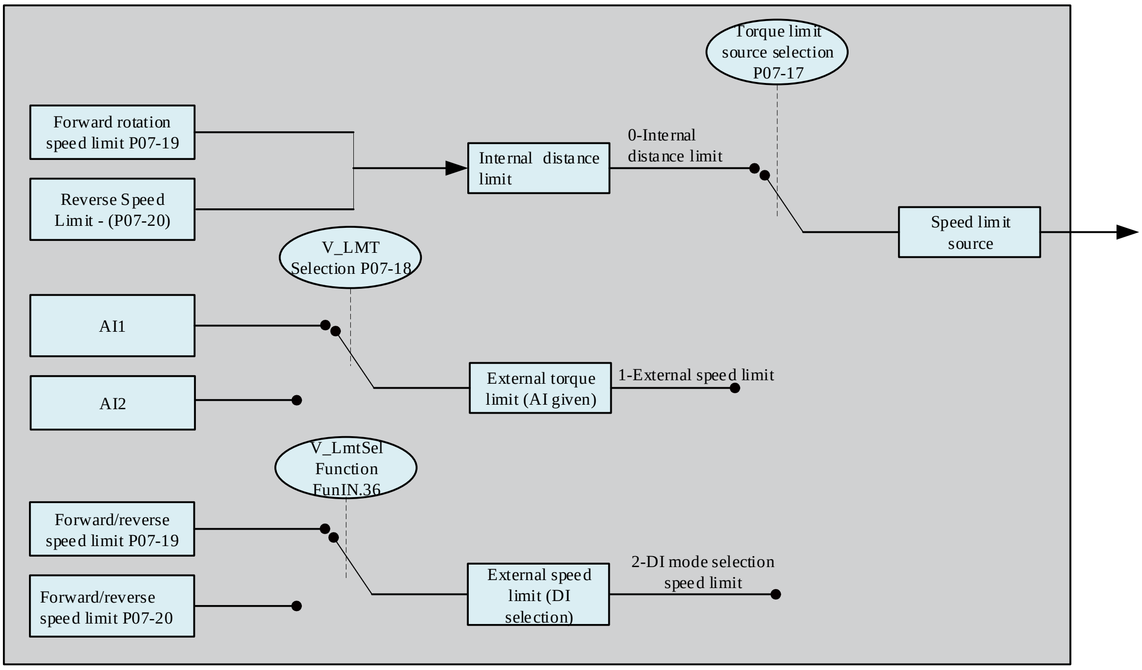


Figure 6-104 Source of speed limit

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.

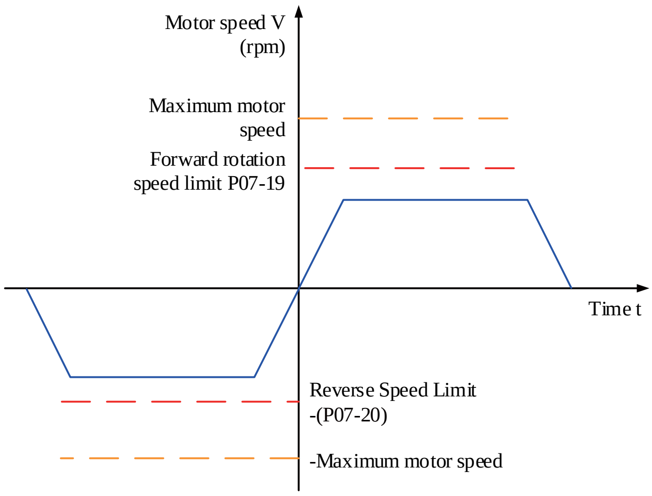


Figure 6-105 P07-17=0 Speed limit curve

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.

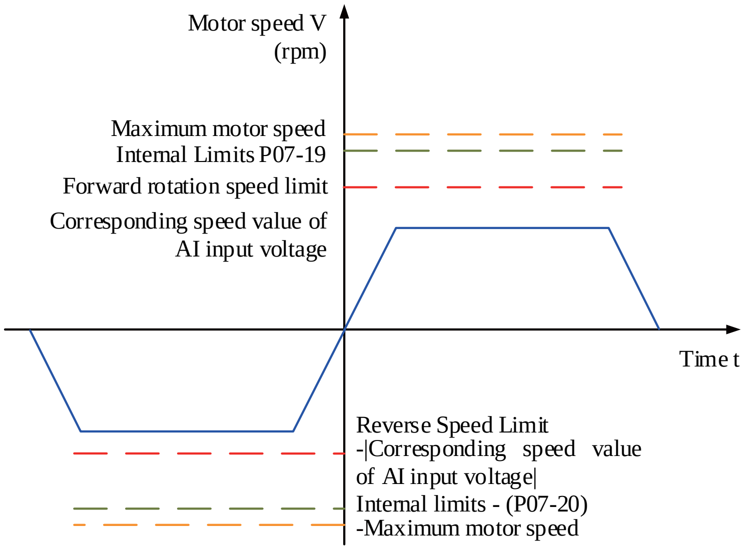


Figure 6-106 P07-17=1 Speed limit curve

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

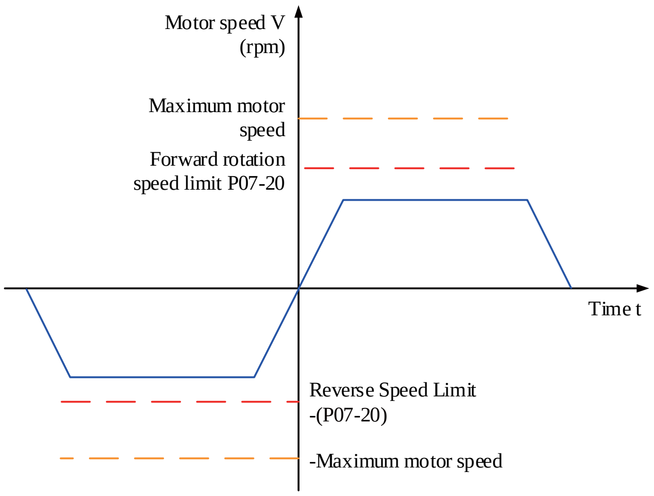
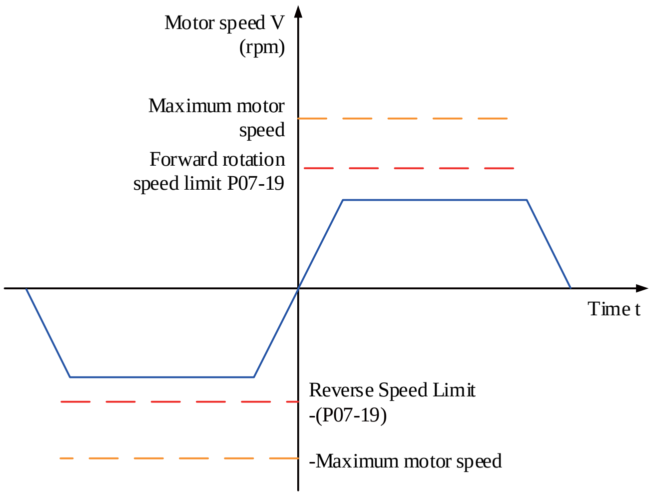
The servo drive selects P07-19 or P07-20 as the forward/reverse speed limit value based on the actual DI terminal logic.

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

Table 6-32 Speed limit description

<table>
<tr><th colspan="2">V_LmtSel</th></tr>
<tr><th>OFF</th><th>ON</th></tr>
<tr><td>
</td><td>
</td></tr>
</table>

☆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

2)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.

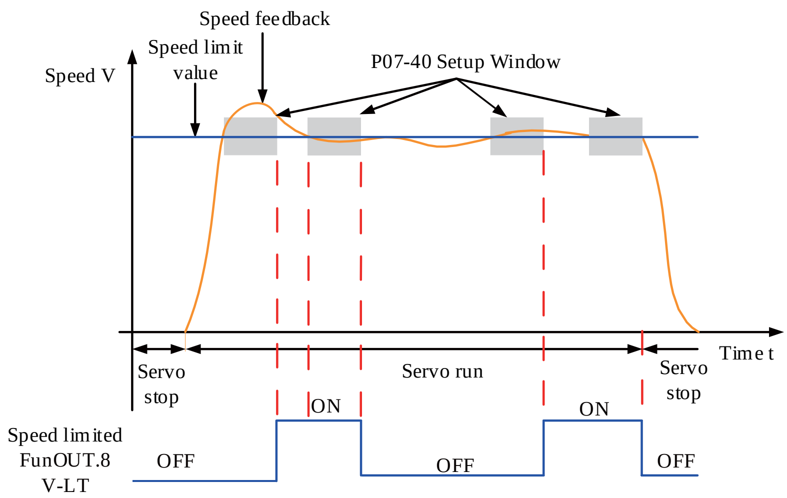


Figure 6-107 Example of Speed Limit DO Output Waveform

☆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.

1.30.5 Torque reaching output

The torque arrival function is used to determine whether the actual torque command has reached the set range. When the actual torque command reaches the torque command threshold, the drive can output the corresponding DO signal (FunOUT.18: ToqReach, torque arrival) for use by the upper computer.

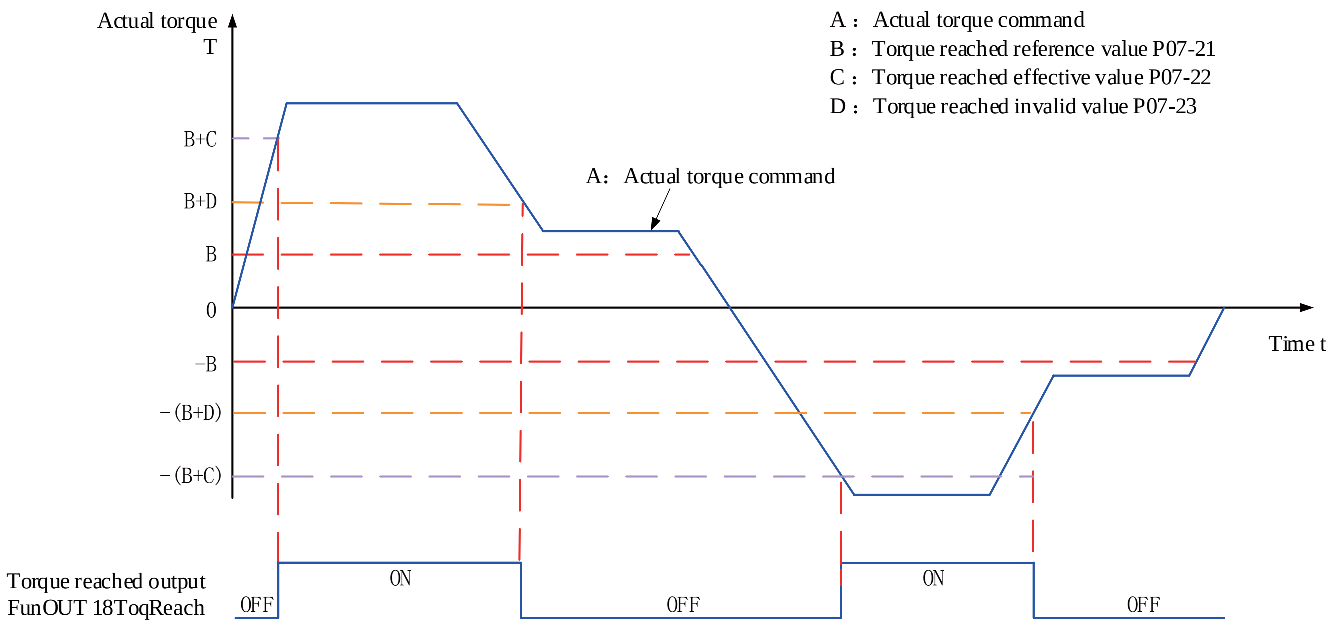


Figure 6-108 Example of Torque Reaching Output Waveform

Actual torque command (can be viewed through P0B-02): A;

The torque reaches the reference value P07-21: B;

The torque reaches the effective value P07-22: C;

Torque reaches invalid value P07-23: D;

Where C and D are offsets based on B.

Therefore, when the torque reaching DO signal changes from invalid to effective, the actual torque command must meet the following requirements:

|A|B+C

Otherwise, the torque reaching DO signal remains invalid.

Conversely, when the torque reaching DO signal changes from valid to invalid, the actual torque command must meet：

|A|<B+D

Otherwise, the torque reaching DO signal remains valid.

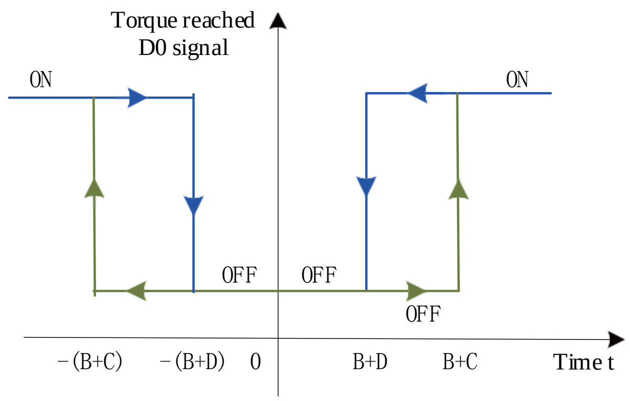


Figure 6-109 Description of Torque Reaching Output Effectiveness

☆Associated function code：

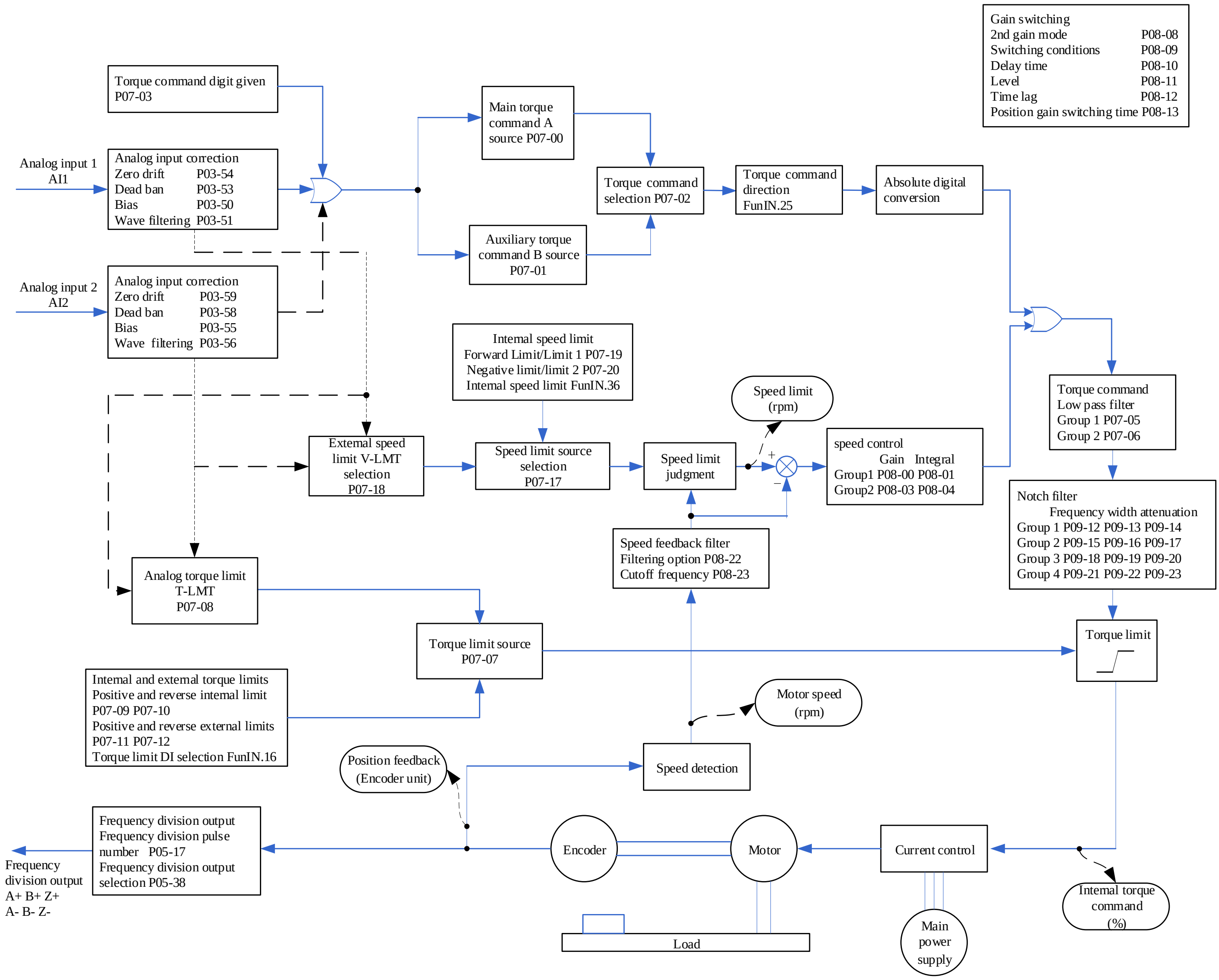
Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P07-21	Torque reaches reference value	0～300.0	%	Set the torque to reach the command reference value	running settings	Effective immediately	0
P07-22	Torque reaches effective value	0～300.0	%	(100% corresponds to one time of rated torque)	running settings	Effective immediately	20.0
P07-23	Torque reaches invalid value	0～300.0	%	Set the torque to reach the effective offset threshold	running settings	Effective immediately	10.0

When using the torque arrival DO signal, one DO terminal of the servo drive should be assigned to the DO function 18 (FunOUT.18: ToqReach, torque arrival), and the DO terminal logic should be determined.

☆Associated function code:

Code	Name	Function name	Description
FunOUT.18	ToqReach	Torque reached	Valid: The absolute value of the torque command reaches the set value Invalid: The absolute value of the torque command is less than the set value

1.30.6 Torque control mode function code block diagram



1.31 Hybrid control mode

Hybrid control mode means that when the servo enable is ON and the servo state is "run", the working mode of the servo drive can be switched between different control modes. There are four hybrid control modes.

- ●Torque mode ↔ Speed mode
- ●Speed mode ↔ Position mode
- ●Torque mode ↔ Position mode
- ●Speed mode ↔ Position mode ↔ Torque mode

Set the function code P02-00 through the panel or drive debugging platform, and the servo drive will operate in a hybrid control mode.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time
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 mode ↔ Position mode	Set the control mode of the servo drive	Shutdown setting	Effective immediately	1

Please set the servo drive parameters under different control modes according to the mechanical structure and indicators. For the setting method, refer to the parameter description for P02-00in Chapter 8.

PWhen 02-00=3/4/5, configure one DI terminal of the servo drive to function 10 (FunIN.10: M1_SEL, mode switching 1), and determine the valid logic of the DI terminal; When P02-00=6, please configure the two DI terminals of the servo drive to function 10 (FunIN. 10: mode switching 1) and function 11 (FunIN. 11: mode switching 2) respectively, and determine the valid logic for the DI terminals.

☆Associated function code:

<table>
<tr><th>Code</th><th>Name</th><th>Function name</th><th>Description</th></tr>
<tr><td>FunIN.10</td><td>M1_SEL</td><td>Mode switching 1</td><td>Used to set the current control mode of the drive when the servo state is "run" in hybrid control mode
<table>
<tr><th>P02-00</th><th>M1_SEL terminal logic</th><th>Control mode</th></tr>
<tr><td rowspan="2">3</td><td>Invalid</td><td>Torque mode</td></tr>
<tr><td>Valid</td><td>Speed mode</td></tr>
<tr><td rowspan="2">4</td><td>Invalid</td><td>Speed mode</td></tr>
<tr><td>Valid</td><td>Position mode</td></tr>
<tr><td rowspan="2">5</td><td>Invalid</td><td>Torque mode</td></tr>
<tr><td>Valid</td><td>Position mode</td></tr>
</table></td></tr>
<tr><td>FunIN.11</td><td>M2_SEL</td><td>Mode switching 2</td><td>Used to set the current control mode of the drive when the servo state is "run" in hybrid control mode
<table>
<tr><th>P02-00</th><th>M2_ SEL terminal logic</th><th>M1_ SEL terminal logic</th><th>Control mode</th></tr>
<tr><td rowspan="3">6</td><td></td><td>Valid</td><td>Position mode</td></tr>
<tr><td>Valid</td><td>Invalid</td><td>Speed mode</td></tr>
<tr><td>Invalid</td><td>Invalid</td><td>Torque mode</td></tr>
</table></td></tr>
</table>

1.32 Operating Instructions for Absolute Value System

1.32.1 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.

1.32.2 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 □□□: 220V level incremental encoder motor 38 □ □ □: 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 encoder 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)	-		Display	-	0
P0B-77	Absolute encoder absolute position (low 32 bits)	-	The absolute position fed back by the absolute value encoder.	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.

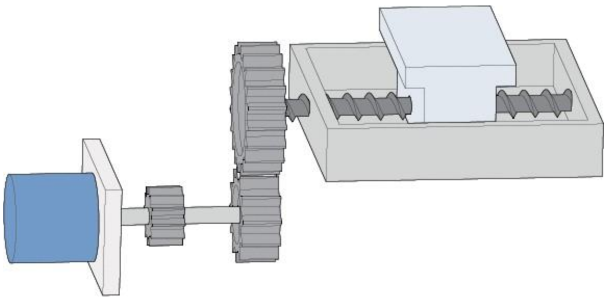


Figure 6-110 Schematic Diagram of Ball Screw Transmission Mechanism

Assume that the mechanical absolute positions (P0B-58 and P0B-60) are P_M, The absolute position of the encoder isP_E【The range of P_E is -2^{38}～(2^{38}-1)】,The absolute position linear mode position offset (P05-46 and P05-48) isP_O， then the relationship between the three is$P_M = P_E - P_O$.

Assume that the gear ratio of the electronic gear wheel is$\frac{B}{A}$, The absolute position counter (P0B-07) represents the current absolute position of the machine (command unit),P0B-07=$P_M /（\frac{B}{A}）$.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 multi turn count overflow fault will occur. This fault can be masked by setting P0A-36.

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)	1-65535	1		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)	0～127	Encoder unit		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		Display	-	0
P0B-77	Mechanical absolute position (low 32 bits)	-	Encoder unit	The absolute position fed back by the absolute value encoder.	Display	-	0
P0B-79	Mechanical absolute position (high 32 bits)	-	Encoder unit		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.

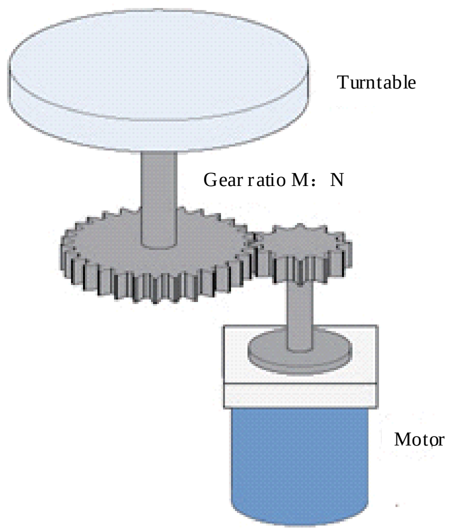


Figure 6-111 Schematic Diagram of Rotating Load

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 resolutionR_E，R_E=223，assume that the number of encoder pulses corresponding to one rotation of the load isR_M，P05-52 or When P05-54 is not equal to 0，R_M=P05-54×232+P05-52；when P05-52, P05-54 are both 0,R_M=R_E×$\frac{P05-50}{P05-51}$

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.

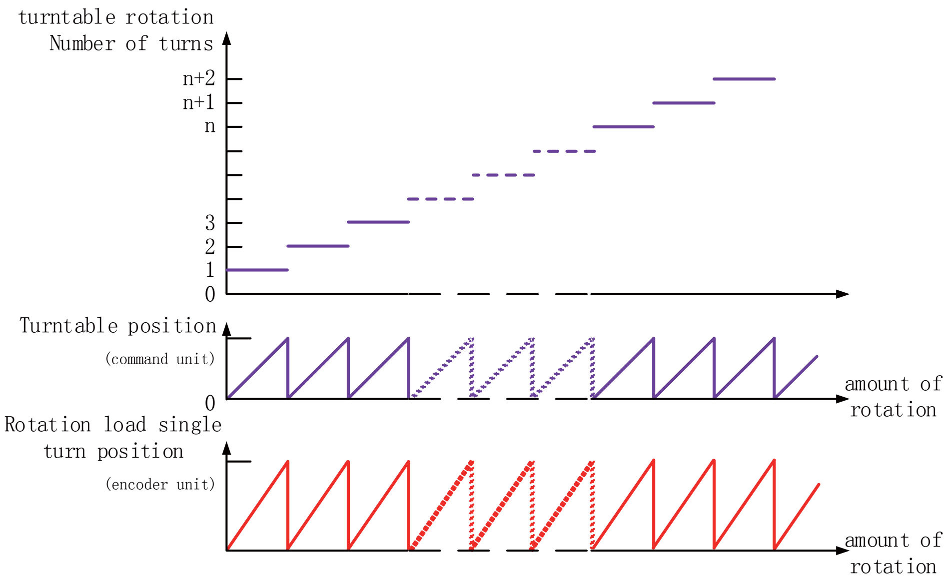


Figure 6-112 Schematic diagram of the corresponding relationship between the position of a single rotation of the rotating load and the position of the turntable

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

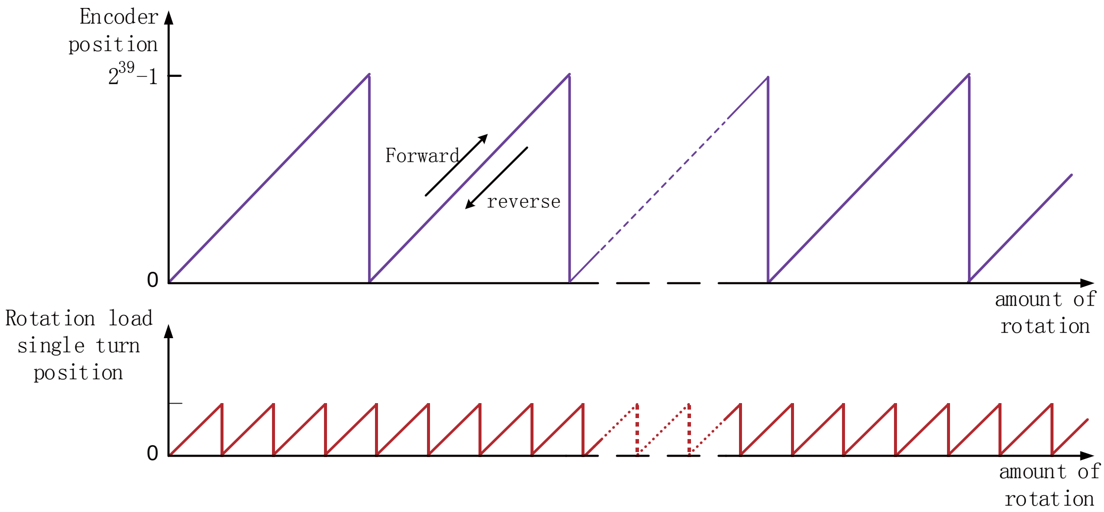


Figure 6-113 Schematic diagram of the relationship between encoder feedback position and rotating load position

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

NOTE

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

1.32.3 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.

1.32.4 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.

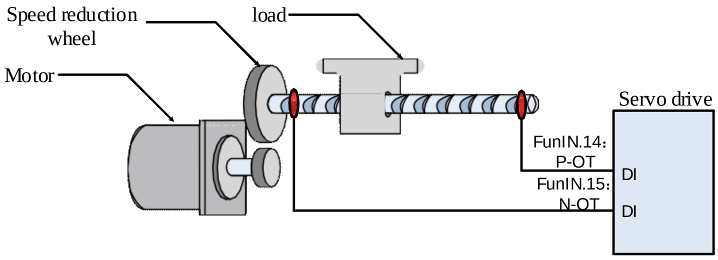


Figure 6-114　Diagram of Limit Switch Installation

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

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.

1.33 Auxiliary functions

To ensure the correct operation of the servo system, the drive provides the following auxiliary functions.

1.33.1 Software reset function

When the servo drive does not have a Class 1 non resettable fault and is not in operation, if the field device is not allowed to power down at will, but the drive needs to be powered on again, the Software reset function can be used.

☆Associated function code：

Function code	Name	Setting range	Function	Setting method	Effective time	Factory setting
P0D-00	Software reset	0: No action 1: Enable	After the Software reset function is enabled, the program in the drive automatically resets without power down (similar to performing a program reset operation when powered on)	Shutdown setting	Effective immediately	0

1.33.2 Motor protection function

1）Motor overload protection

After the servo motor is powered on, due to the thermal effect of the current, it continuously generates heat and releases heat to the surrounding environment. When the heat generated exceeds the heat released, the temperature of the motor increases, and excessive temperature will cause the motor to burn down. Therefore, the drive provides a Motor overload protection function to prevent the motor from burning down due to excessive temperature.

By setting the motor overload protection gain (P0A-04), you can adjust the time when the motor overload fault (FU.620) is reported. P0A-04 is generally maintained as the default value, but can be changed based on the actual heating condition of the motor when the following conditions occur:

●Occasions where the working environment temperature of servo motors is high;

●The servo motor circulates, and the single movement cycle is short, frequent acceleration and deceleration occasions.

When confirming that the motor will not burn out, it can also shield the motor from overload (P0A-26=1).

Caution：

- Use the motor overload shielding function carefully, otherwise the motor may be burnt out!

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-04	Motor overload protection gain	50～300	%	Set the time when the motor overload fault (FU.620) is reported	Shutdown setting	Effective immediately	100
P0A-26	Motor overload shield enabled	0: Open motor overload detection	-	Set whether to enable motor overload fault (FU.620) and motor	Shutdown setting	Effective immediately	0

		1: Shielded motor overload detection		overload warning (FU.909)			

2）Motor locked rotor over temperature protection

When the servo motor is locked, the motor speed is almost zero, and the actual current is very high. At this time, the motor is seriously heating! The servo motor has a certain ability to run in locked-rotor mode, but if the allowable time is exceeded, the motor will be burned due to excessive temperature. Therefore, the drive provides a Motor locked rotor over temperature protection function to prevent the motor from being burnt out due to excessive temperature in case of locked rotor.

By setting the motor locked rotor over temperature protection time threshold (P0A-32), you can change the time when the motor locked rotor over temperature fault (FU.630) is reported. Through P0A-33, you can set whether to enable the motor locked rotor over temperature protection, which is enabled by default.

Caution：

- Use the Motor locked rotor over temperature protection shielding function with caution, otherwise the motor may burn down!

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-32	Locked rotor over temperature protection time window	10～65535	ms	Set the alarm time for motor stall over temperature fault (FU.630)	running settings	Effective immediately	200
P0A-33	Locked rotor overtemperature protection enable	0: Shield motor locked rotor over temperature protection monitoring detection 1: Open Motor locked rotor over temperature protection monitoring and detection	-	Set whether to enable the motor to stall over temperature fault (FU.630)	running settings	Effective immediately	1

3）Motor speed protection

Excessive servo motor speed will cause motor damage or mechanical damage. Therefore, the servo drive provides a motor overspeed protection function.

$$\text{Overspeed fault threshold=}\begin{cases} Maximum\ motor\ speed \times 1.2 & P0A-08 = 0 \\ & or\ P0A-08 > Maximum\ motor\ speed \times 1.2 \\ \mathrm{P0A-08} & \mathrm{P0A-08} \neq 0 \text{ and} \\ & \mathrm{P0A-08} < Maximum\ motor\ speed \times 1.2 \end{cases}$$

Caution：

- The servo drive also provides a overspeed protection function to prevent the motor from losing control and stalling.
- Use the overspeed protection shield function carefully. When in vertical or towed load applications, please set P0A-12 to zero to shield overspeed fault detection.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-08	Overspeed fault threshold	0～10000	rpm	Set the threshold value of motor rotation speed when motor overspeed fault (FU.500) is reported	running settings	Effective immediately	0
P0A-12	Overspeed protection function enabled	0: Shield overspeed protection function 1: Enable the overspeed protection function	-	Set whether to enable the overspeed protection function	running settings	Effective immediately	1

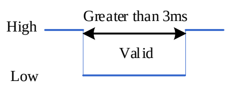
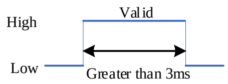
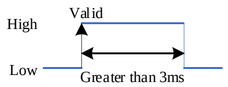
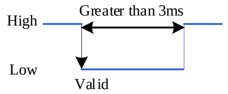
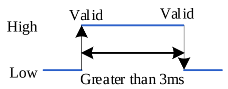
In addition to the overspeed protection function, the servo drive in speed control mode and Torque control mode can respectively set speed limits to protect the motor and machinery.

1.33.3 DI port filtering time setting

The servo drive provides 9 hardware DI terminals, of which DI1 to DI7 are ordinary DI terminals, and DI8 and DI9 are fast DI terminals.

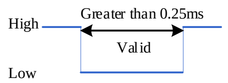
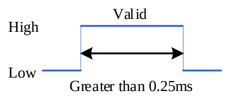
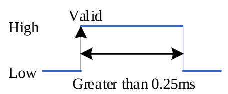
Low speed DI terminal, valid signal diagram：

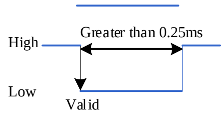
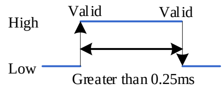
Table 6-32 Description of Common DI Terminals

Set value	DI terminal logic when DI function is valid	Notes
0	Low level	
1	High level	
2	Rising edge	
3	Falling edge	
4	Rising and falling edges	

High speed DI terminal, valid signal representation：

Table 6-33 Description of High Speed DI Terminals

Set value	DI terminal logic when DI function is valid	Notes
0	Low level	
1	High level	
2	Rising edge	

Set value	DI terminal logic when DI function is valid	Notes
3	Falling edge	
4	Rising and falling edges	

1）Servo Enable (S-ON) Filter Settings

When using a servo drive, be sure to use the DI function 1: FunIN1: S-ON, and enable the servo (both hardware DI and virtual DI)!

When using the hardware DI terminal for servo enable control, if there is interference in the servo enable signal, filtering can be set through P02-18. At this time, it should be noted that the effective time width of the servo enable signal must be greater than the (P02-18)+3ms setting value, otherwise, the servo enable will be invalid.

2）Fast DI terminal filtering settings

The servo drive provides two fast DI terminals, with an input signal frequency of up to 4kHz. When there is interference in the signal, filtering can be set through P0A-19 and P0A-20.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P02-18	Servo enable (S-ON) filter time constant	0～64	ms	Set the filtering time constant for the DI signal: servo enable (S-ON).	Shutdown setting	Effective immediately	0
P0A-19	DI8 filter time constant	0～255	25ns	Set the pin filter time constant for the fast DI terminal DI8	Shutdown setting	Re-energize	80
P0A-20	DI9 filter time constant	0～255	25ns	Set the pin filter time constant for the fast DI terminal DI9	Shutdown setting	Re-energize	80

1.33.4 Band brake protection detection function

When using a band brake motor for gravity loads, when the Z-axis servo is enabled and the input command is zero, and the rotational speed is lower than 10 rpm, it is detected whether the torque of the motor is less than 70% of the set gravity load within the first 500 ms, and lasts for 200 ms, a fault FU.625 is reported, indicating that the band brake may not be turned on.

Check if the band brake is engaged. If the motor rotates twice after the band brake is engaged, a warning FU.626 will be reported.

Set P0D.24 to 1 to enable the Z-axis gravity load identification function. After successful identification, P0D.24 becomes 0; The identification condition is that the servo is enabled and the band brake is turned on, the input command is 0 and the speed is less than 10 rpm, lasting for 128 milliseconds. After successful identification, the result is stored in the P0A.48 function code。

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0A-47	Band brake protection detection enable	0: Not enabled 1: Enabled	-	Set whether to enable the band brake protection detection function	running settings	Effective immediately	1
P0A-48	Gravity load detection value	0～300.0	%	Display the detected gravity load value or manually set it accordingly	running settings	Effective immediately	30.0
P0D-24	Gravity load identification	0: Unidentified 1: Enable identification	-	Set whether to enable the gravity load identification function	running settings	Effective immediately	0

Chapter VII Adjustment

1.34 Summary

The servo drive needs to drive the motor as quickly and accurately as possible to track instructions from the upper computer or internal settings. In order to achieve this requirement, it is necessary to adjust the servo gain reasonably.

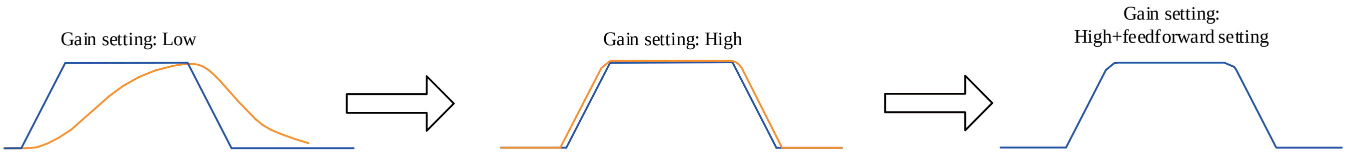


Figure 7-1 Example of Gain Setting

Position loop gain: 40.0Hz	Position loop gain: 200.0Hz	Position loop gain: 200.0Hz
Speed loop gain: 200.0Hz	Speed loop gain: 25.0Hz	Speed loop gain: 25.0Hz
Speed loop integral time constant: 100.00ms	Speed loop integral time constant: 50.00ms	Speed loop integral time constant: 50.00ms
Speed feedforward gain: 0	Speed feedforward gain: 0	Speed feedforward gain: 50.0%
Load inertia ratio: 30	Load inertia ratio: 30	Load inertia ratio: 30

The servo gain is set through a combination of multiple parameters (position loop, speed loop gain, filter, load rotational inertia ratio, etc.), which affect each other. Therefore, the setting of servo gain must take into account the balance between various parameter setting values.

⚠Caution：

- Before performing gain adjustment, it is recommended to perform a jog test run to confirm that the motor can operate normally!

The general process of gain adjustment is shown in the following figure:

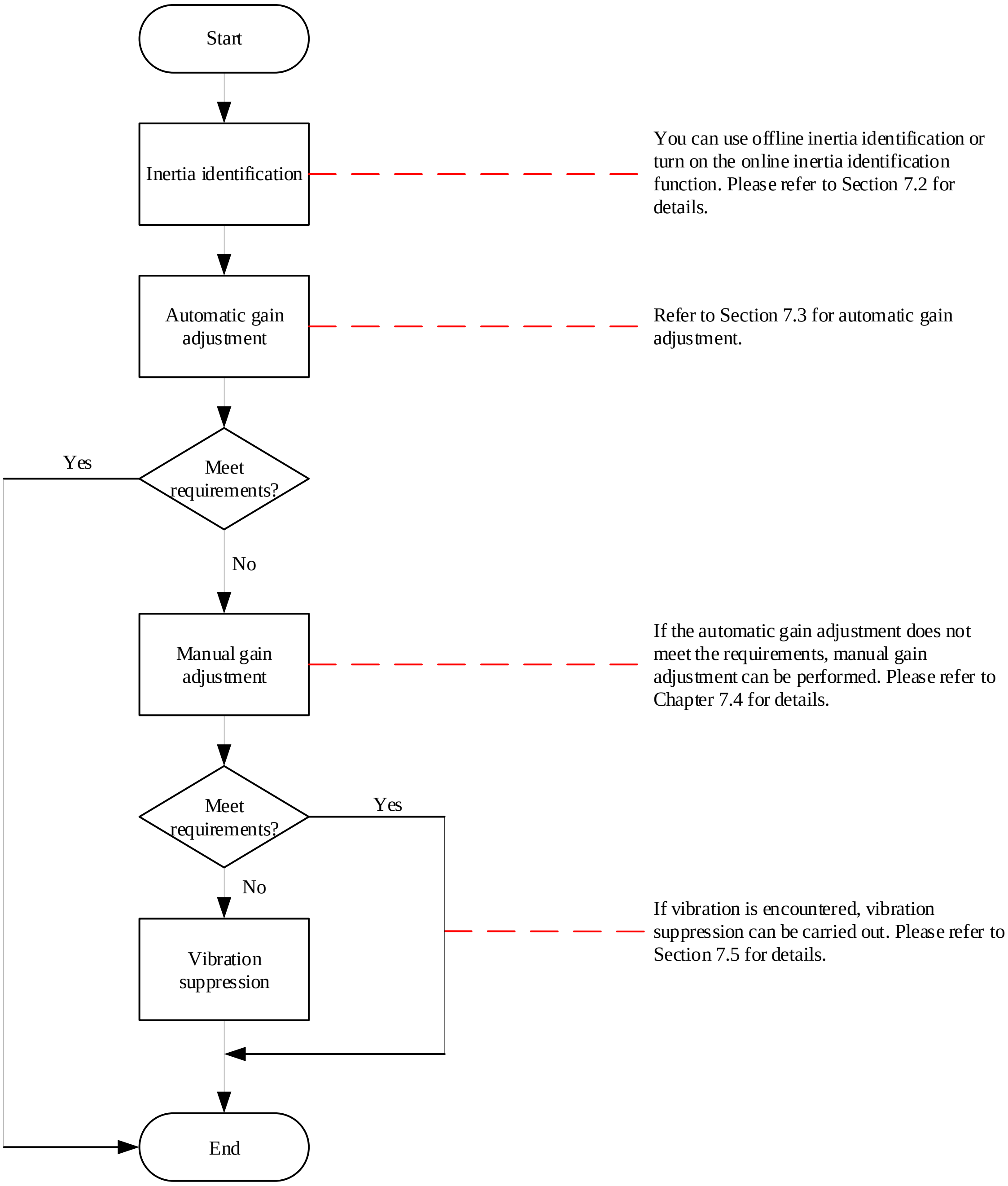


Figure 7-2 Gain Adjustment Process

Table 7-1 Gain Adjustment Process Description

Gain Adjustment Process			Function	Detailed chapters
1	Inertia identification	Offline	Using the drive's own Inertia identification function, the drive automatically calculates the load inertia ratio	7.2.1
		Online	Send commands through upper computer communication to rotate the motor, and the drive calculates the load inertia ratio in real time	7.2.2
2	Automatic gain adjustment		On the premise that the inertia ratio is set correctly, the drive automatically adjusts a set of matching gain parameters	On the premise that the inertia ratio is set correctly, the drive automatically adjusts a set of matching gain parameters

Gain Adjustment Process			Function	Detailed chapters
3	Manual gain adjustment	Basic gain	Based on Automatic gain adjustment, if the expected effect is not achieved, manually adjust the gain to optimize the effect	7.4
		Command filtering	Filter settings for position, speed, and torque commands	7.4.3
		Feedforward gain	Enable feedforward function to improve tracking performance	7.4.4
		Pseudo differential regulator	Adjust the speed loop control mode to improve the anti-interference ability in the low frequency band	7.4.5
		Torque disturbance observation	Start the torque disturbance observer function to improve the ability to resist torque disturbances	7.4.6
4	Vibration suppression	Mechanical resonance	Enable the trap function to suppress mechanical resonance	7.5.1
		Low-frequency resonance	Enable the low-frequency resonance suppression filter function to suppress low-frequency resonance	7.5.2

1.35 Inertia identification

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

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

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.

Caution：

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.

1.35.1 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：

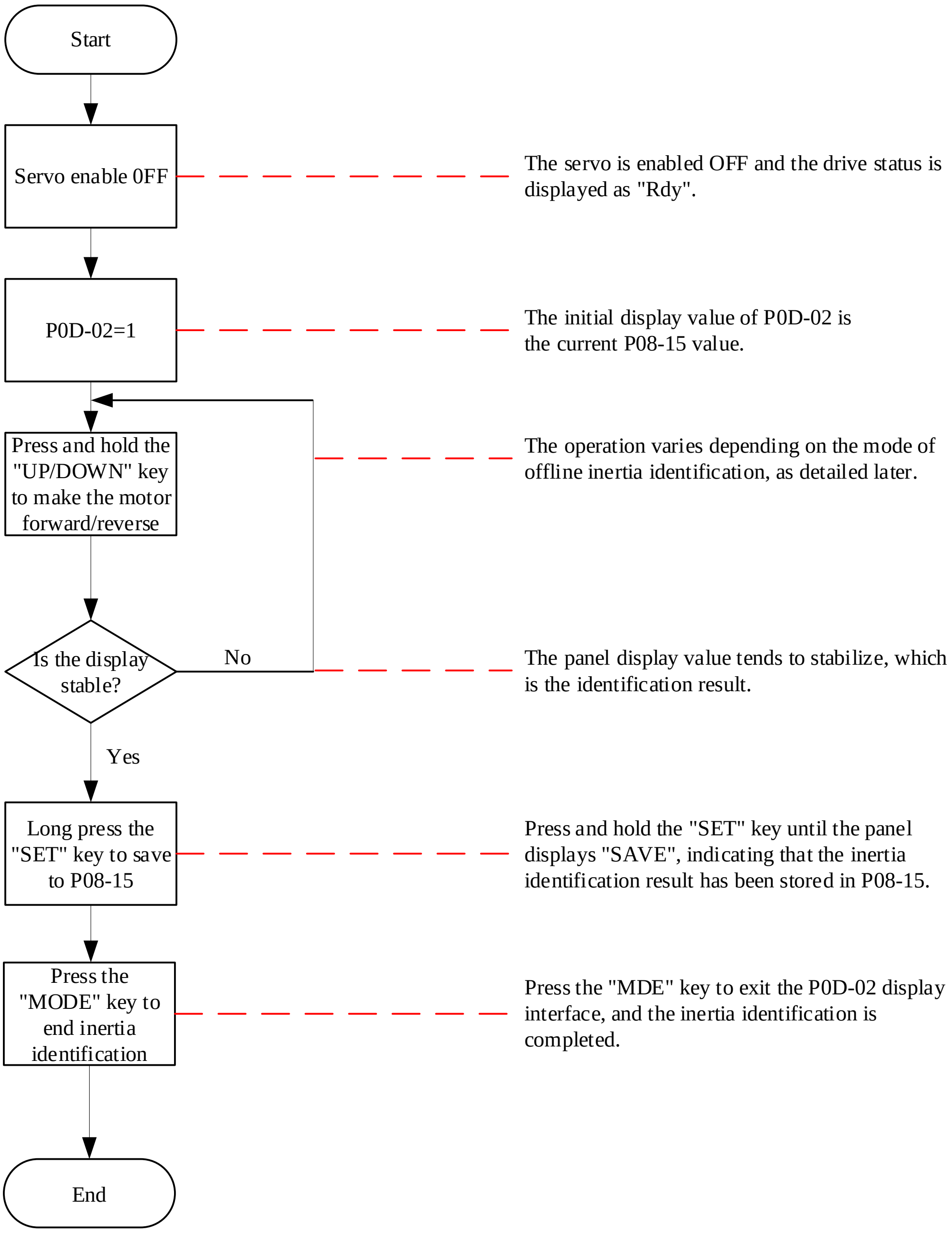
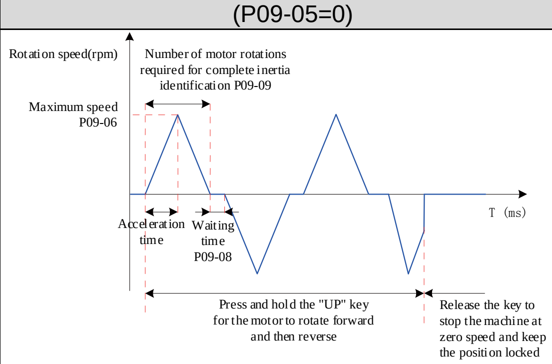
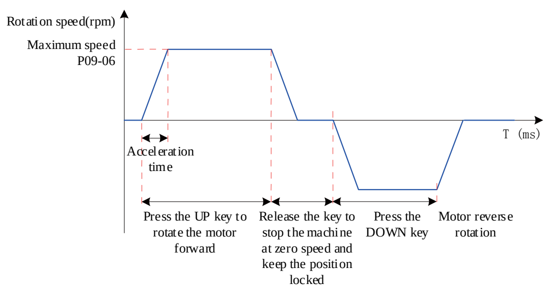


Figure 7-3 Offline Inertia Identification Flow Chart

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.

Table 7-2 Comparison of Two Offline Inertia Identification Modes

Items	Positive and negative triangular wave form (P09-05=0)	JOG jog mode (P09-05=1)
Command form	 	
Maximum speed	P09-06	P09-06
Acceleration and	P09-07	P09-07

Items	Positive and negative triangular wave form (P09-05=0)	JOG jog mode (P09-05=1)
deceleration time		
Key Description	Long press and hold the UP key: the motor rotates forward first and then reverses Long press and hold the DOWN key: the motor reverses first and then rotates forward Release the key: stop at zero speed and keep the position locked	Press the UP key: the motor rotates forward Press the DOWN key: the motor reverses Release the key: stop at zero speed and keep the position locked
Interval time	P09-08	Time interval between two key operations
Number of motor rotations	≤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：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P09-05	Offline Inertia identification mode selection	0: Positive and negative triangular wave mode 1: JOG jog mode	-	Set Offline Inertia identification mode	Shutdown setting	Effective immediately	0
P09-06	Inertia identification maximum speed	100～1000	rpm	Set the maximum speed command for Offline Inertia identification	Shutdown setting	Effective immediately	500
P09-07	Acceleration to maximum speed time constant during Inertia identification	20～800	ms	Set the time for the motor to accelerate from 0 rpm to the maximum speed of Inertia identification (P09-06) under Offline Inertia identification	Shutdown setting	Effective immediately	125
P09-08	Waiting time after completion of a single Inertia identification	50～10000	ms	Set the time interval between two consecutive speed commands during the positive and negative triangular wave mode Offline Inertia identification	Shutdown setting	Effective immediately	800
P09-09	Complete a single Inertia identification of the number of motor rotations	-	r	Displays the number of turns required for the positive and negative triangular wave mode Offline Inertia identification motor	-	-	-

1.35.2 Online Inertia identification

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

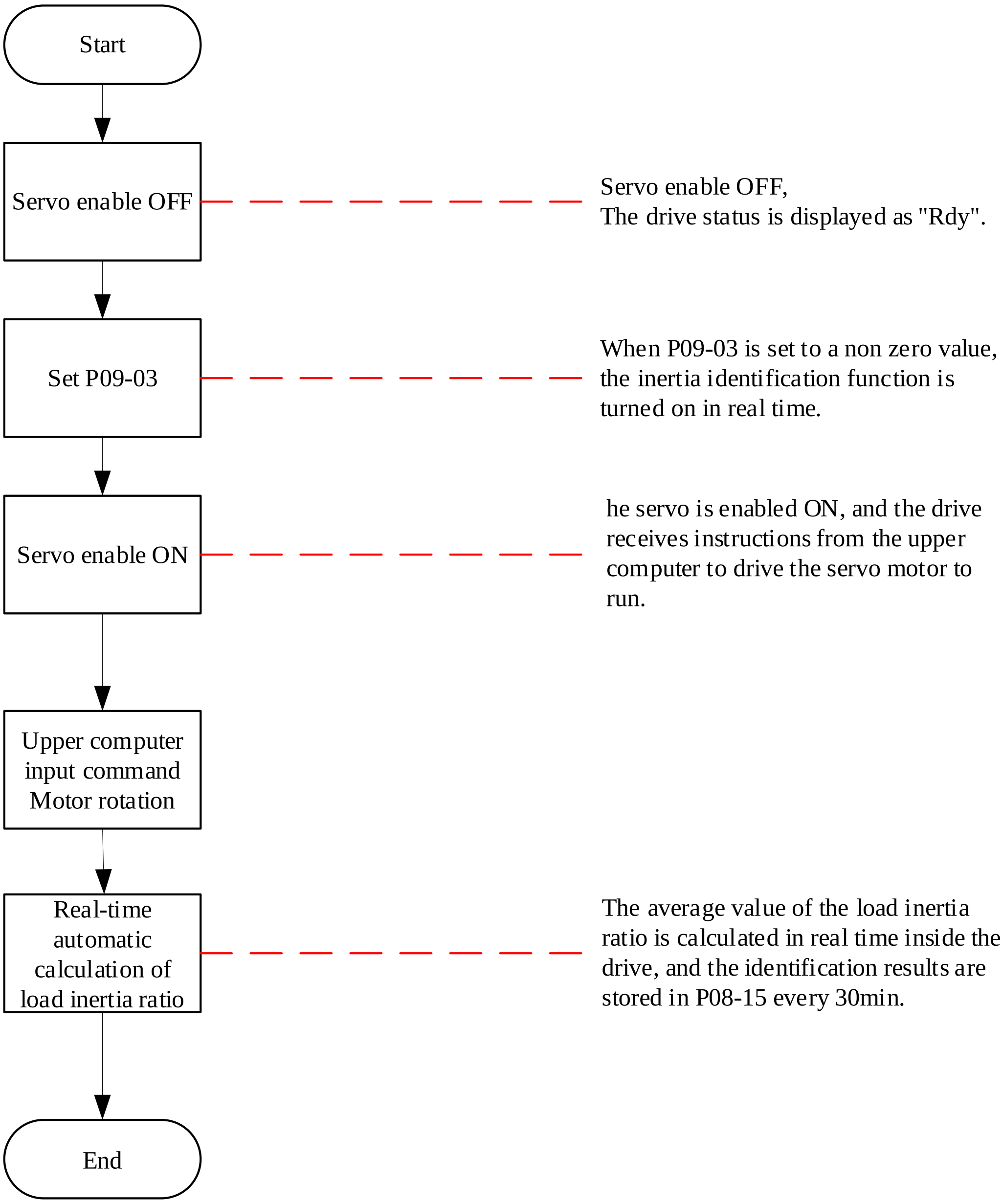


Figure 7-4 Online Inertia Identification Operation Process

NOTE

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

1.36 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.

⚠ Caution:

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

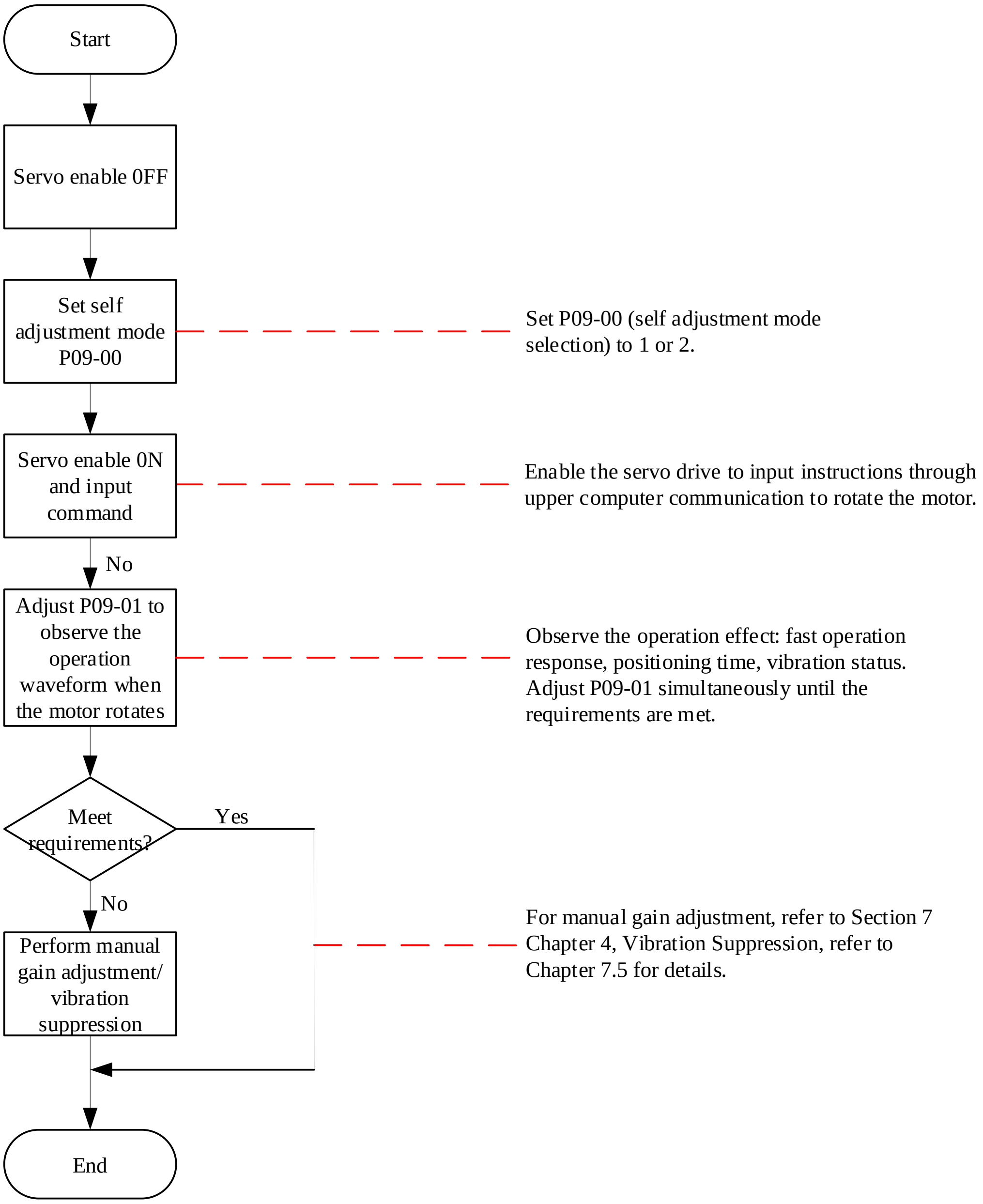


Figure 7-5 Automatic gain adjustment steps

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:

Table 7-3 Stiffness Class 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

The servo drive provides two automatic gain adjustment modes：

Caution：

- The parameter self-adjusting mode (P09-00=1) is suitable for most situations. When the requirements for fast positioning are high, the positioning mode (P09-00=2) can be used.

1）Parameter self adjustment mode(P09-00=1)

The first gain (P08-00 to P08-02, P07-05) parameters are automatically updated according to the stiffness level set in P09-01 and stored in the corresponding function code：

Table 7-4 Automatic parameter update in parameter self-adjustment mode

Function code		Name
P08	00	Speed loop gain
P08	01	Speed loop integral time constant
P08	02	Position loop gain
P07	05	Torque command filtering time constant

2）Positioning mode(P09-00=2)

a）Based on Table 7-4, the second gain (P08-03 to P08-05, P07-06) parameters are also automatically updated and stored in the corresponding function code according to the rigidity level set in P09-01, and the position loop gain of the second gain parameter should be one rigidity level higher than the first gain parameter：

Table 7-5 Automatic Updating Parameters for Positioning Mode

Function code	Name	Notes
P08-03	Second speed loop gain	
P08-04	Second speed loop integral time constant	P08-04 is set to a fixed value of 512.00ms, indicating that the integration effect of the second speed loop is invalid, and the speed loop only adopts proportional control.
P08-05	Second position loop gain	
P07-06	Second Torque command filtering time constant	

b）The speed feedforward related parameters are set to fixed values：

Table 7-6 Fixed Parameters of Positioning Mode

Function code	Name	Notes
P08-19	Speed feedforward gain	30.0%
P08-18	Speed feedforward filtering time constant	0.50ms

c）The gain switching related parameters are set to fixed values：

When in positioning mode, the gain switching function is automatically turned on.

Function code	Name	Parameter value	Notes
P08-08	Second gain mode setting	1	In the Positioning mode, the switching between the first gain (P08-00 to P08-02, P07-05) and the second gain (P08-03 to P08-05, P07-06) is effective;
P08-09	Gain switching condition selection	0	Except for the Positioning mode, keep the home settings.
P08-10	Gain switching delay time	5.0ms	In Positioning mode, the gain switching condition is P08-09=10; Except for the Positioning mode, keep the home settings.
P08-11	Gain switching level	50	In Positioning mode, the gain switching delay time is 5.0 ms; Except for the Positioning mode, keep the home settings.
P08-12	Gain switching delay	30	In Positioning mode, the gain switching level is 50; Except for the Positioning mode, keep the home settings.

Caution：

- In Automatic gain adjustment mode, parameters automatically updated with the rigidity level selection (P09-01) and parameters with fixed values cannot be manually modified. To modify, you must set P09-00 to 0 and exit the self adjustment mode.。

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P09-00	Self adjusting mode selection	0: Parameter self setting is invalid, manually adjust the parameter 1: Parameter self-tuning mode, using a rigidity meter to automatically adjust the gain parameters 2: Positioning mode, using a rigid meter to automatically adjust the gain parameters		Set self adjusting mode	running settings	Effective immediately	0
P09-01	Rigidity level selection	0～31		Set the level of rigidity level	running settings	Effective immediately	12

1.37 Manual gain adjustment

1.37.1 Basic parameters

When the automatic gain adjustment cannot achieve the desired effect, you can manually adjust the gain. Optimize the effect through more detailed adjustments.

The servo system consists of three control loops, namely, the position loop, the speed loop, and the current loop from the outside to the inside. The basic control block diagram is shown in the following figure.

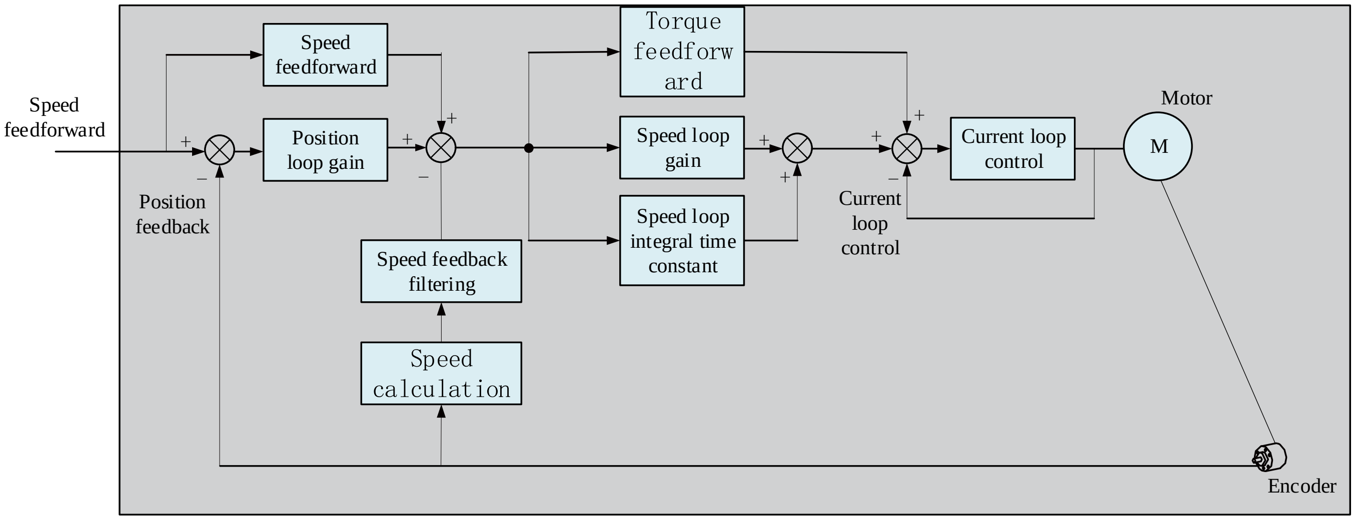


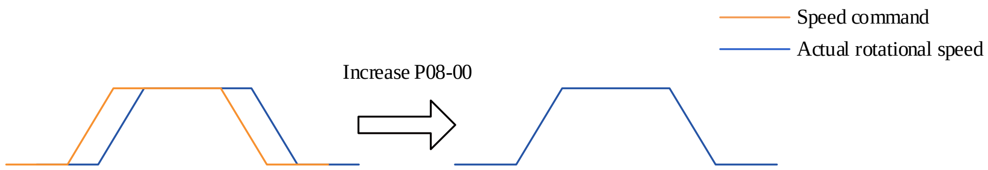
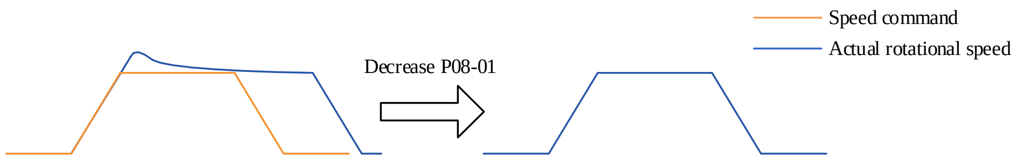
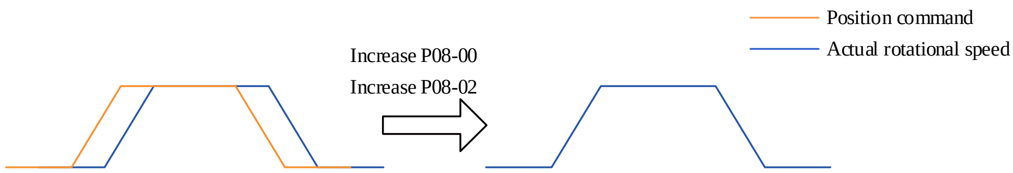
Figure 7-6 Basic Description Block Diagram of Manual Gain

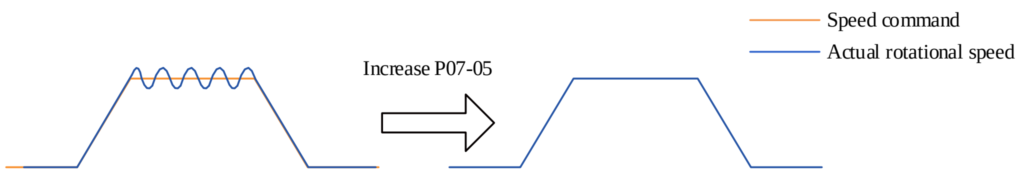
The more inner the loop, the higher the responsiveness is required. Fault to comply with this principle may result in system instability!

The default current loop gain of the servo drive has ensured sufficient responsiveness, and generally requires no adjustment. Only the position loop gain, speed loop gain, and other auxiliary gains need to be adjusted. Therefore, when performing gain adjustment in the Position control mode, in order to ensure system stability, while increasing the position loop gain, it is necessary to increase the speed loop gain and ensure that the position loop response is lower than the speed loop response.

The basic gain parameter adjustment method is as follows.

Table 7-7 Gain Parameter Adjustment Instructions

Step	Function code	Name	Adjustment instructions
1	P08-00	Speed loop gain	◆Parameter action： Determines the maximum frequency of variable speed commands that the speed loop can follow. On the premise that the average value of the load inertia ratio (P08-15) is set correctly, it can be considered that the maximum following frequency of the speed loop=P08-00  ◆Adjustment method： In the range where no noise or vibration occurs, increasing this parameter can accelerate the positioning time, bringing better speed stability and tracking performance; If noise occurs, lower the Parameter setting value; When mechanical vibration occurs, refer to "7.6Vibration suppression" to use the mechanical resonance suppression function.
2	P08-01	Speed loop integral time constant	◆Parameter action： Eliminate speed loop bias.  ◆Adjustment method： It is recommended to take values based on the following relationship: 500≤P08-00 × P08-01≤1000 For example, when the speed loop gain P08-00=40.0Hz, the speed loop integration time constant should meet: 12.50ms ≤ P08-01 ≤ 25.00ms. Reducing the set value can enhance the integration effect and accelerate the positioning time, but too small a set value can easily cause mechanical vibration. If the set value is too high, the speed loop deviation cannot always be reset to zero. When P08-01=512.00ms, the integral is invalid.
3	P08-02	Position loop gain	◆Parameter action： Determines the highest frequency of changing position commands that the position loop can follow. Maximum follow frequency of position loop=P08-02  ◆Adjustment method:

Step	Function code	Name	Adjustment instructions
			To ensure system stability, it is necessary to ensure that the maximum following frequency of the speed loop is 3-5 times that of the position loop. Therefore $$3 \leq \frac{2 \times \pi \quad \times P \quad 08-00}{P \quad 08-02} \leq 5$$ For example, when the speed loop gain P08-00=40.0Hz, the position loop gain should meet the following requirements: 50.2Hz ≤ P08-02 ≤ 83.7Hz. Adjust according to the positioning time. Increasing this parameter can accelerate the positioning time and improve the ability of the motor to resist external disturbances when stationary. Too high a set value may cause system instability and oscillation.
4	P07-05	Torque command filter Wave time constant	◆Parameter action： Eliminate high-frequency noise and suppress mechanical resonance.  ◆Adjustment method: It should be ensured that the cutoff frequency of the torque command low-pass filter is 4 times higher than the maximum follow frequency of the speed loop, so: $$\frac{1000}{2 \times \pi \times P07-05} \geq （P08-00） \times 4$$ For example, when the speed loop gain P08-00=40.0Hz, the Torque command filtering time constant should meet P07-05 ≤ 1.00ms. When vibration occurs when increasing P08-00, vibration can be suppressed by adjusting P07-05. For specific settings, refer to“7.6Vibration suppression”； If the set value is too large, the response of the current loop will decrease; To suppress vibration during shutdown, try increasing P08-00 and decreasing P07-05; If the motor stops vibrating excessively, try reducing the P07-05 setting.

☆Associated function code：

Function code	Name	Setting range	Unit	Factory setting	Effective time	Setting method	Correlation mode
P08-00	Speed loop gain	0.1～2000.0	Hz	Set the size of the speed loop proportional gain	Effective immediately	Running setting	25.0
P08-01	Speed loop integral time constant	0.15～512.00	ms	Set the integral time constant of the speed loop	Effective immediately	Running setting	31.83
P08-02	Position loop gain	0.0～2000.0	Hz	Set the size of the position loop proportional gain	Effective immediately	Running setting	40.0
P07-05	Torque command filtering time constant	0.00～30.00	ms	Set the size of the Torque command filtering time constant	Effective immediately	Running setting	0.79

1.37.2 Gain switching

The Gain switching function can be triggered by servo internal status or external DI. Valid only in position and Speed control mode. Using Gain switching can play the following roles:

●It is possible to switch to a lower gain when the motor is stationary (servo enabled) to suppress vibration;

●Switch to higher gain when the motor is stationary to shorten positioning time;

●Switch to higher gain during motor operation to achieve better command tracking performance;

●Different gain settings can be switched through external signals based on load equipment conditions, etc.

1）P08-08=0：

Fixed to the first gain (P08-00 to P08-02, P07-05), but the speed loop can be switched through DI function 3 (FunIN. 3: GAIN_SEL, Gain switching) to achieve proportional/proportional integration control.

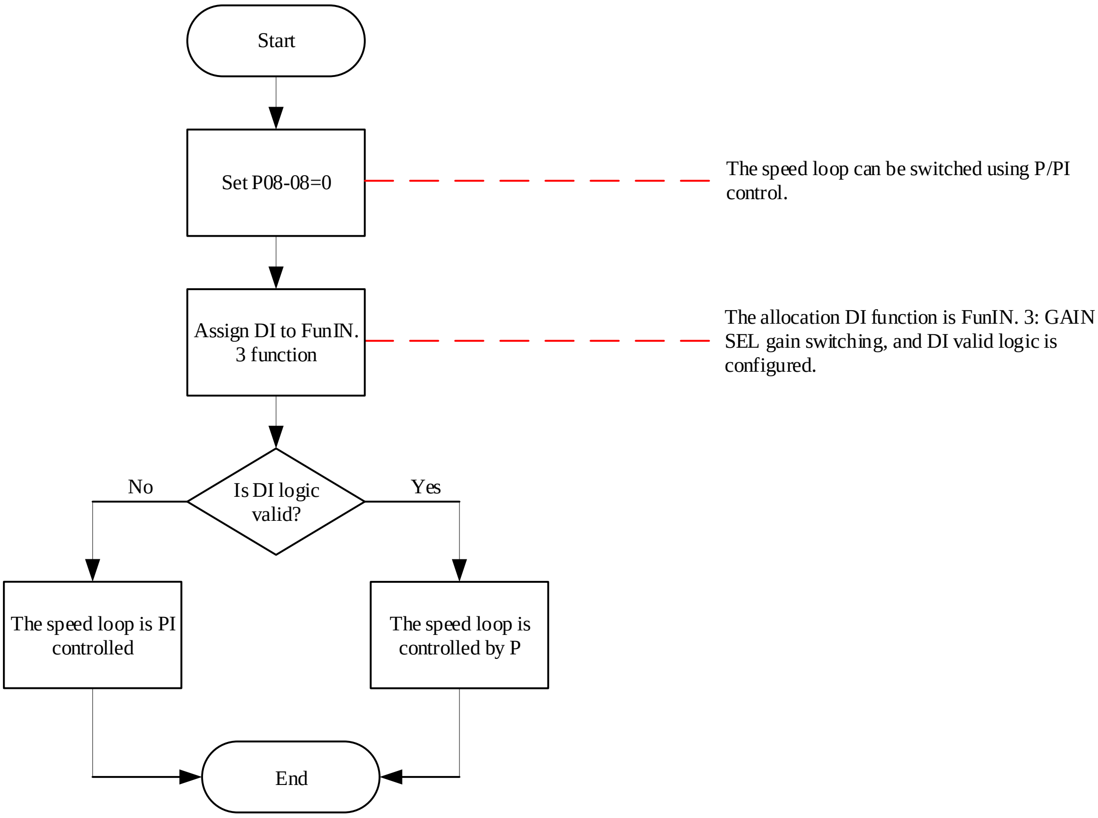


Figure 7-7 P08-08=0Gain switching flowchart

2）P08-08=1：

Switching between the first gain (P08-00 to P08-02, P07-05) and the second gain (P08-03 to P08-05, P07-06) can be achieved. The switching conditions should be set through P08-09.

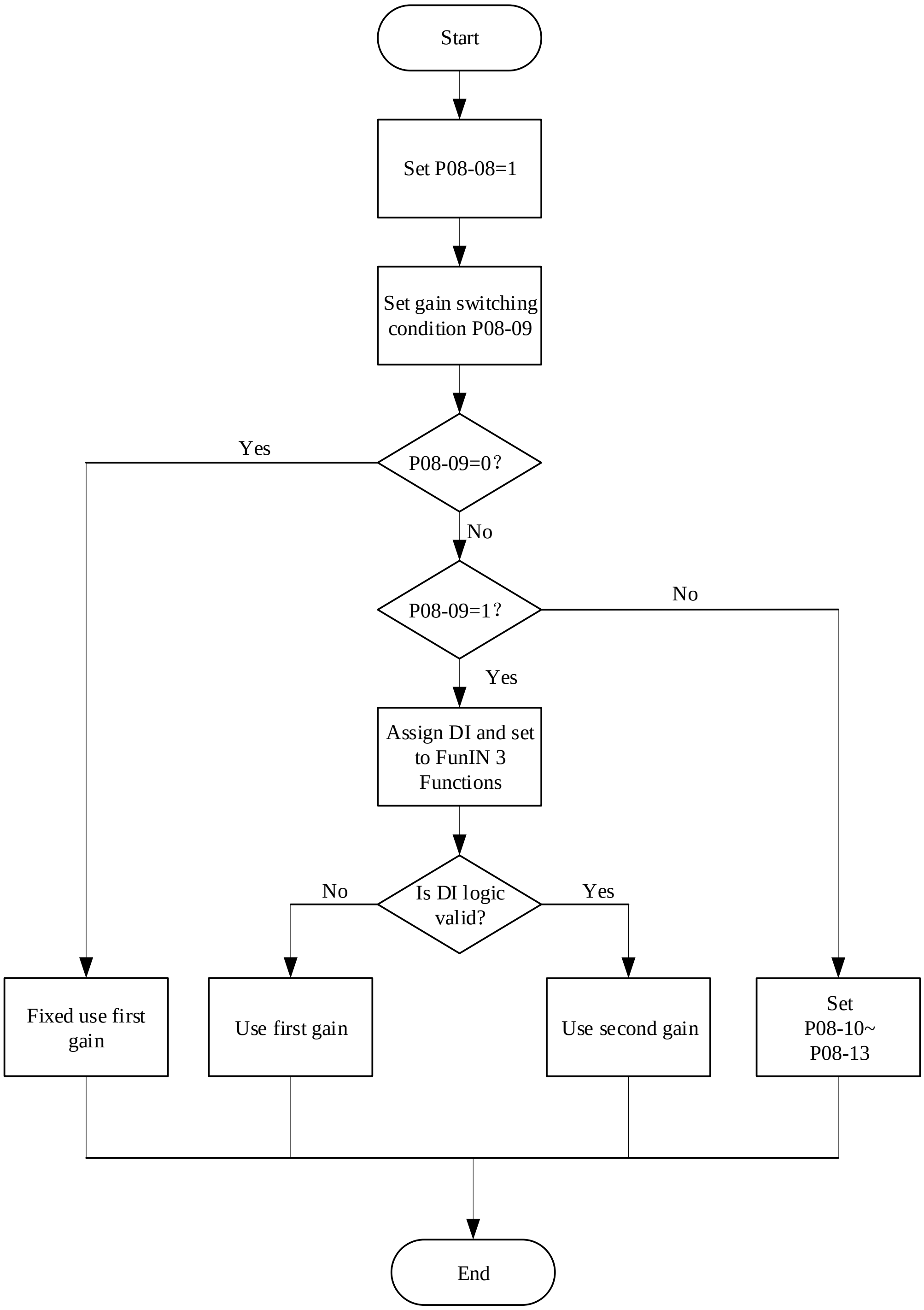
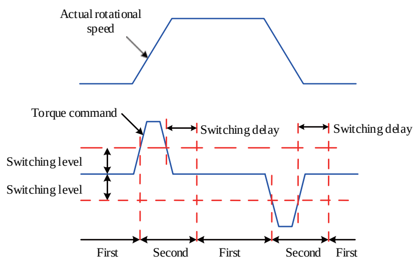
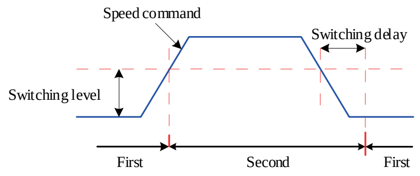
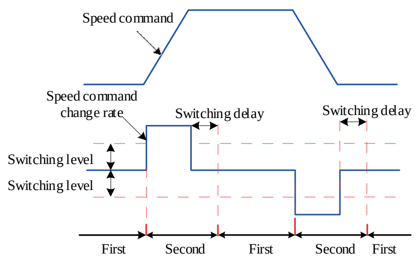
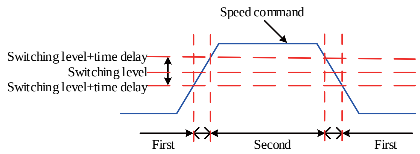
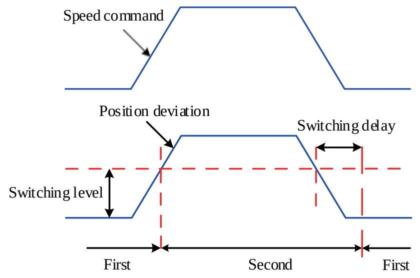
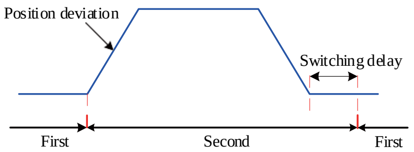
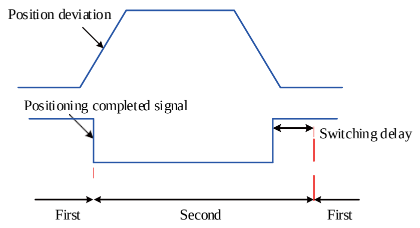
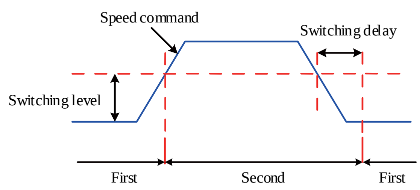


Figure 7-8 P08-08=1 Gain switching flowchart

The second Gain switching condition has a total of 11 modes. The schematic diagrams and related parameters of different modes are shown in the following table.

Table 7-8 Description of Gain switching conditions

Gain switching condition setting			Related parameters		
P08-09	Condition	Diagrammatic sketch	Delay time (P08-10)	Switching level (P08-11)	Switching delay (P08-12)
0	First gain fixed	-	Invalid	Invalid	Invalid
1	Switching using external DI	-	Invalid	Invalid	Invalid

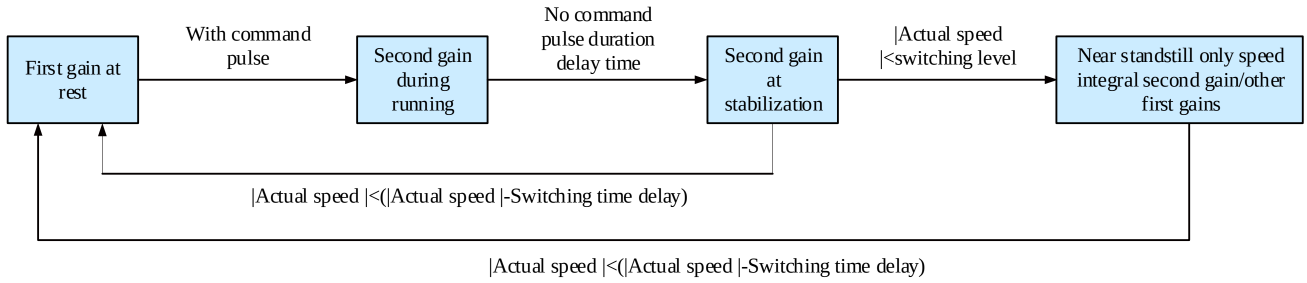
Gain switching condition setting			Related parameters		
2	Torque command		Valid	Valid (%)	Valid (%)
3	Speed command		Valid	Valid	Valid
4	Speed command change rate		Valid	Effective (10 rpm/s)	Valid
5	Speed command high and low speed threshold		Invalid	Valid	(10rpm/s)
6	Position deviation		Valid	(rpm)	Valid
7	Position command		Valid	Valid	(rpm)
8	Positioning complete		Valid	(Encoder unit)	Valid
9	Actual speed		Valid	Invalid	(Encoder unit)
10	With position command+actual	See notes for details	Valid	Invalid	Invalid

Gain switching condition setting			Related parameters		
	speed				

Caution：

- "Delay time P08-10" is only valid when the second gain switching reaches the first Gain.

NOTE



☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P08-08	Second gain mode setting	0: First gain fixed, using external DI for P/PI switching 1: Use Gain switching according to the condition settings in P08-09	-	Set the mode of the second gain	running settings	Effective immediately	1
P08-09	Gain switching condition selection	0: First gain fixed 1: Switching using external DI 2: High torque command: 3: High speed command 4: Large speed command change rate 5: Speed command high and low speed threshold 6: Large position deviation 7: With position command 8: Positioning completed 9: Large actual speed 10:With position command+actual speed	-	Set conditions for Gain switching	running settings	Effective immediately	0
P08-10	Gain switching delay time	0～10	-	Set the delay time for Gain switching	running settings	Effective immediately	5.0
P08-11	Gain switching level	1～1000	According to switching conditions	Set the level of Gain switching	running settings	Effective immediately	50
P08-12	Gain switching	0～20000	Accor	Set the time	running	Effective	30

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
	delay		ding to switching conditions	delay of Gain switching	settings	immediately	
P08-13	Position Gain switching time	0.0～100.0	ms	Set the switching time for the position loop gain	running settings	Effective immediately	3.0

1.37.3 Comparison of Several Filters

Name	Function	Applicable occasions	Impact of excessive filtering	Index
Pulse input pin filtering	Prevent inaccurate servo reception pulse number caused by interference	The system wiring is not standardized, with strong environmental interference	The number of pulses received by the servo is smaller than the number of pulses sent by the upper computer	Section 6.2.1
Position command filtering	Position command filtering is used to filter the position command (Encoder unit) after electronic gear ratio frequency division or multiplication, making the motor run smoother and reducing the impact on the machine.	The position command output by the upper computer is not subjected to acceleration or deceleration processing	Increased delay in response	Section 6.2.3
Analog input filtering	Preventing motor command fluctuations caused by unstable analog input voltage can also reduce motor misoperation caused by interfering signals.	Low pulse command frequency	Increased delay in response	Section 6.3.1/

1.37.4 Feedforward gain

1) Speed feedforward

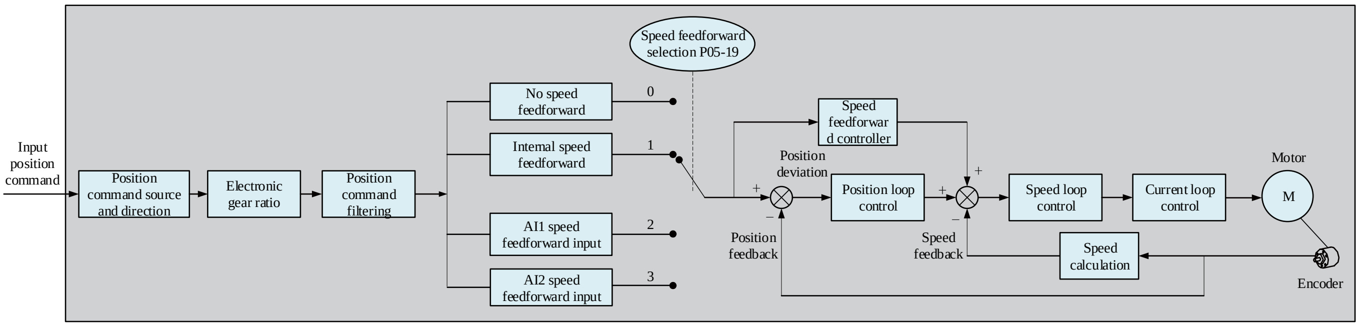


Figure 7-9 Speed feedforward control operation diagram

Speed feedforward can be applied to Position control mode and full closed-loop functions. Using the Speed feedforward function can improve speed command response and reduce position deviation at fixed speeds.

Operation steps of Speed Feedforward function:

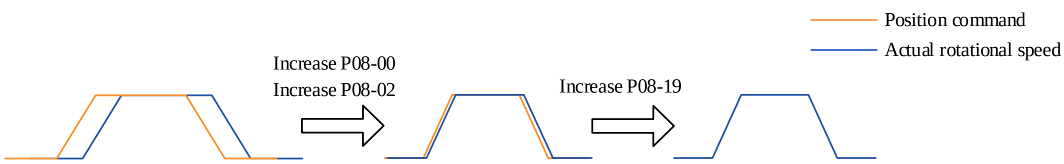
a) Set the Speed feedforward signal source

Set P05-19 (Speed feedforward control selection) to a value other than 0, the Speed feedforward function takes effect, and the corresponding signal source is selected;

Function code	Name	Set value	Notes
P05-19	Speed feedforward control selection	0: No Speed feedforward	-
		1: Internal Speed feedforward	Use the speed information corresponding to the encoder unit as the source of the Speed feedforward signal.
		2: Use AI1 as the Speed feedforward input	Use the speed value corresponding to the analog input from analog channel AI1 as the source of the speed feedforward signal. AI1Parameter settings, please refer to：P03-80, P03-50, P03-51, P03-53, P03-54
		3: Use AI2 as the Speed feedforward input	Use the speed value corresponding to the analog input from the analog channel AI2 as the source of the speed feedforward signal. AI2Parameter settings, please refer to：P03-80, P03-55, P03-56, P03-58, P03-59

b）Set the Speed feedforward parameter

Including speed feedforward gain (P08-19) and speed feedforward filter time constant (P08-18).

Function code	Name	Adjustment instructions
P08-18	Speed feedforward filtering time constant	
P08-19	Speed Feedforward gain	◆Parameter action： Increasing P08-19 can improve response, but speed overshoot may occur during acceleration and deceleration; Reducing P08-18 can inhibit the speed overshoot during acceleration and deceleration; Increasing P08-18 can suppress noise in situations where the update cycle of the position command is longer than the drive control cycle, and the pulse frequency of the position command is uneven, and suppress jitter in the positioning completion signal; ◆Adjustment method: To adjust, first, set P08-18 as a fixed value; Then, gradually increase the setting value of P08-19 from 0 until the Speed Feedforward achieves an effect at a certain setting value.

		When adjusting, you should repeatedly adjust P08-18 and P08-19 to find a balanced setting

2) Torque feedforward:

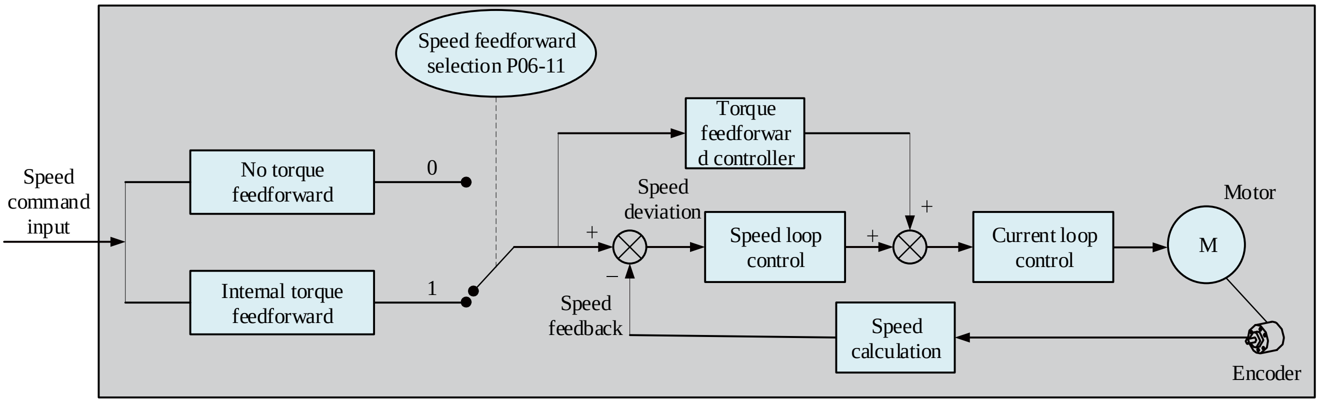


Figure 7-10 Torque feedforward control operation diagram

Position control mode, using torque feedforward, can improve torque command response and reduce position deviation during fixed acceleration and deceleration; speed control mode, using torque feedforward, can improve torque command response and reduce speed deviation at fixed speeds.

Operation steps of torque feedforward function:

a) Set the torque feedforward signal source;

Set P06-11 (Torque feedforward control selection) to 1, the Torque feedforward function takes effect, and the corresponding signal source is selected;

Function code	Name	Set value	Notes
P06-11	Torque feedforward control selection	0:No torque feedforward	-
		1:Internal torque feedforward	Use the speed command as the source of the Torque feedforward signal. In Position control mode, the speed command comes from the output of the position controller.

b) Set the torque feedforward parameter;

Function code	Name	Adjustment instructions
P08-20	Torque feedforward filtering time constant	◆Parameter action: Increasing P08-21 can improve response, but overshoot may occur during acceleration and deceleration; Reducing P08-20 can suppress overshoot during acceleration and deceleration; Increase P08-20 to suppress noise. ◆Adjustment method: When adjusting, first, keep P08-20 as the default value; Then, gradually increase the set value of P08-21 from 0 to a certain set value, Torque feedforward achieved results. When adjusting, you should repeatedly adjust P08-20 and P08-21 to find a balanced setting
P08-21	Torque feedforward gain	For details, please refer to"7.4.4Feedforward gain".

1.37.5 Pseudo differential feedforward control

In non torque control mode, pseudo differential forward feedback control (PDFF control) can be used to adjust the speed loop control mode.

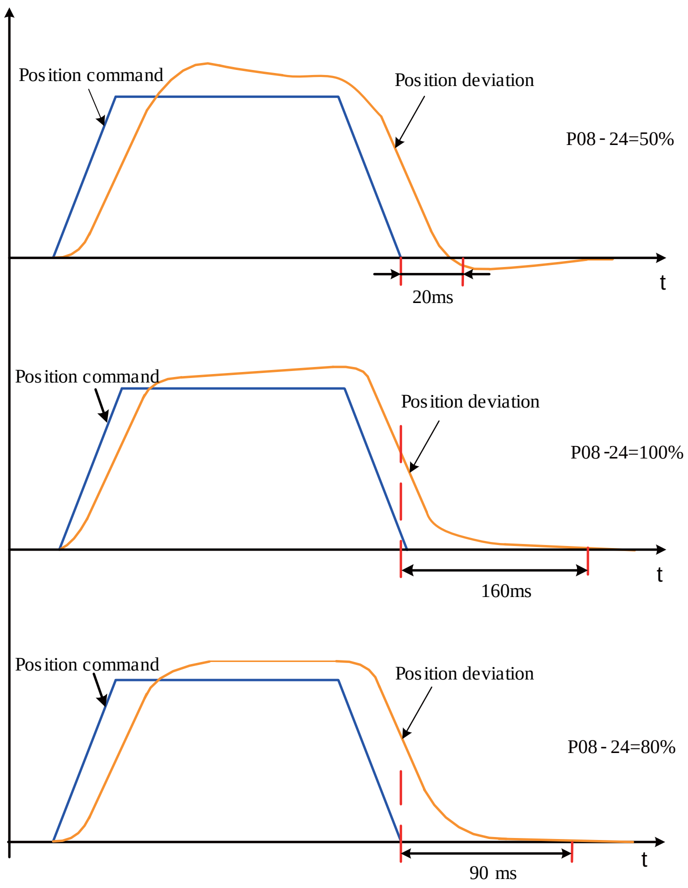


Figure 7-11 Example of Pseudo Differential Adjustment Control

Pseudo differential feedforward control enhances the anti-interference ability of the speed loop by adjusting the speed loop control method, and improves the ability to follow speed commands.

Function code	Name	Adjustment instructions
P08-24	Pseudo differential feedforward control coefficient	◆Parameter action： In non torque control mode, change the control method of the speed loop. ◆Adjustment method: P08-24 is set too small, resulting in slow speed loop response and strain; When there is an overshoot in the speed feedback, gradually decrease P08-24 from 100.0 until the Pseudo differential feedback control achieves an effect at a certain set value. When P08-24=100.0, the speed loop control method remains unchanged and is the default proportional integral control.

1.37.6 Torque disturbance observation

Disturbance observation function can be used in non torque control mode.

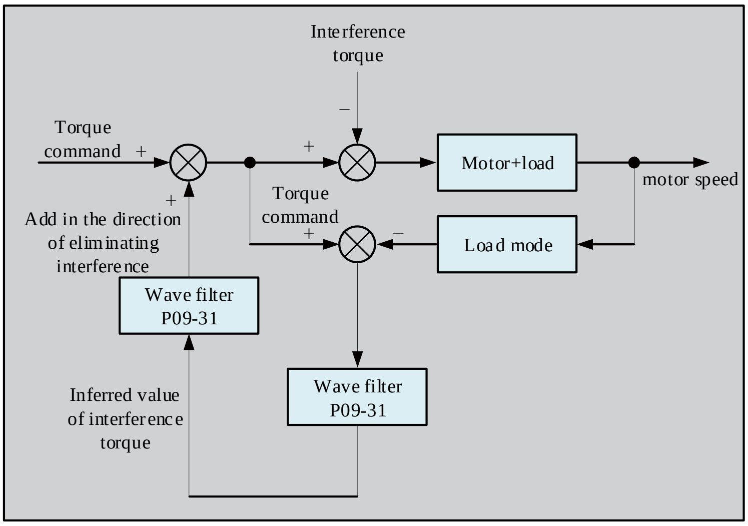


Figure 7-12 Disturbance Observation Function Block Diagram

The disturbance observer can reduce the impact of external disturbances on the servo system and reduce vibration by detecting and estimating the external disturbance torque to the system and compensating for torque commands.

Function code	Name	Adjustment instructions
P09-30	Torque disturbance compensation gain	◆ Parameter action： Increasing P09-30, that is, increasing the proportion of compensation torque superimposed on the torque command, can improve the ability to suppress disturbances, but the noise becomes larger. Increasing P09-31 can reduce noise; Reducing P09-31 can detect and estimate external disturbance torques with short delay times, thereby improving the ability to suppress disturbances, but the noise becomes larger. ◆ Adjustment method: When adjusting, first, set P09-31 to a larger value; Then, gradually increase the set value of P09-30 from 0 until the disturbance observer achieves an effect at a certain set value; Finally, gradually reduce the set value of P09-31 while ensuring that the disturbance observer is always effective. When adjusting, you should repeatedly adjust P09-30 and P09-31 to find a balanced setting.
P09-31	Torque disturbance observer filter time constant	

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P08-18	Speed feedforward filtering time constant	0.00～64.00	ms	Set the filtering time constant of the speed feedforward gain	running settings	Effective immediately	0.50
P08-19	Speed feedforward gain	0.0～100.0	%	Set the size of the speed feedforward gain	running settings	Effective immediately	0.0
P08-20	Torque feedforward filtering time constant	0.00～64.00	ms	Set the filtering time constant of the torque feedforward gain	running settings	Effective immediately	0.50

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P08-21	Torque Feedforward gain	0.0～200.0	ms	Set the size of the torque feedforward gain	running settings	Effective immediately	0.0
P08-24	Pseudo differential feedforward control coefficient	0.0～100.0	%	Set Pseudo differential feedforward control coefficient	running settings	Effective immediately	100.0
P09-30	Torque disturbance compensation gain	0～100.0	%	Set the gain of disturbance torque compensation	running settings	Effective immediately	0.0
P09-31	Torque disturbance observer filter time constant	0.00～25.00	Ms	Set the filtering time constant of the disturbance observer	running settings	Effective immediately	0.50

1.38 Parameter adjustment under different control modes

Parameter adjustment under different control modes should follow the order of "Inertia identification"==>"Automatic gain adjustment"==>"Manual gain adjustment".

1.38.1 Parameter adjustment in position mode

1）Obtain the load inertia ratio P08-15 through Inertia identification：

2）Gain parameter in position mode：

① First gain：

Function code	Name	Function	Default value
P07-05	Torque command filtering time constant	Set Torque command filtering time constant	0.79ms
P08-00	Speed loop gain	Set the speed loop proportional gain	25.0Hz
P08-01	Speed loop integral time constant	Set the integral time constant of the speed loop	31.83ms
P08-02	Position loop gain	Set the position loop proportional gain	40.0Hz

② Second gain：

Function code	Name	Function	Default value
P07-06	Second Torque command filtering time constant	Set Torque command filtering time constant	0.79ms
P08-03	Second speed loop gain	Set the speed loop proportional gain	40.0Hz
P08-04	Second speed loop integral time constant	Set the integral time constant of the speed loop	40.00ms
P08-05	Second position loop gain	Set the position loop proportional gain	64.0Hz
P08-08	Second gain mode setting	Set the mode of the second gain	1
P08-09	Gain switching condition selection	Set conditions for Gain switching	0
P08-10	Gain switching delay time	Set the delay time for Gain switching	5.0ms
P08-11	Gain switching level	Set the level of Gain switching	50
P08-12	Gain switching delay	Set the time delay of Gain switching	30
P08-13	Position Gain switching time	Set the switching time for the position loop gain	3.0ms

③ Common gain：

Function code	Name	Function	Default value
P08-18	Speed feedforward filtering time constant	Set the filtering time constant of the Speed feedforward signal	0.50ms
P08-19	Speed Feedforward gain	Set Speed Feedforward gain	0.0%
P08-20	Torque feedforward filtering time constant	Set the filtering time constant of the Torque feedforward signal	0.50ms
P08-21	Torque Feedforward gain	Set the torque Feedforward gain	0.0%
P08-22	Speed feedback filtering options	Set the speed feedback filtering function	0
P08-23	Speed feedback low-pass filter cutoff frequency	Set the cutoff frequency of the first order low-pass filter for speed feedback	4000Hz
P08-24	Pseudo differential feedforward control coefficient	Set the coefficient of the PDFF controller	100.0%
P09-30	Torque disturbance compensation gain	Set the gain of disturbance torque compensation	0.0%
P09-31	Torque disturbance observer filter time constant	Set the filtering time constant of the disturbance observer	0.5ms
P09-04	Low frequency resonance suppression mode selection	Set the mode of low-frequency resonance suppression	0
P09-38	Low frequency resonance frequency	Set the frequency of the low-frequency resonance suppression filter	100.0Hz
P09-39	Low frequency resonance frequency filter setting	Set the filtering settings of the low-frequency resonance suppression filter	2
P0A-16	Low frequency resonance position deviation judgment threshold	Set how many pulses or more for position fluctuations to be considered low-frequency resonance	5

3)Obtain initial values of the first gain (or second gain) and common gain through automatic gain adjustment

4）Manually fine adjust the following gains：

Function code	Name	Function
P07-05	Torque command filtering time constant	Set torque command filtering time constant
P08-00	Speed loop gain	Set the speed loop proportional gain
P08-01	Speed loop integral time constant	Set the integral time constant of the speed loop
P08-02	Position loop gain	Set the position loop proportional gain
P08-19	Speed feedforward gain	Set Speed feedforward gain

1.38.2 Parameter adjustment in speed mode

The parameter adjustment in Speed control mode is the same as that in Position control mode. Except for the position loop gain (P08-02, P08-05), please adjust according to7.5.1.

1.38.3 Parameter adjustment in torque mode

Parameter adjustment in the Torque control mode needs to be differentiated according to the following conditions：

The actual speed reaches the speed limit value (refer to “6.4.4Torque mode speed limit”)，for speed limit in torque mode), and the adjustment method is the same as“7.5.2 Parameter adjustment in speed mode” "7.5.2 Parameter adjustment in speed mode"; The actual speed does not reach the speed limit, except for the position speed loop gain and speed loop integral time constant, the adjustment method is the same as “7.5.2Parameter adjustment in speed mode”；

1.39 Vibration suppression

1.39.1 Mechanical resonance suppression

The mechanical system has a certain resonance frequency, and when the servo gain increases, resonance may occur near the mechanical resonance frequency, resulting in the inability to continue to increase the gain. There are two ways to suppress mechanical resonance：

1）Torque command filtering(P07-05，P07-06)

By setting the filtering time constant, the torque command is attenuated in the high-frequency band above the cut-off frequency to achieve the purpose of suppressing mechanical resonance.

Filter cut-off frequency fc (Hz)=1/[2 π × P07-05(ms) × 0.001].

2）Notch filter：

A notch filter can suppress mechanical resonance by reducing the gain at a specific frequency. After setting the notch filter correctly, vibration can be effectively suppressed, and you can try to continue increasing the servo gain. The principle of the notch filter is shown in the figure below.

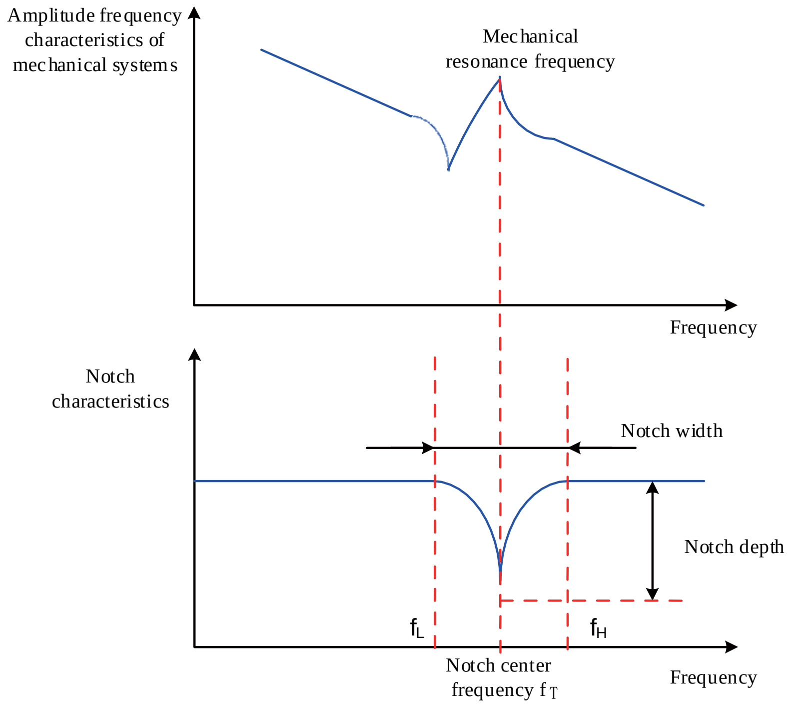


Figure 7-13 Suppression principle of notch filter

The servo drive has a total of 4 sets of trap filters, each set of trap filters has 3 parameters, namely trap frequency, width level, and depth level. The first and second groups of wave traps are manual wave traps, and each parameter is manually set by the user; The third and fourth groups of trap parameters can be set manually or configured as adaptive traps (P09-02=1 or 2), at which time each parameter is automatically set by the drive.

Table 7-9 Description of notch filter

Items	Manual notch filter		Manual/adaptive notch filter	
	The first group of notch filters	The second group of notch filters	The third group of notch filters	The 4th group of notch filters
Frequency	P09-12	P09-15	P09-18	P09-21
Width level	P09-13	P09-16	P09-19	P09-22

Depth level	P09-14	P09-17	P09-20	P09-23

NOTE

- When "Frequency" is the default value of 4000Hz, the notch filter is invalid.

Caution:

- If resonance occurs and a notch filter is required, adaptive notch filters are preferred. Adaptive notch filter is invalid or ineffective, try using manual notch filter again.

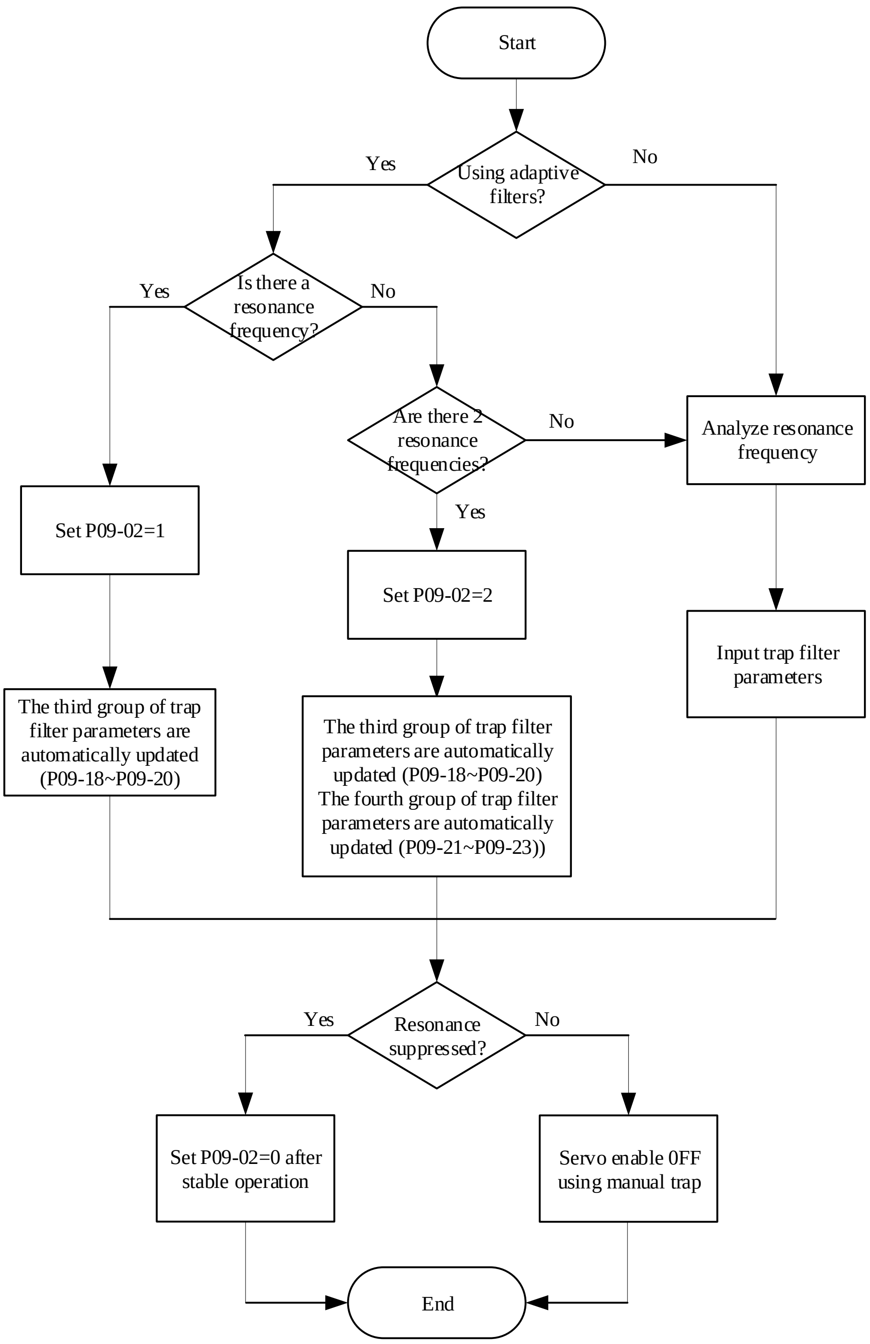


Figure 7-14 Steps for using the notch filter

a）Steps for using adaptive notch filter：

① Set P09-02 (adaptive notch filter mode selection) to 1 or 2 based on the number of resonance points;

When resonance occurs, you can first set P09-02 to 1 and start an adaptive notch filter. After the gain is adjusted, if a new resonance occurs, set P09-02 to 2 and start two adaptive notch filters.

② During Servo running, the third or fourth set of notch filter parameters are automatically updated, and the corresponding P09 function code is automatically stored every 30 minutes.

③ If resonance is suppressed, it indicates that the adaptive notch filter has achieved an effect. After waiting for the servo to run stably for a period of time, when P09-02 is set to 0, the adaptive notch filter parameter is fixed to the last updated value. This step can prevent incorrect actions during Servo running from causing the notch filter parameter to be updated to an incorrect value, which can exacerbate the vibration condition.

④ If the vibration cannot be eliminated for a long time, please timely turn off the servo enable.

If the resonance frequency exceeds 2, and the adaptive notch filter cannot meet the demand, a manual notch filter can be used at the same time; You can also use all four notch filters as manual notch filters (P09-02=0).

Caution:

- When using adaptive notch filter, if servo enable OFF occurs within 30 minutes, the notch filter parameter will not be stored in the corresponding function code.
- When the resonance frequency is below 300Hz, the effect of adaptive notch filter will be reduced.

b)Steps for using manual notch filter：

① Analyze resonance frequency;

When using a manual notch filter, it is necessary to set the frequency of the notch filter to the actual resonance frequency. Method for obtaining resonance frequency:

- Obtained from the "mechanical characteristic analysis" of the drive debugging platform;
- Calculate the resonance frequency by driving the motor phase current displayed on the oscilloscope interface of the debugging platform;
- Automatically test the resonance frequency when P09-02=3 and Servo running, and save the test results in P09-24

② Input the resonance frequency obtained in step ① into the notch filter parameter of the selected group, and simultaneously input the width level and depth level of the notch filter of the group;

③ If resonance is suppressed, it indicates that the notch filter has achieved an effect. You can continue to adjust the gain. After the gain increases, if new resonance occurs, repeat steps ① to ②;

④ If the vibration cannot be eliminated for a long time, please timely turn off the servo enable.c）notch filter

The notch filter width level is used to represent the ratio of the notch filter width to the notch filter center frequency：

$$\text{notch filter width level}=\frac{f_H-f_L}{f_T}$$

Among them：

f_T：Notch filter center frequency, i.e., mechanical resonance frequency

f_H-f_L：The notch filter width represents a frequency bandwidth with an amplitude attenuation rate of - 3 dB relative to the notch filter center frequency.

The corresponding relationship is shown in Figure 7-15 below. Generally, it is sufficient to maintain the default value of 2.

d）Notch filter depth level

The notch filter depth level represents the ratio relationship between input and output at the center frequency.

When the notch filter depth level is 0, the input is completely suppressed at the center frequency; When the notch filter depth level is 100, the input is fully passable at the center frequency. Therefore, the smaller the notch filter depth level setting, the deeper the notch depth, and the stronger the suppression of mechanical resonance, but it may lead to system instability, which should be noted when using.

⚠Caution:

- If there are no obvious peaks in the amplitude frequency characteristic curve obtained using the mechanical characteristic analysis tool, and vibration actually occurs, this vibration may not be mechanical resonance, but may be caused by reaching the limit gain of the servo. This vibration cannot be suppressed by notch filter, but can only be improved by reducing the gain or torque command filtering time.

The specific correspondence is shown in the following figure：

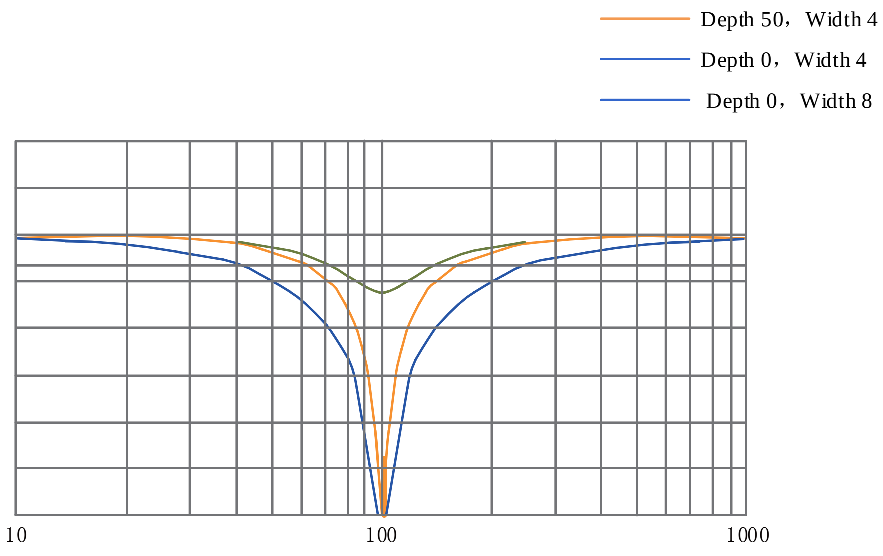


Figure 7-15 Frequency characteristics of notch filter

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P09-02	Adaptive notch filter mode selection	0: The third and fourth groups of adaptive notch filter parameters are no longer updated 1:1 adaptive notch filters are effective, and the third set of notch filter parameters are updated in real time based on the vibration situation 2: Two adaptive notch filters are effective, and the third and fourth groups of notch filter parameters are updated in real time based on vibration conditions 3: Only test the resonance frequency, which is displayed in	-	Set the mode of adaptive notch filter	running settings	Effective immediately	0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
		P09-24 4: Clear the adaptive notch filter and restore the values of the third and fourth groups of notch filters to the factory state.					
P09-12	The first set of notch filter frequencies	50～4000	Hz	Set the frequency of the first set of notch filters	running settings	Effective immediately	4000
P09-13	The first set of notch filter width levels	0～10	-	Set the width level of the first set of notch filters	running settings	Effective immediately	2
P09-14	The first group of notch filter depth levels	0～99	-	Set the attenuation level of the first set of notch filters	running settings	Effective immediately	0
P09-15	Second set of notch filter frequencies	50～4000	Hz	Set the frequency of the second set of notch filters	running settings	Effective immediately	4000
P09-16	The second group of notch filter width levels	0～10	-	Set the width level of the second set of notch filters	running settings	Effective immediately	2
P09-17	The second group of notch filter depth levels	0～99	-	Set the attenuation level of the second set of notch filters	running settings	Effective immediately	0
P09-18	Third group of notch filter frequencies	50～4000	Hz	Set the frequency of the third set of notch filters	running settings	Effective immediately	4000
P09-19	Third group of notch filter width levels	0～10	-	Set the width level of the third set of notch filters	running settings	Effective immediately	2
P09-20	The third group of notch filter depth levels	0～99	-	Set the attenuation level of the third set of notch filters	running settings	Effective immediately	0
P09-21	Fourth group of notch filter frequencies	50～4000	Hz	Set the frequency of the fourth set of notch filters	running settings	Effective immediately	4000
P09-22	Fourth group of notch filter width levels	0～10	-	Set the width level of the fourth group of notch filters	running settings	Effective immediately	2
P09-23	The fourth group of notch filter	0～99	-	Set the attenuation level of the	running settings	Effective immediately	0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
	depth levels			fourth group of notch filters			
P09-24	Resonance frequency identification results	-	Hz	Identification result of resonance frequency when P09-02=3 is displayed	-	-	0

1.39.2 Low frequency resonance suppression

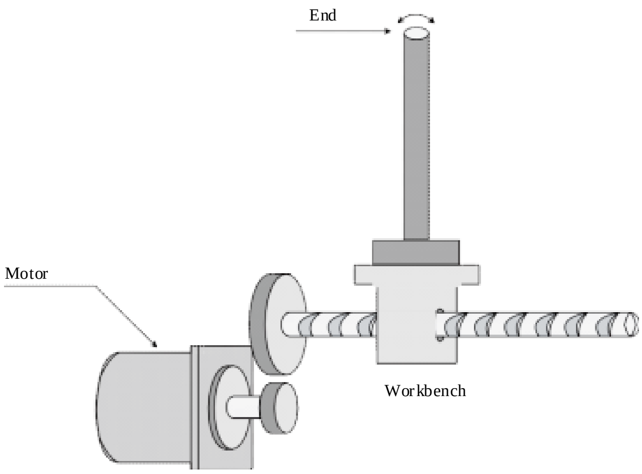


Figure 7-16 Mechanical Schematic Diagram of Low Frequency Resonance

If the end of a mechanical load is long and heavy, end vibration is prone to occur during an Emergency shutdown, affecting the positioning effect. The frequency of this vibration is generally within 100 Hz, which is lower than the mechanical resonance frequency in Subsection 7.6.1. Therefore, it is called low-frequency resonance. The Low frequency response suppression function can effectively reduce this vibration.

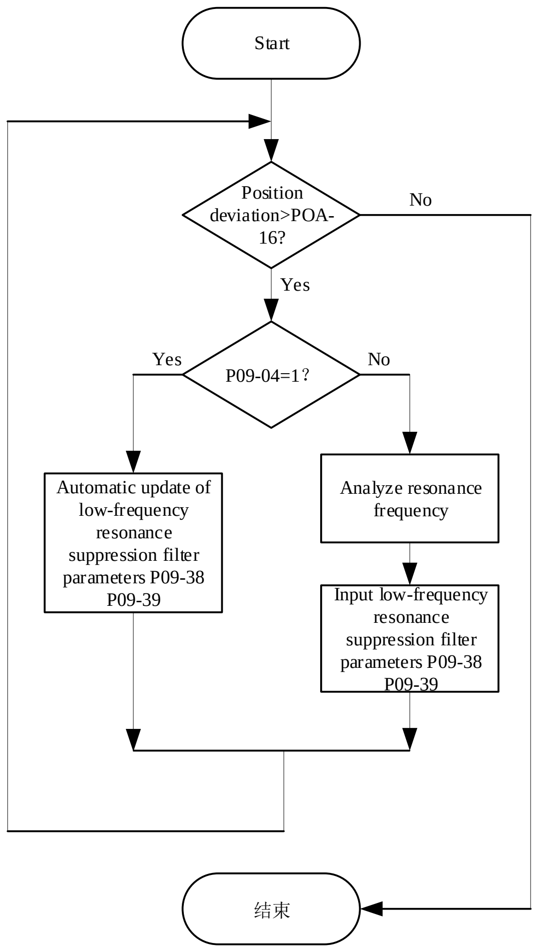


Figure 7-17 Steps for Using Low frequency response suppression Filter

1）Set the low-frequency resonance position deviation judgment threshold P0A-16:

When the position deviation is greater than P0A-16, low-frequency resonance is considered to have occurred; Reducing this parameter makes it easier to detect vibrations.

2) Set the Low frequency response suppression mode P09-04:

The servo drive provides two Low frequency response suppression methods, with automatic setting being preferred:

a) P09-04=1, automatically set Low frequency response suppression filter parameters:

At this time, the servo drive automatically detects the frequency and amplitude of low-frequency resonance, and automatically sets P09-38 (low-frequency resonance frequency) and P09-39 (low-frequency resonance frequency filter setting).

b) P09-04=0, manually set the Low frequency response suppression filter parameter:

Firstly, use the oscilloscope function of the drive debugging platform to collect the waveform of the position deviation of the motor in the positioning state, and calculate the fluctuation frequency of the position deviation, which is the low-frequency resonance frequency;

Then, manually input P09-38 (low frequency resonance frequency), and P09-39 generally remains the default.

3) Observe whether the position deviation still exceeds P0A-16 after using the Low frequency response suppression filter:

If yes, repeat steps 2) to 3); If no, it indicates that Low frequency response suppression has achieved an effect。

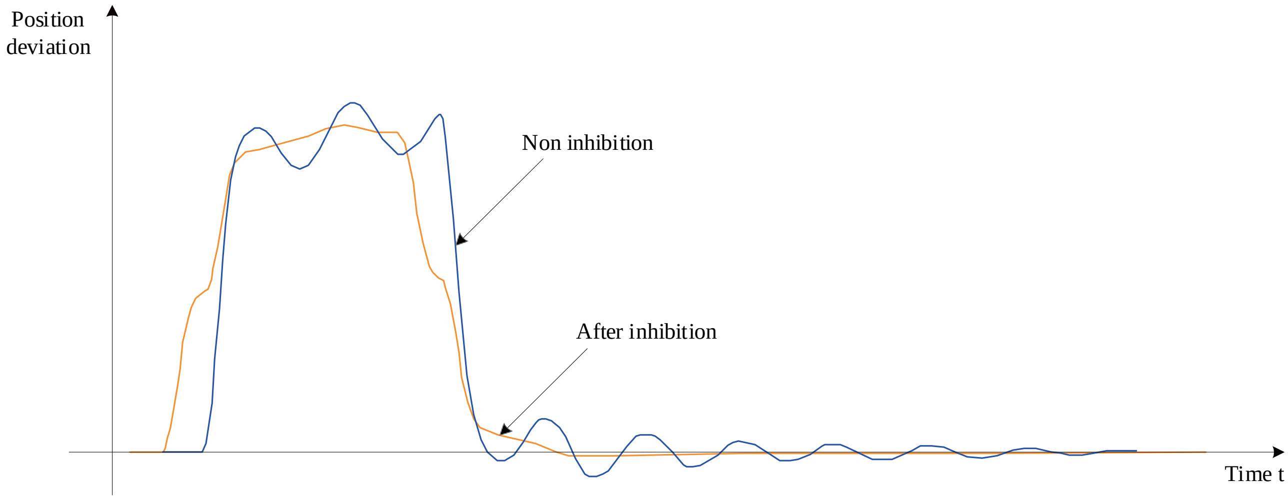


Figure 7-18 Rendering of Low frequency response suppression

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P09-04	Low frequency response suppression mode selection	0: Manually set the parameters of the Low frequency response suppression filter 1: Automatically set the parameters of the Low frequency response suppression filter	-	Set the mode of Low frequency response suppression	running settings	Effective immediately	0
P09-38	Low frequency resonance frequency	1.0～100.0	Hz	Set the frequency of the Low frequency response	running settings	Effective immediately	100.0

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
				suppression filter			
P09-39	Low frequency resonance frequency filter setting	0～10	-	Set the width level of the Low frequency response suppression filter	running settings	Effective immediately	2
P0A-16	Low frequency resonance position deviation judgment threshold	1～1000	P	Setting the position deviation of more than several pulses is considered as low-frequency resonance	running settings	Effective immediately	5

Chapter VIII Parameter Description

Function code group	Parameter Group Summary	Function code group	Parameter Group Summary
Group P00	Servo motor parameters	Group P0A	Fault and protection parameters
Group P01	Drive parameters	Group P0B	Monitoring parameters
Group P02	Basic control parameters	Group P0C	Communication parameters
Group P03	Terminal input parameters	Group P0D	Auxiliary functions parameter
Group P04	Terminal output parameters	Group P0F	Full closed-loop functional parameters
Group P05	Position control parameters	Group P11	Multi-segment position function parameters
Group P06	Speed control parameters	Group P12	Multi segment speed parameters
Group P07	Torque control parameters	Group P17	Virtual DIDO Parameters
Group P08	Gain class parameters	P30 group	Communication reading servo related variables
Group P09	Self adjusting parameters	P31 group	Communication given servo related variables

Group P00: Servo motor parameters

<table>
<tr><td rowspan="2">P00-00</td><td>Name</td><td colspan="3">Motor number</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>14130: Tamagawa absolute encoder motor
22 □□□: 220V level incremental encoder motor
38 □ □ □: 380V level incremental encoder motor</td><td>Unit</td><td>-</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>14130</td></tr>
<tr><td colspan="9">Set the number of the servo motor.
For LCDA630P series drives, the matching motor is a bus type motor with an encoder resolution of 17 bits (1048576 P/r), and P00-00 is fixed to "14130". For the specific number of bus type motors, please refer to P00-05. The matching motor is an incremental motor with an encoder wire count of 2500P/r. P00-00 is the motor number.
If the motor number is set incorrectly, FU.120 (product matching fault) will occur.</td></tr>
</table>

<table>
<tr><td rowspan="2">P00-02</td><td>Name</td><td colspan="3">Non label</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">Display non-standard version of the software number, hexadecimal Display.
For LCDA630P series drives, display type: 6XX.YY.
20: A fixed number for non-standard software. YY: The upgrade record number of non-standard software.</td></tr>
</table>

P00-04	Name	Encoder version number			Setting method	Display	Related modes	-
	Setting range	-	Unit	-	Effective method	-	Factory setting	-
For LCDA630P series drives, display the software version number of the encoder.Display type: 20XX. Y, 1 decimal place 20: Indicates that the encoder has a resolution of 17 bits (1048576 P/r)								

P00-05	Name	Bus motor number			Setting method	Display	Related modes	-
	Setting range	-	Unit	-	Factory setting	-	Factory setting	-
For LCDA630P series drives, the specific number of the bus type motor is displayed, which is determined by the motor model and cannot be changed.								

P00-08	Name	Absolute value encoder type			Setting method	Shutdown setting	Related modes	-
	Setting range	14100: Multi turn absolute encoder Other: Single turn absolute value encoder	Unit	-	Effective method	Re-energize	Factory setting	-
When using a 17 bit encoder motor, set 14100 as a multi turn absolute value encoder, and the others as a single turn absolute value encoder.								
P00-09	Name	Rated voltage			Setting method	Shutdown setting	Related modes	-
	Setting range	0：220 1：380	Unit	V	Effective method	Re-energize	Factory setting	-

P00-10	Name	Rated power			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	kW	Effective method	Re-energize	Factory setting	-

P00-11	Name	Rated current			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	A	Effective method	Re-energize	Factory setting	-

P00-12	Name	Rated torque			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	Nm	Effective method	Re-energize	Factory setting	-

P00-13	Name	Maximum torque			Setting method	Shutdown setting	Related modes	-
	Setting range	0.10～655.35	Unit	Nm	Effective method	Re-energize	Factory setting	-

P00-14	Name	Rated rotational speed			Setting method	Shutdown setting	Related modes	-
	Setting range	100～6000	Unit	rpm	Effective method	Re-energize	Factory setting	-

P00-15	Name	Maximum rotational speed			Setting method	Shutdown setting	Related modes	-
	Setting range	100～6000	Unit	rpm	Effective method	Re-energize	Factory setting	-

P00-16	Name	Rotational inertiaJm			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	$kgcm^2$	Effective method	Re-energize	Factory setting	-

P00-17	Name	Pole pairs of permanent magnet synchronous motors			Setting method	Shutdown setting	Related modes	-
	Setting range	2～360	Unit	Antipolar	Effective method	Re-energize	Factory setting	-

P00-18	Name	Stator resistance			Setting method	Shutdown setting	Related modes	-
	Setting range	0.001～65.535	Unit	Ω	Effective method	Re-energize	Factory setting	-

P00-19	Name	Stator inductance Lq			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	mH	Effective method	Re-energize	Factory setting	-

P00-20	Name	Stator inductanceLd			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	mH	Effective method	Re-energize	Factory setting	-

P00-21	Name	Line back potential coefficient			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	mV/rpm	Effective method	Re-energize	Factory setting	-

P00-22	Name	Torque coefficient Kt			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	Nm/Arms	Effective method	Re-energize	Factory setting	-

P00-23	Name	Electrical constant Te	Setting method	Shutdown setting	Related modes	-

	Setting range	0.01～655.35	Unit	ms	Effective method	Re-energize	Factory setting	-

P00-24	Name	Mechanical constant Tm			Setting method	Shutdown setting	Related modes	-
	Setting range	0.01～655.35	Unit	ms	Effective method	Re-energize	Factory setting	-

P00-28	Name	Absolute code disk position offset			Setting method	Shutdown setting	Related modes	-
	Setting range	0～1073741824	Unit	P/r	Effective method	Re-energize	Factory setting	-

P00-30	Name	Encoder selection (HEX)			Setting method	Shutdown setting	Related modes	-
	Setting range	0x000: Ordinary incremental encoder (UVW-ABZ) 0x010-17bit: Tamagawa bus encoder	Unit	1	Effective method	Re-energize	Factory setting	-

P00-31	Name	Number of encoder lines			Setting method	Shutdown setting	Related modes	-
	Setting range	0～1073741824	Unit	P/r	Effective method	Re-energize	Factory setting	-

P00-33	Name	Electrical angle corresponding to Z signal			Setting method	Shutdown setting	Related modes	-
	Setting range	0.0～360	Unit	°	Effective method	Re-energize	Factory setting	-

P00-34	Name	U-phase rising edge response angle			Setting method	Shutdown setting	Related modes	-
	Setting range	0.0～360	Unit	°	Effective method	Re-energize	Factory setting	180

Group P01: Drive parameters

P01-00	Name	MCU software version number			Setting method	Display	Related modes	-
	Setting range	0～65535	Unit	-	Effective method	-	Factory setting	-

P01-01	Name	FPGA software version number			Setting method	Display	Related modes	-
	Setting range	0～65535	Unit	-	Effective method	-	Factory setting	-

P01-02	Name	Servo drive number			Setting method	Shutdown setting	Related modes	-
	Setting range	0～65535	Unit	-	Effective method	Re-energize	Factory setting	-

Set the No. of the servo drive.

Set value	Servo drive number	Notes
1	S1R1	The rated power of drive is 0.1kW, and the main circuit power supply specification is single-phase 220V.
2	S1R6	The rated power of drive is 0.2kW, and the main circuit power supply specification is single-phase 220V.
3	S2R8	The rated power of drive is 0.4kW, and the main circuit power supply specification is single-phase 220V.
5	S5R5	The rated power of drive is 0.75kW, and the main circuit power supply specification is single-phase/three-phase 220V (* 1).
6	S7R6	The rated power of drive is 1.0kW, and the main circuit power supply specification is single-phase/three-phase 220V.
7	S012	The rated power of drive is 1.5kW, and the main circuit power supply specification is single-phase/three-phase 220V.
8	S018	The rated power of drive is 3kW, and the main circuit power supply specification is single-phase/three-phase 220V.
9	S025	The rated power of drive is 5.5kW, and the main circuit power supply specification is single-phase/three-phase 220V.
00010	S032	The rated power of drive is 7.5kW, and the main circuit power supply specification is single-phase/three-phase 220V.
10001	T3R5	The rated power of drive is 1.0kW, and the main circuit power supply specification is three-phase 380V.
10002	T5R4	The rated power of drive is 1.5kW, and the main circuit power supply specification is three-phase 380V.
10003	T8R4	The rated power of drive is 2.0kW, and the main circuit power supply specification is three-phase 380V.
10004	T012	The rated power of drive is 3.0kW, and the main circuit power supply specification is three-phase 380V.
10005	T017	The rated power of drive is 5.0kW, and the main circuit power supply specification is three-phase 380V.
10006	T021	The rated power of drive is 6.0kW, and the main circuit power supply

		specification is three-phase 380V.
10007	T026	The rated power of drive is 7.5kW, and the main circuit power supply specification is three-phase 380V.

If the servo drive number is set incorrectly, FU.120 (product matching fault) will occur.

If the power supply voltage of the main circuit of the servo drive does not meet the above specifications, FU.420 (main circuit phase fault) or FU.990 (main circuit phase fault warning) will occur.

◆Notes：

*1：The main circuit power supply specification of the drive is three-phase 220V, but when P0A-00=2, single-phase 220V can be used as the main circuit power supply.

Q55

Group P02: Basic control parameters

<table>
<tr><td rowspan="2">P02-00</td><td>Name</td><td colspan="3">Control mode selection</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～6</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>1</td></tr>
<tr><td colspan="9">Select the servo drive control mode.
<table>
<tr><th>Set value</th><th>Control model</th><th>Notes</th></tr>
<tr><td>0</td><td>Speed mode</td><td>Refer to Section 6.3 for speed mode parameter settings</td></tr>
<tr><td>1</td><td>Position mode</td><td>Refer to Section 6.2 for location mode parameter settings</td></tr>
<tr><td>2</td><td>Torque mode</td><td>Refer to Section 6.4 for torque mode parameter settings</td></tr>
<tr><td>3</td><td>Torque mode ↔ Speed mode</td><td>One DI terminal should be set with FunIN. 10: M1 function_ SEL (mode switching) and determine terminal logic.
<table>
<tr><th>M1_ SEL terminal logic</th><th>Control model</th></tr>
<tr><td>Invalid</td><td>Torque mode</td></tr>
<tr><td>Valid</td><td>Speed mode</td></tr>
</table></td></tr>
<tr><td>4</td><td>Speed mode ↔ Position mode</td><td>One DI terminal should be set with FunIN. 10: M1 function_ SEL (mode switching) and determine terminal logic.
<table>
<tr><th>M1_ SEL terminal logic</th><th>control model</th></tr>
<tr><td>Invalid</td><td>Speed mode</td></tr>
<tr><td>Valid</td><td>Position mode</td></tr>
</table></td></tr>
<tr><td>5</td><td>Torque mode ↔ Position mode</td><td>One DI terminal should be set with FunIN. 10: M1 function_ SEL (mode switching) and determine terminal logic.
<table>
<tr><th>M1_ SEL terminal logic</th><th>Control model</th></tr>
<tr><td>Invalid</td><td>Torque mode</td></tr>
<tr><td>Valid</td><td>Position mode</td></tr>
</table></td></tr>
<tr><td>6</td><td>Torque mode ↔ speed ↔ Position mixing mode</td><td>Two DI terminal functions should be set as FunIN.10: M1_ SEL (mode switching) and FunIN. 11: M2_ SEL (mode switching) and determine terminal logic.
<table>
<tr><th>M2_SEL Terminal logic</th><th>M1_SEL Terminal logic</th><th>Control model</th></tr>
<tr><td>Invalid</td><td>I</td><td>Torque mode</td></tr>
<tr><td>Valid</td><td>Invalid</td><td>Speed mode</td></tr>
<tr><td>-</td><td>Valid</td><td>Position mode</td></tr>
</table></td></tr>
<tr><td>9</td><td>CANopen control mode</td><td>For details, see“10.3 CANopen Communication”。</td></tr>
</table>
When P02-00=3,4,5,6, please refer to “6.5 Hybrid control mode” for parameter settings.</td></tr>
</table>

P02-01	Name	Absolute value system selection			Setting method	Shutdown setting	Related modes	ALL
	Setting range	0～2	Unit	-	Effective method	Re-energize	Factory setting	0

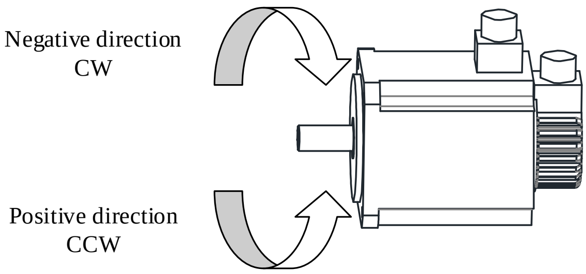
Select the drive absolute position function.

Set value	Absolute value system selection	Notes
0	Incremental position mode	After the drive is powered off, it is necessary to perform an home reset to confirm the mechanical home, and there is no position memory function after power fault.
1	Absolute position linear mode	Applicable to absolute value encoder motors (motor number P00-00=14130). When the drive is powered off, the encoder backs up data through the battery. After power on, the drive calculates the mechanical absolute position through the encoder absolute position. For details, see"6.6 Operating Instructions for Absolute Value System".
2	Absolute position rotation mode	

P02-02	Name	Rotation direction selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Re-energize	Factory setting	0

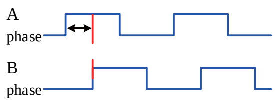
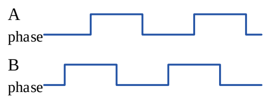
Set the positive rotation direction of the motor when viewed from the motor shaft side.

Set value	Rotation direction	Notes
0	Take CCW direction as forward rotation direction	During the forward command, when viewed from the motor shaft side, the motor rotates in the CCW direction, that is, the motor rotates counterclockwise.
1	Take CW direction as forward rotation direction	When commanded in the forward direction, when viewed from the motor shaft side, the motor rotates in the CW direction, that is, the motor rotates clockwise.



P02-03	Name	Output pulse phase			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Re-energize	Factory setting	0

When using the pulse output function, the phase relationship between the A-phase pulse and the B-phase pulse is output with the motor rotation direction unchanged.

Set value	Output pulse phase	Notes
0	A leads B	In the encoder frequency division output pulse, the A-phase pulse is 90 ° ahead of the B-phase pulse 
1	A lags B	The A-phase pulse lags behind the B-phase pulse by 90 ° in the encoder frequency division output pulse 

P02-05	Name	Servo enable OFF shutdown mode selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

When setting the servo enable (S-ON) OFF, the deceleration mode of the servo motor from rotation to stop and the motor state after stopping.

Set value	Shutdown mode
0	Free stop and maintain free running status
1	Zero speed shutdown to maintain free running status

Appropriate shutdown methods should be set according to the mechanical status and operating requirements.

For comparison of shutdown methods, please refer to "6.1.9 Servo Shutdown".

P02-06	Name	Fault No.2 Shutdown Mode Selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the deceleration mode of the servo motor from rotation to stop and the motor state after stopping when the servo drive encounters the second type of fault.

Set value	Shutdown mode
0	Free stop and maintain free running status
1	Zero speed shutdown to maintain free running status

For details of type 2 faults, please refer to"Chapter 9 Troubleshooting" . For comparison of shutdown methods, please refer to "6.1.9 Servo Shutdown".

◆ Caution:

After enabling the band brake, when the second type of fault occurs, the internal force P02-06 of the drive is 1: zero speed shutdown to maintain free running status.

P02-07	Name	Overtravel shutdown mode selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	1

When setting the servo enable (S-ON) OFF, the deceleration mode of the servo motor from rotation to stop and the motor state after stopping.

Set value	Shutdown mode
0	Free stop and maintain free running status
1	Zero speed shutdown, position remains locked
2	Zero speed shutdown and maintain free running status

When the servo motor drives the vertical shaft, in order to ensure safety, it should be set that the motor shaft is in a position locked state (P02-07=1) after an overtravel occurs.

For a comparison of shutdown modes, please refer to "6.1.9 Servo Shutdown".

P02-08	Name	Fault NO.1Shutdown mode selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the deceleration mode of the servo motor from rotation to stop and the motor state after stopping when the servo drive encounters a Type 1 fault.

Set value	Shutdown mode
0	Free stop and maintain free running status

For details of Type 1 faults, please refer to "Chapter IX Handling of faults and warnings during startup"。

For a comparison of shutdown modes, please refer to "6.1.9 Servo Shutdown".

P02-09	Name	Band brake output ON to command reception delay			Setting method	running settings	Related modes	PS
	Setting range	0～500	Unit	ms	Effective method	Effective immediately	Factory setting	250

After the servo drive is powered on, the servo drive starts to receive input commands, and the delay time from the band brake output (BK) ON is set.

During P02-09, the servo did not receive position/speed/torque commands.

Please refer to"6.1.6 Band brake settings", and check "Band brake timing diagram when the motor is stationary".

P02-10	Name	Static state, band brake output OFF to motor power off delay			Setting method	running settings	Related modes	PS
	Setting range	1～1000	Unit	ms	Effective method	Effective immediately	Factory setting	150

Set the delay time from the band brake output (BK) to OFF when the motor enters a dead state when it is stationary.

Please refer to "6.1.6 Band brake settings", and check "Band brake timing diagram when the motor is stationary".

P02-11	Name	Rotation speed threshold when the band brake output is OFF in rotating state			Setting method	running settings	Related modes	PS
	Setting range	0～3000	Unit	rpm	Effective method	Effective immediately	Factory setting	30

Set the motor speed threshold when the band brake output (BK) is set to OFF when the motor is in the rotating state.

Please refer to "6.1.6 Band brake settings", and check "Band brake timing diagram when the motor is stationary".

P02-12	Name	Rotation status, servo enable OFF to band brake output OFF delay			Setting method	running settings	Related modes	PS
	Setting range	1～1000	Unit	ms	Effective method	Effective immediately	Factory setting	500

When the motor is in the rotating state, set the band brake output (BK) to OFF and the delay time for the distance servo enable (S-ON) to OFF.

Please refer to "6.1.6 Band brake settings", and check "Band brake timing diagram when the motor is stationary".

P02-15	Name	LED WARNING DISPLAY SELECTION			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Set whether the panel switches to the Trouble display mode when the servo drive encounters a Type 3 warning.

Set value	Shutdown mode	Notes
0	Immediately output a warning message	When a Type 3 warning occurs, the panel displays a warning code in real time.
1	Do not output warning messages	The panel only displays Type 1 and Type 2 faults, and does not display Type 3 warnings. To view whether Type 3 warnings have occurred in the past 10 times, select and view them through the parameters P0B-33 and P0B-34.

For details of Type 3 warnings, please refer to "Chapter 9 Troubleshooting".

P02-18	Name	Servo enable (S-ON) filter time constant			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～64	Unit	ms	Effective method	Effective immediately	Factory setting	0

Set the filtering time constant for DI function 1 (FunIN. 1: S-ON, servo enabled).

When the servo enable (S-ON) is allocated to the common hardware DI terminal: the signal width must be greater than (P02-18)+3ms, otherwise the servo enable is invalid. When the servo enable (S-ON) is assigned to the fast hardware DI terminal: the signal width must be greater than (P02-18)+0.25ms, otherwise the servo enable is invalid. When the servo enable (S-ON) is assigned to the VDI terminal: the signal width must be greater than (P02-18)+1ms, otherwise the servo enable is invalid.

The DI servo enable signal displayed in the oscilloscope of the universal drive debugging platform does not undergo P02-18 filtering.

P02-21	Name	Minimum allowable braking resistance of the drive			Setting method	Display	Related modes	PST
	Setting range	-	Unit	Ω	Effective method	-	Factory setting	-

Check the minimum allowable braking resistance of a certain type of drive, which is only related to the drive model.

P02-22	Name	Power of built-in braking resistor			Setting method	Display	Related modes	PST
	Setting	-	Unit	W	Effective	-	Factory	-

	range				method		setting	

Check the built-in braking resistor power of a certain type of drive, which is only related to the drive model.

P02-23	Name	Internal braking resistance value			Setting method	Display	Related modes	PST
	Setting range	-	Unit	Ω	Effective method	-	Factory setting	-

Check the built-in braking resistance value of a certain type of drive, which cannot be changed and is only related to the drive model.

When the maximum braking energy that the bus capacitance can absorb is less than the calculated value of the maximum braking energy, it is necessary to use a braking resistor. When using a built-in braking resistor, connect terminals "B2" and "B3" directly with a short connector.

When the servo drive number (P01-02)=1 or 2 or 3, there is no built-in braking resistor.

P02-24	Name	Resistance heat dissipation coefficient			Setting method	Shutdown setting	Related modes	PST
	Setting range	10～100	Unit	%	Effective method	Effective immediately	Factory setting	30

When setting and using a braking resistor, the heat dissipation coefficient of the resistor is effective for both internal and external braking resistors. Please set P02-24 (resistance heat dissipation coefficient) based on the heat dissipation conditions of the actual resistance.

◆ Recommended value：

Generally, P02-24 (resistance heat dissipation coefficient) does not exceed 30% during natural cooling;

When forced air cooling is applied, P02-24 (resistance heat dissipation coefficient) does not exceed 50%.

P02-25	Name	Resistance heat dissipation coefficient			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～3	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the methods to absorb and release braking energy.

Set value	Methods to absorb and release braking energy	Notes
0	Use built-in braking resistor	"Maximum braking energy calculation value">"Maximum braking energy that can be absorbed by the capacitor"
1	Use external braking resistor for natural cooling	And "calculated value of braking power" ≤ "built-in braking resistor power".
2	Using external braking resistor, forced air cooling	"Maximum braking energy calculation value">"Maximum braking energy that can be absorbed by the capacitor"
3	No braking resistor is used, and it is completely absorbed by capacitance	And "calculated value of braking power">"built-in braking resistor power".

Please refer to “6.1.7Brake setting” to select the appropriate braking method.

P02-26	Name	External braking resistor power			Setting method	Shutdown setting	Related modes	PST
	Setting	1～65535	Unit	W	Effective	Effective	Factory	-

	range				method	immediately	setting	

Used to set the power of the external braking resistor of a certain type of drive.

◆Caution:

The external braking resistor power (P02-26) cannot be less than the calculated braking power value.

P02-27	Name	External braking resistor power			Setting method	Shutdown setting	Related modes	PST
	Setting range	1～1000	Unit	Ω	Effective method	Effective immediately	Factory setting	-

Used to set the external braking resistance value of a certain type of drive.

When "maximum braking energy calculation value">"maximum braking energy that can be absorbed by a capacitor", and "braking power calculation value">"built-in braking resistor power", the use of an external braking resistor is required.

If P02-27 (external braking resistance value) is too large, either FU.920 (braking resistance overload) or FU.410 (main circuit electrical overvoltage) will occur.

When P02-27 (external braking resistance value) is less than P02-21 (minimum allowable braking resistance value of the drive), FU.922 (external braking resistance is too small) will occur. If it continues to be used, the drive will be damaged.

External braking resistor and internal braking resistor cannot be used simultaneously! When using an external braking resistor, please remove the short connector between terminals "B2" and "B3" and connect both ends of the braking resistor to "B2" and "B1/⊕" respectively.

P02-30	Name	External braking resistor power			Setting method	Shutdown setting	Related modes	PST
	Setting range	0-65535	Unit	-	Effective method	Re-energize	Factory setting	0

Set the User Password. Please refer to “5.4 User Password”.

P02-31	Name	System parameter initialization			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Used to restore parameters to factory values or clear fault records.

Set value	Operational implications	Notes
0	No operation	-
1	Restore Factory Setting Values	Except for P00 and P01 group parameters, other group parameters are restored to the factory value of the drive.
2	Clear obstacle record	The last 10 fault and warning codes have been cleared.

If necessary, please use our company's drive debugging platform software to back up the parameters of the function code groups except for P00 and P01 groups.

P02-32	Name	Panel default display function			Setting method	running settings	Related modes	-
	Setting range	0～99	Unit	-	Effective method	Effective immediately	Factory setting	50

According to the settings, the panel can automatically switch to the monitoring parameter display mode (P0B group parameters), and P02-32 is used to set the intra group bias of P0B group parameters.

Set value	P0B group parameters	Notes
0	P0B-00	The motor speed is not zero, and Panel display P0B-00 is set.
1	P0B-01	Panel display P0B-01 (speed command) value.

When nonexistent P0B group parameters are set, the panel does not switch to P0B group parameter display.

P02-33	Name	EtherCAT software version number			Setting method	Display	Related modes	-
	Setting range	-	Unit	-	Effective method	-	Factory setting	-

Displays the software version number of EtherCAT communication, with 4 decimal places.

P02-34	Name	CAN software version number			Setting method	Display	Related modes	-
	Setting range	-	Unit	-	Effective method	-	Factory setting	-

P02-38	Name	Fault short circuit braking time			Setting method	running settings	Related modes	PST
	Setting range	0～30000	Unit	ms	Effective method	Effective immediately	Factory setting	5000

Set the duration of short circuit braking.

P02-39	Name	Fault short circuit braking threshold			Setting method	running settings	Related modes	PST
	Setting range	0～3000	Unit	0.1%	Effective method	Effective immediately	Factory setting	1000

Set the maximum braking current for short circuit braking.

Group P03: Terminal input parameters

P03-00	Name	Power-on effective DI function allocation 1			Setting method	running settings	Related modes	-
	Setting range	0～0xFFFF	Unit	-	Effective method	Re-energize	Factory setting	0

Set a DI function (FunIN. 1 to FunIN. 16) to take effect immediately after being powered on again.

P03-00 is displayed in hexadecimal on the panel. After converting to binary, bit (n)=1 indicates FunIN The (n+1) function is valid.

P03-00 is input and displayed in decimal on the universal drive debugging platform.

FunIN. 1 to FunIN.16 Please refer to "Definition of basic functions of DIDO".

P03-00 Set value,please refer to the table below.

Set value (hexadecimal)	Significant bit	Power-on effective DI function	Function name
0000	No	0 (Do not assign DI functionality)	No
0001	bit0	1	S-ON (servo enable)
0002	bit1	2	ALM-RST (Fault and warning reset)
0004	bit	3	GAIN-SEL(Gain switching)
0008	bit3		CMD-SEL (switching of main and auxiliary operation instructions)
0010	bit4		DIR-SEL (multi speed DI switching operation direction setting)
0020	it5	6	CMD1(Multi segment running command switching1)
0040	bit6	7	CMD2(Multi segment running command switching2)
0080	bit7		CMD3(Multi segment running command switching3)
0100	bit8	9	CMD4(Multi segment running command switching4)
0200	bit9	10	M1-SEL (mode switching 1)
0400	bi 10	11	M2-SEL (mode switching 2)
0800	bit11	12	ZCLAMP (zero fixed enable)
1000	bit12	3	INHIBIT (position command inhibition)
2000	bit13	14	P-OT (Forward overtravel switch)
4000	it14	15	N-OT (reverse overtravel switch)
8000	bit15	16	P-CL (Positive external torque limit)

Do not set the parameter values of P03-00 to values other than those in the table above.

P03-00 inhibits duplication with P03 groups (DI functions that require hardware terminal assignment) and P17 groups (virtual DI functions). Otherwise, the settings for P03-00 are invalid. The validity of the repeatedly assigned DI functions is determined by the actual input DI logic for P03 or P17 groups.

"It is not recommended to use the" Power-on Valid DI Function Allocation "function for DI functions that are valid along the change, such as" ALM-RST (Fault and Warning Reset Signal) ".".

"It is not recommended to use the" Power on Valid DI Function Allocation "function for DI functions that require" Valid and Invalid Switching ".".

<table>
<tr><td rowspan="2">P03-01</td><td>Name</td><td colspan="3">Power-on effective DI function allocation 2</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～0xFFFF</td><td>Unit</td><td>-</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>0</td></tr>
</table>

Set a DI function (FunIN.17 to FunIN.32) to take effect immediately after being powered on again.

P03-01 is displayed in hexadecimal on the panel. After converting to binary, bit (n)=1 indicates FunIN The (n+1) function is valid.

P03-01 is input and displayed in decimal on the universal drive debugging platform.

FunIN.17 to FunIN.32 Please refer to "Definition of basic functions of DIDO".

Please refer to the table below for P03-01Set value.

Set value (hexadecimal)	Significant bit	Power-on effective DI function	Function Name
0000	Not Applicable	0 (Do not assign DI functionality)	Not Applicable
0001	bit0	17	N-CL (Negative External Torque Limit)
0002	bit1	1	JOGCMD+(forward jog)
0004	bit2	19	JOGCMD - (reverse jog)
0008	bit3	20	PosStep (Step Enable)
0010	bit4	21	HX1 (handwheel magnification 1)
0020	bit5	2	HX2 (handwheel magnification 2)
0040	bit6	23	HX_ EN (hand wheel enable)
0080	it7	2	GEAR_ SEL (Electronic gear ratio selection)
0100	bit8	25	ToqDirSel (torque command direction setting)
0200	bit9	26	SpdDirSel (speed command direction setting)
0400	b t10	27	PosDirSel (position command direction setting)
0800	it11	28	PosInSen (multi segment position command enable)
1000	bit12	29	XintFree
2000	bit13	30	Not Applicable
4000	bit1	31	HomeSwitch
8000	bit1	32	HomingStart (home reset enable)

Do not set the parameter values of P03-01 to values other than those in the table above.

P03-02	Name	DI1 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	14

Set the DI function corresponding to the hardware DI1 terminal.

For DI functions, please refer to "Definition of basic functions of DIDO".

Please refer to the following table for parameter value settings.

Set value	DI terminal function	Set value	DI terminal function
0	Do not assign DI functions	19	JOGCMD - (reverse jog)
1	S-ON (servo enable)	20	PosStep (Step Enable)
2	ALM-RST (Fault and warning reset)	21	HX1 (handwheel magnification signal 1)
3	GAIN-SEL(Gain switching)	22	HX2 (handwheel magnification signal 2)
4	CMD-SEL (switching of main and auxiliary operation instructions)	23	HX_ EN (handwheel enable signal)
5	DIR-SEL (multi segment operation command direction selection)	24	GEAR_ SEL (Electronic gear selection)
6	CMD1(Multi segment running command switching1)	25	ToqDirSel (torque command direction setting)
7	CMD2(Multi segment running command switching2)	26	SpdDirSel (speed command direction setting)
8	CMD3(Multi segment running command switching3)	27	PosDirSel (position command direction setting)
9	CMD4(Multi segment running command switching4)	28	PosInSen (multi segment position command enable)
10	M1-SEL (mode switching 1)	29	XintFree
11	M2-SEL (mode switching 2)	30	Not Applicable
12	ZCLAMP (zero fixed enable)	31	HomeSwitch
13	INHIBIT (position command inhibition)	32	HomingStart (Home reset enable)
14	P-OT (Forward overtravel switch)	33	XintInhibit
15	N-OT (reverse overtravel switch)	34	EmergencyStop
16	P-CL (Positive External Torque Limit)	35	ClrPosErr (Clear position deviation)
17	N-CL (Negative external torque Limit)	36	V_ LmtSel (Internal speed limit source)
18	JOGCMD+(forward jog)	37	PulseInhibit(Pulse inhibit)

◆Caution:

Do not set P03-02 to values other than those in the table above.

The same DI function cannot be allocated repeatedly. Otherwise, FU.130 (DI Function Duplicate Allocation) will occur.

Do not assign a DI function and set the DI logic to valid before canceling the assignment, otherwise the DI function will remain valid!

DI1 to DI7 are ordinary DIs, and the input signal width should be greater than 3ms.

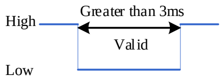
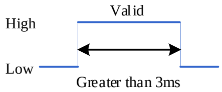
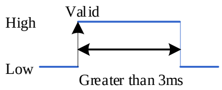
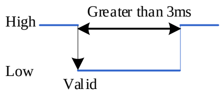
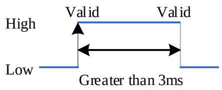
DI8 and DI9 are fast DIs, and the input signal width should be greater than 0.25ms.

The DI signal in the oscilloscope of the universal drive debugging platform is a filtered signal (the common DI filtering time constant is 3ms, and the fast DI filtering time constant is 0.25ms). Signals with a width smaller than the filtering time constant are not displayed.

When using the Interrupt fixed length function, the servo drive forces DI9 to be an interrupt fixed length trigger switch. Do not assign P03-18 to other DI functions.

P03-03	Name	DI1 terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Set the level logic of the hardware DI1 terminal when the DI function selected by DI1 is valid.
DI1 to DI7 are ordinary DIs, and the input signal width should be greater than 3ms. Please set the effective level logic correctly according to the upper computer and peripheral circuits. Please refer to the following table for the input signal width.

Set value	DI terminal logic when DI function is valid	Notes
0	Low level	
1	High level	
2	Rising edge	
3	Falling edge	
4	Rising and falling edges	

P03-04	Name	DI2 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	15

P03-05	Name	DI2 terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P03-06	Name	DI3 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	13

P03-07	Name	DI3 terminal logic selection			Setting method	running settings	Related modes	-
	Setting	0～4	Unit	-	Effective	Shutdown	Factory	0

	range				method	takes effect	setting	

P03-08	Name	DI4 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	2
P03-09	Name	DI4 terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P03-10	Name	DI5 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	1
Set the DI function corresponding to the hardware DI5 terminal. S-ON (servo enable) must be assigned. Otherwise, the servo drive will not work. DI5 is assigned as FunIN. 1: S-ON by default.								
P03-11	Name	DI5terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0
The setting makes the DI function selected by DI5 effective, and the level logic of the hardware DI5 terminal. When low speed DI is assigned as a servo enable (S-ON) function, the effective signal width must be greater than (P02-18)+3ms. After reassigning the DI (VDI) assigned by the servo enable (S-ON) function, FU.941 will occur (changing parameters requires power on again to take effect). At this time, the power must be turned on again to make the change effective. Otherwise, the servo enable (S-ON) function logic is determined by the original DI (VDI).								

P03-12	Name	DI6 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	12

P03-13	Name	DI6terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P03-14	Name	DI7 terminal function selection			Setting method	running settings	Related modes	-
	Setting	0～37	Unit	-	Effective	Shutdown	Factory	3

	range				method	takes effect	setting	

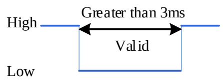
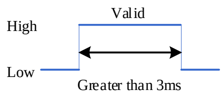
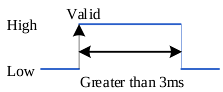
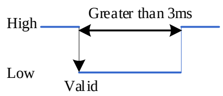
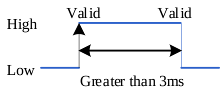
P03-15	Name	DI7terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P03-16	Name	DI8 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	31
Set the DI function corresponding to the hardware DI8 terminal.								

P03-17	Name	DI8terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

The setting makes the DI function selected by DI8 effective, and the level logic of the hardware DI8 terminal.

DI8 and DI9 are fast DIs, and the input signal width should be greater than 0.25ms. Please set the effective level logic correctly according to the upper computer and peripheral circuits. Please refer to the following table for the input signal width.

Set value	DI terminal logic when DI function is valid	Notes
0	Low level	
1	High level	
2	Rising edge	
3	Falling edge	
4	Rising and falling edges	

P03-18	Name	DI9 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Set the DI function corresponding to the hardware DI9 terminal.

P03-19	Name	DI9terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～4	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

The setting makes the DI function selected by DI9 effective, and the level logic of the hardware DI9 terminal.

When using the Interrupt fixed length function, the servo drive forces DI9 to be an interrupt fixed length trigger switch. Do not assign P03-18 to other DI functions, otherwise FU.130 will occur, and the DI9 terminal logic is forced to be effective for edge change.

P03-34	Name	Power-on effective DI function allocation3			Setting method	running settings	Related modes	-
	Setting range	0～0xFFFF	Unit	-	Effective method	Re-energize	Factory setting	0

Power-on effective DI function allocation

Set a DI function (FunIN.33 to FunIN.37) to take effect immediately after being powered on again.

P03-34 is displayed in hexadecimal on the panel. After conversion to binary, bit (n)=1 indicates FunIN The (n+1) function is valid. P03-34 is input and displayed in decimal on the universal drive debugging platform. Please pay attention to data conversion when using it. FunIN.33 to FunIN.37 Please refer to "Definition of basic functions of DIDO".

Please refer to the table below for P03-34Set value.

Set value (hexadecimal)	Significant bit	Power-on effective DI function	Function Name
0000	Not Applicable	0 (Do not assign DI functionality)	Not Applicable
0001	bit	33	XintInhibit(Interrupt fixed length inhibition)
0002	bit1	34	EmergencyStop(Emergency shutdown)
0004	bit2	35	ClrPosErr(Clear position deviation)
0008	bit3	36	V_LmtSel(Internal speed limit source)
0010	bit4	37	PulseInhibit(Pulse command inhibition)
0020	bit5	38	Not Applicable
0040	bit6	39	Not Applicable
0080	bit7	40	Not Applicable
0100	bit8	41	Not Applicable
0200	bit9	42	Not Applicable
0400	bit10	43	Not Applicable
800	bit11	44	Not Applicable
1000	bit12	45	Not Applicable
2000	bit13	46	Not Applicable
4000	bit14	47	Not Applicable
8000	bit15	48	Not Applicable

Do not set the parameter values of P03-34 to values other than those in the table above.

<table>
<tr><td rowspan="2">P03-35</td><td>Name</td><td colspan="3">Power-on effective DI function allocation3</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～0xFFFF</td><td>Unit</td><td>-</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Set a DI function (FunIN.49 to FunIN.64, temporarily unavailable) to take effect immediately after powering on again.
P03-35 is displayed in hexadecimal on the panel. After conversion to binary, bit (n)=1 indicates FunIN The (n+1) function is valid.
P03-05 The input and display on the universal drive debugging platform are both decimal. Please pay attention to data conversion when using.
Please refer to the table below for P03-35Set value.</td></tr>
</table>

Set value (hexadecimal)	Significant bit	Power-on valid DI enable	Function name
0000	Not Applicable	0(Do not assign DI functions)	Not Applicable
0001	bit0	49	
0002	bit1	50	
0004	bit2	51	
0008	bit3	52	
0010	bit4	53	
0020	bit5	54	
0040	bit6	55	
0080	bit7	56	
010	bit8	57	
0200	bit9	58	
0400	bit10	59	
0800	bit11	60	
1000	bit12	61	
2000	bit13	62	
4000	bit1	63	
800	bit15	64	

Do not set the parameter values of P03-35 to values other than those in the table above.

<table>
<tr><td rowspan="2">P03-50</td><td>Name</td><td colspan="3">AI1 Offset</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>-5000～5000</td><td>Unit</td><td>mV</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When the drive sampling voltage value after zero drift correction is set to 0, the actual input voltage of AI1 is set.</td></tr>
</table>

<table>
<tr><td rowspan="2">P03-51</td><td>Name</td><td colspan="3">AI1 input filtering time constant</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～655.35</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>2.00</td></tr>
<tr><td colspan="9">Set the filtering time constant of the software for the AI1 input voltage signal.
By setting P03-56, it is possible to prevent motor command fluctuations caused by unstable analog input voltage, and also to reduce motor misoperation caused by interference signals.
The filtering function has no effect on eliminating or suppressing zero drift and dead bands.</td></tr>
</table>

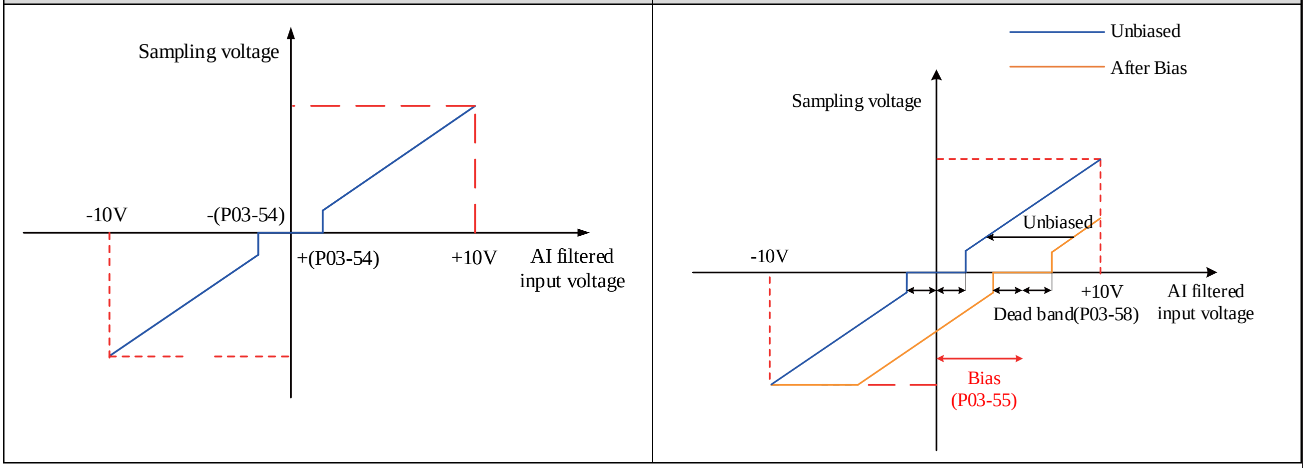
P03-53	Name	AI1 Deadband			Setting method	running settings	Related modes	-
	Setting range	0～1000.0	Unit	mV	Effective method	Effective immediately	Factory setting	10.0

When the drive sampling voltage value is set to 0, the AI1 input voltage range is set.

P03-54	Name	AI1 zero drift			Setting method	running settings	Related modes	-
	Setting range	-500.0～500.0	Unit	mV	Effective method	Effective immediately	Factory setting	0.0

Zero drift: refers to the value of the sampling voltage of the servo drive relative to GND when the input voltage of the analog channel is 0.

Relationship between sampling voltage and input voltage after AI filtering	
Unbiased	Biased (taking bias>0 as an example)



Use Auxiliary functions P0D-10=1 to automatically adjust the AI1 zero drift, and the adjusted AI1 zero drift value will be stored in P03-54.

If the zero drift is greater than 500.0mV, FU.831 (excessive AI zero drift) will occur.

If the sampling voltage is greater than 11.5V, FU.834 (AD sampling overvoltage fault) will occur.

In the Torque control mode, the Torque command source is the analog voltage timing. For the setting method of AI1, please refer to "6.4.1 Torque command input setting".

P03-55	Name	AI2 Bias			Setting method	running settings	Related modes	-
	Setting range	-5000～5000	Unit	mV	Effective method	Effective immediately	Factory setting	0

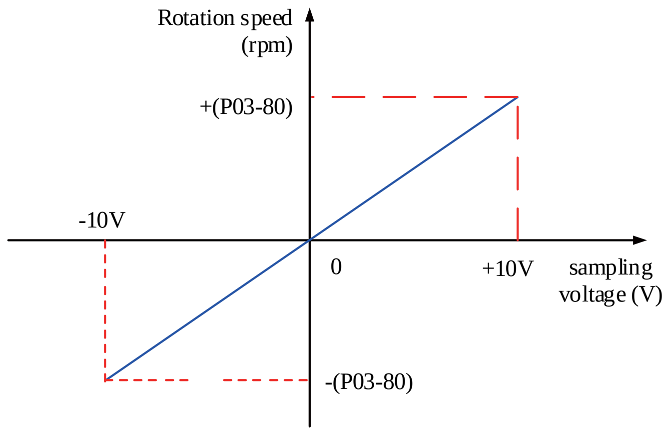
P03-56	Name	AI2 input filtering time constant			Setting method	running settings	Related modes	-
	Setting range	0～655.35	Unit	ms	Effective method	Effective immediately	Factory setting	2.00

P03-58	Name	AI2 Deadband			Setting method	running settings	Related modes	-
	Setting range	0～1000.0	Unit	mV	Effective method	Effective immediately	Factory setting	10.0

P03-59	Name	AI2 Zero drift			Setting method	running settings	Related modes	-
	Setting range	-500.0～500.0	Unit	mV	Effective method	Effective immediately	Factory setting	0.0

P03-80	Name	Speed value corresponding to analog quantity 10V			Setting method	Shutdown setting	Related modes	-
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	3000

Set the corresponding motor speed value when the sampling voltage is 10V.



$$\text{Speed setting value} = \frac{SAmpling\ voltage}{10} \times (P03-80)$$

In Position control mode, when Speed Feedforward is used and the feed forward source is AI1 or AI2 (P05-19=2 or 3);

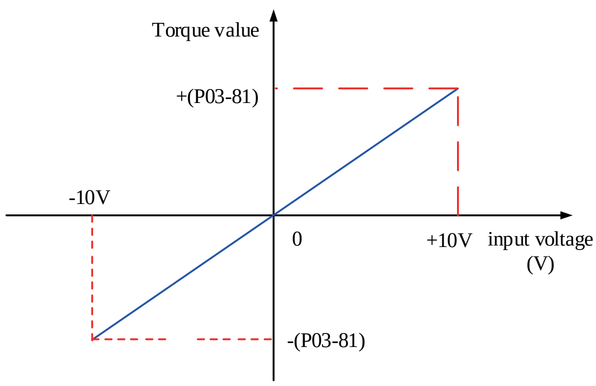
In Speed control mode, Speed command source is the analog quantity timing (P06-00 (P06-01)=1 or 2);

In Torque control mode, the speed limit source is analog timing (P07-18=1 or 2).

P03-81	Name	Torque value corresponding to analog quantity 10V			Setting method	Shutdown setting	Related modes	-
	Setting range	1.00～8.00	Unit	Times	Effective method	Effective immediately	Factory setting	1.00

Set the torque value corresponding to the sampling voltage of 10V.

The torque value is expressed as a multiple relative to the rated torque of the motor: "1.00 times" corresponds to 1 time the rated torque of the motor.



$$\text{Torque setting value} = \frac{sampling\ voltage}{10} \times (P03-81)$$

In the Torque control mode, the Torque command source is the analog quantity timing (P07-00 (P07-01)=1 or 2);

In Torque control mode, the torque limit source is the analog timing (P07-08=1 or 2).

GROUP P04: Termal output parameters

P04-00	Name	DO1 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	1

Set the DO function corresponding to the hardware DO1 terminal. For DO functions, please refer to "DIDO Basic Function Definitions". Please refer to the following table for parameter value settings.

Set value	DOFunction name	Set value	DOFunction name
0	Do not allocate DO functions	12	ALMO1: Output 3-digit alarm code
1	S-RDY: Servo ready	13	ALMO2: Output 3-digit alarm code
2	TGON: Motor rotation	14	ALMO3: Output 3-digit alarm code
3	ZERO: Zero speed signal	15	Xintcoin: interrupt fixed length completed
4	V-CMP: Consistent speed	16	HomeAttack: Zero return completed
5	COIN: Positioning completed	17	ElecHomeAttack: Electrical zero return completed
6	NEAR: Positioning near	18	ToqReach: Torque reached
7	C-LT: Torque Limit	9	V-Arr: Speed reached
8	V-LT: Speed limited	20	AngIntRdy: angle identification output
9	BK：band brake	21	DB: DB brake output
10	WARN: Warning	22	CmdOk: Internal command output
11	ALM: Fault		

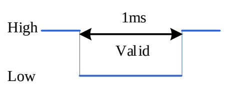
Do not set the parameter values of P04-00 to values other than those in the table above.

The same DO function can be assigned to different DO terminals, including hardware DO and VDO terminals.

P04-01	Name	DO1terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Set the output level logic of the hardware DO1 terminal when the DO function selected by DO1 is valid.

DO1 to DO5 belong to ordinary DO, and the minimum output signal width is 1ms. The upper computer should be designed correctly to ensure that valid DO terminal logic changes are received.

Set value	DO1 terminal logic when DO function is valid	Transistor state	Minimum signal width
0	Low level	Conduction	

Before receiving logic changes to the DO terminal, first confirm P04-22 (DO source selection), and confirm whether the output level of the DO terminal is determined by the actual state of the drive or by communication.

P04-02	Name	DO2 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	5

P04-03	Name	DO2terminal logic selection	Setting method	running settings	Related modes	-

	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P04-04	Name	DO3 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	3

P04-05	Name	DO3terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P04-06	Name	DO4 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	11

P04-07	Name	DO4terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P04-08	Name	DO5 terminal function selection			Setting method	running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	16

P04-09	Name	DO5terminal logic selection			Setting method	running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P04-22	Name	DO Source selection			Setting method	Shutdown setting	Related modes	-
	Setting range	0～31	Unit	-	Effective method	Effective immediately	Factory setting	0

Set whether the DO function logic selected by the hardware DO terminals (DO1 to DO5) is determined by the actual state of the drive or set by communication.

P04-22 is displayed in decimal on the panel and converted to binary:

Bit (n)=0 in P04-22 indicates that the DO (n+1) function logic is determined by the actual state of the drive;

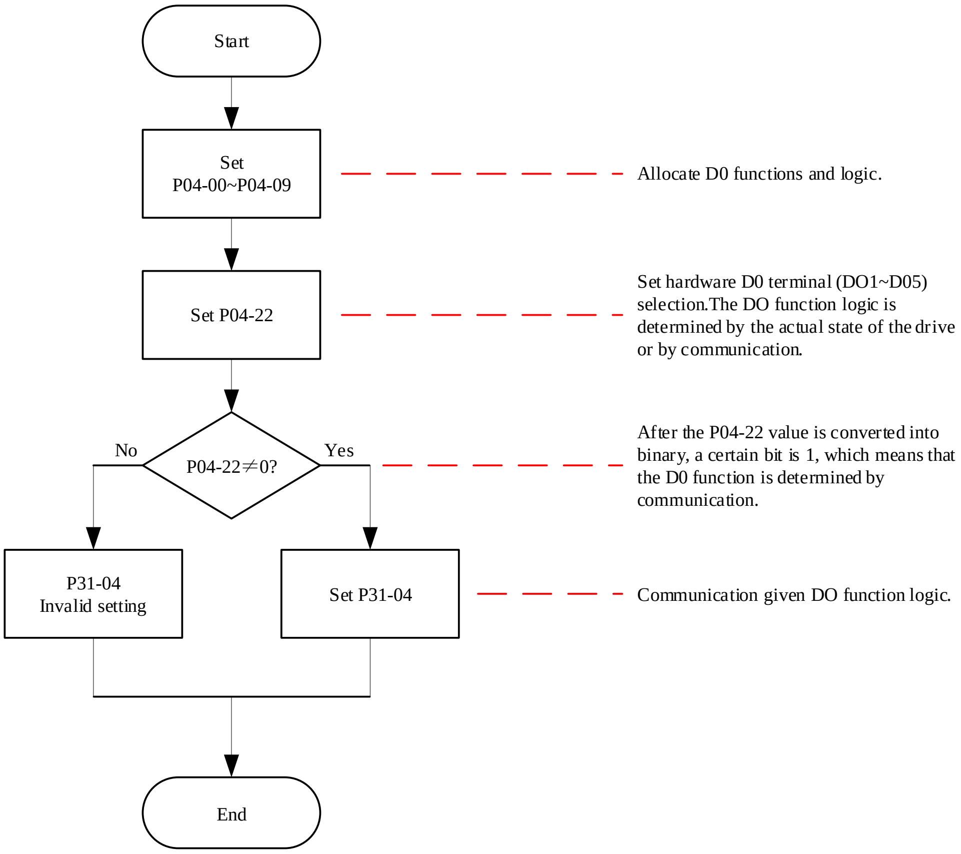
The bit (n)=1 in P04-22 indicates that the DO (n+1) function logic is determined by communication (corresponding to function code P31-04).

Set value (Decimal)	Set value(Binary)					DO logic	
	it4	bit3	bit2	bit1	bit0	Determined by drive status	Communication (P31-04) setting
	DO5	DO4	DO3	DO2	DO1		
0	0	0	0	0	0	DO1～DO5	Not Applicable
1	0	0	0	0	1	DO2～DO5	DO1
…	…	…	…	…	…	…	…
31	1	1	1	1	1	Not Applicable	DO1～DO5

Do not set the parameter values of P04-22 to values other than those in the table above.

Carefully set the band brake output (FunOUT. 9: BK) to the communication setting.

Follow these steps to use DO:



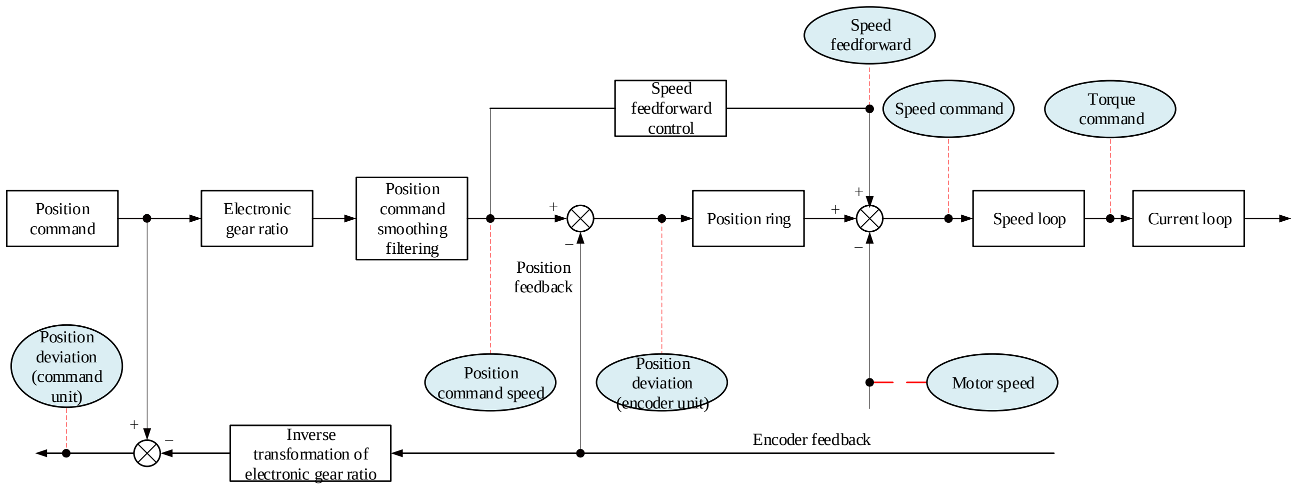
P31-04 is not visible on the panel and can only be changed through communication. Bit (n)=1 in P31-04 indicates that the DO (n+1) function logic is valid, and bit (n)=0 indicates that the DO (n+1) function logic is invalid.

The status of the DO output signal can be read through monitoring parameters, as detailed in the parameter description for P0B-05 in Chapter 8.

P04-50	Name	AO1 signal selection			Setting method	running settings	Related modes	-
	Setting range	0～9	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the analog output terminal 1 (AO1) to output the signal.

Set value	AO1 signal	Notes
0	Motor speed (1V/000rpm)	When the actual rotational speed of the motor is 1000 rpm, the theoretical output voltage of the AO1 terminal is 1 V.
1	Speed command (1 /1000rpm)	The motor speed command refers to the speed loop input command, including: ■ Position loop output during position control; ■ Speed setting command during speed control. When the speed command is 1000 rpm, the theoretical output voltage of the AO1 terminal is 1 V.
2	Torque command (1V/1x rated torque)	Motor torque commands, including: ■ Speed loop output during position or speed control; ■ Torque setting command during torque control. When the torque command is 1 times the rated torque of the motor, the theoretical output voltage of the AO1 terminal is 1V.
3	Position deviation (0.05V/1 command unit)	There is no position deviation through Electronic Gear Ratio. When the position deviation is 1 command unit, the theoretical output voltage of the AO1 terminal is 0.05V.
4	Position deviation (0.05V/1 encoder unit)	Positional deviation through electronic gear ratio. When the position deviation is 1 encoder unit, the theoretical output voltage of the AO1 terminal is 0.05V.
5	Position command speed(1V/1000rpm)	In the position control mode, the motor speed value corresponding to the position command output in each position loop cycle. When the position command speed is 1000 rpm, the theoretical output voltage of the AO1 terminal is 1 V. The filtering time constant for the position command speed can be set through P0A-27.
6	Positioning complete	Positioning completion (COIN) signal: Valid, AO1 output voltage is 5V; Invalid, AO The output voltage is 0V.
7	Speed feedforward (1V/1000rpm)	In the position mode, the output signal of the Speed feedforward control corresponds to the partial source of the speed command. When the speed command output by the Speed Feedforward control is 1000 rpm, the theoretical output voltage of the AO1 terminal is 1 V.
8	AI1 voltage	The sampling voltage of AI1.
9	AI2 voltage	Sample voltage of AI2.



P04-51	Name	AO1 bias voltage			Setting method	running settings	Related modes	-
	Setting range	-10000～10000	Unit	mV	Effective method	Effective immediately	Factory setting	5000
When the theoretical output voltage is set to 0V, the actual output voltage value of AO1 is offset.								

P04-52	Name	AO1 magnification			Setting method	running settings	Related modes	-
	Setting range	-99.99～99.99	Unit	Times	Effective method	Effective immediately	Factory setting	1.00

Set the theoretical output voltage to 1V, and after amplification, AO1 will actually output the voltage value.

Take P04-50=0 (AO1 output signal is motor speed) as an example:

When the pre-designed motor speed x changes between ± 3000 rpm and the AO1 output voltage y ranges from 0 to 5000 mV, then：

$$\begin{cases} -3000 \times k + b = 0 \\ 3000 \times k + b = 5000 \end{cases}$$

Therefore, k=0.83, b=2500, so P04-51=2500 (mV), P04-52=0.83 (times).

P04-53	Name	AO2 signal selection			Setting method	running settings	Related modes	-
	Setting range	0～9	Unit	-	Effective method	Effective immediately	Factory setting	0

P04-54	Name	AO2 bias voltage			Setting method	running settings	Related modes	-
	Setting range	-10000～10000	Unit	mV	Effective method	Effective immediately	Factory setting	5000

P04-55	Name	AO2 magnification			Setting method	running settings	Related modes	-
	Setting range	-99.99～99.99	Unit	times	Effective method	Effective immediately	Factory setting	1.00

Group P05: Position control parameters

P05-00	Name	Location command source			Setting method	Shutdown setting	Related modes	P
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

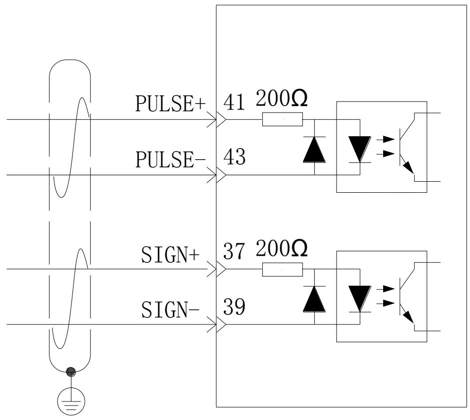
Position control mode" is used to select Location command source.

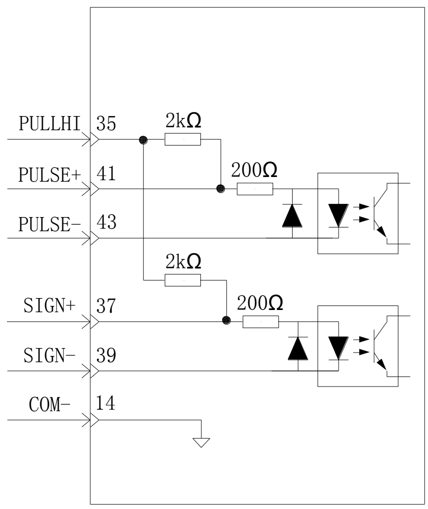
Set value	Command Source	Command acquisition method
0	Pulse command	The upper computer or other pulse generating devices generate position pulse commands that are input to the servo drive through hardware terminals.
1	Step amount	Hardware terminals are selected through P05-01.
2	Multi segment position command	The step displacement is set by parameter P05-05.

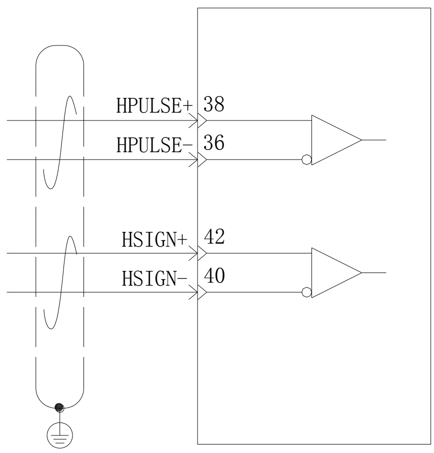
Among them, the pulse command belongs to the external position command, and the step amount and multi segment position command belong to the internal position command.

P05-01	Name	Pulse command input terminal selection			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

When Position control mode, Location command source is a pulse command (P05-00=0), select the hardware input terminal based on the frequency of the input pulse.

<table>
<tr><th>Set value</th><th>Input terminal</th><th>Hardware interface</th></tr>
<tr><td rowspan="2">0</td><td rowspan="2">Low speed</td><td>Differential input terminals: PULSE+, PULSE -, SIGN+, SIGN


The maximum pulse frequency is 500 kpps.</td></tr>
<tr><td>Open collector input terminals: PULHI, PULSE+, PULSE -, SIGN+, SIGN


The maximum pulse frequency is 200 kpps.</td></tr>
<tr><td>1</td><td>High speed</td><td>差分输入端子：HPULSE+、HPULSE-、HSIGN+、HSIGN


Maximum pulse frequency 4Mpps</td></tr>
</table>

P05-02	Name	Number of position commands per 1 rotation of the motor			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1048576	Unit	P/r	Effective method	Re-energize	Factory setting	0

Set the number of position commands required for each rotation of the motor.

When P05-02=0, the parameters of Electronic gear ratio 1 and 2 (P05-07 to P05-13) and the setting of Electronic gear ratio switching conditions (P05-39) are valid.

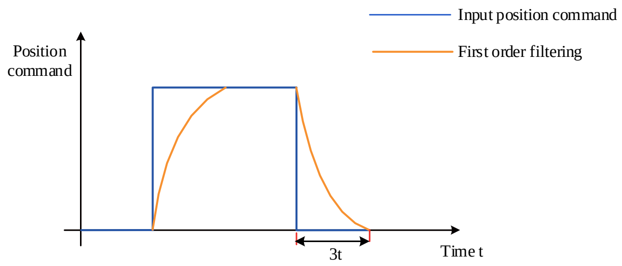
When P05-02≠0，Electronic gear ratio$\frac{B}{A} = \frac{encoder\ \ resolution}{P\ \ 05-02}$，at this time, Electronic gear ratio1 and Electronic gear ratio2 have no effect.

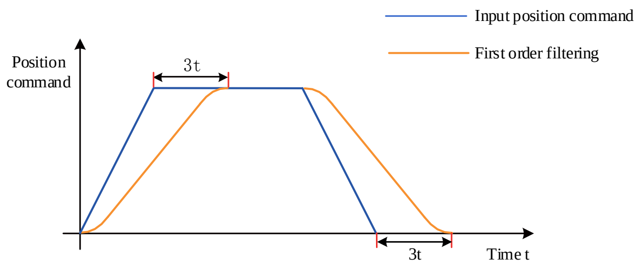
For LCDA630P series drives, the encoder resolution is 1048576P/r.

P05-04	Name	First order low-pass filtering time constant			Setting method	Shutdown setting	Related modes	P
	Setting range	0～6553.5	Unit	ms	Effective method	Effective immediately	Factory setting	0.0

Sets the first order low-pass filtering time constant for the position command (Encoder unit).

The position command P is a rectangular wave and a trapezoidal wave, and the position command after first order low-pass filtering is as follows：





This function has no effect on the amount of displacement (total number of position commands).

If the Set value is too large, it will increase the delay of the response. Therefore, the filtering time constant should be set according to the actual situation.

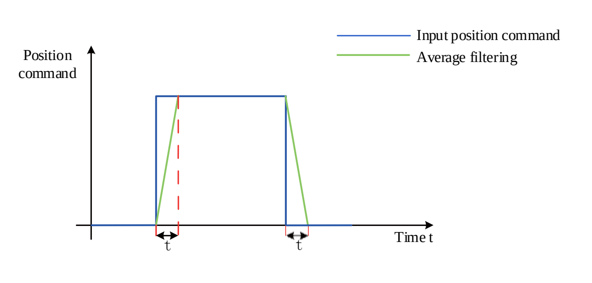
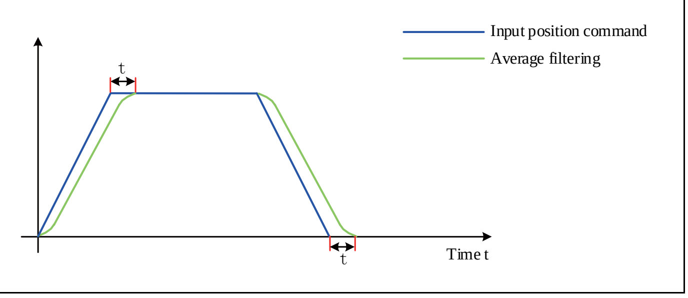
P05-05	Name	Step amount			Setting method	Shutdown setting	Related modes	P
	Setting range	-9999～9999	Unit	Command unit	Effective method	Effective immediately	Factory setting	50

The total number of location commands when the main Location command source is set to a step amount (P05-00=1).

Motor displacement=P05-05 × The positive or negative value of P05-05 determines the positive or negative speed of the motor.

P05-06	Name	Average filtering time constant			Setting method	Shutdown setting	Related modes	P
	Setting range	0～128.0	Unit	ms	Effective method	Effective immediately	Factory setting	0.0

Set the average filter time constant for the position command (Encoder unit). The position command P is a rectangular wave and a trapezoidal wave, and the position command after average filtering is as follows：

The position command is a rectangular wave	The position command is a trapezoidal wave
	

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

P05-07	Name	Electronic gear ratio1(numerator)			Setting method	running settings	Related modes	P
	Setting range	1～1073741824	Unit	-	Effective method	Effective immediately	Factory setting	1048576

The default value for LCDA630P series drives is 1048576.
Set the numerator of the first group of electronic gear ratios for frequency division of the position command (command Unit).
P05-02 (position pulses per rotation of the motor) is valid when it is equal to 0.

P05-09	Name	Electronic gear ratio1(numerator)			Setting method	running settings	Related modes	P
	Setting range	1～1073741824	Unit	-	Effective method	Effective immediately	Factory setting	10000

Set the denominator of the first group of electronic gear ratios for frequency division of the position command (Command Unit).

P05-02 (position pulses per rotation of the motor) is valid when it is equal to 0.

P05-11	Name	Electronic gear ratio1(numerator)			Setting method	running settings	Related modes	P
	Setting range	1～1073741824	Unit	-	Effective method	Effective immediately	Factory setting	1048576

Set the numerator of the second group of electronic gear ratios for frequency division of the position command (command Unit).

P05-02 (position pulses per rotation of the motor) is valid when it is equal to 0.

P05-13	Name	Electronic gear ratio1(numerator)			Setting method	running settings	Related modes	P
	Setting range	1～1073741824	Unit	-	Effective method	Effective immediately	Factory setting	10000

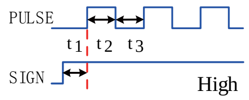
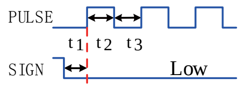
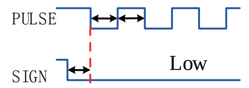
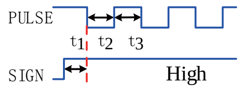
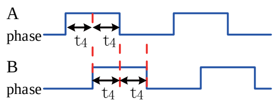
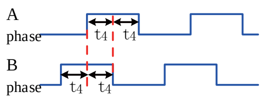
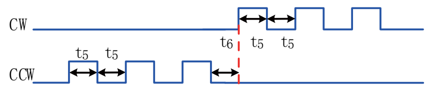
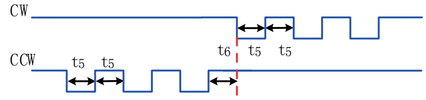
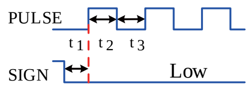
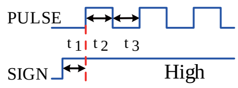
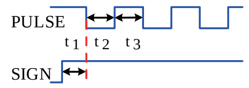
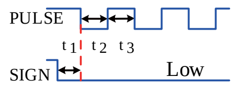
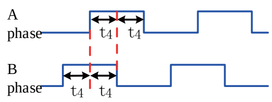
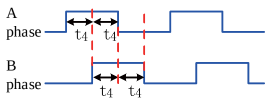
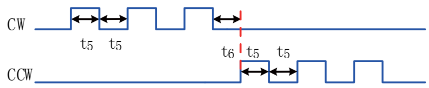
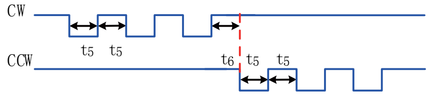
Set the denominator of the second group of electronic gear ratios for frequency division of the position command (Command Unit).

P05-02 (number of command pulses per rotation of the motor)=0.

<table>
<tr><td rowspan="2">P05-15</td><td>Name</td><td colspan="3">Pulse command form</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～3</td><td>Unit</td><td>-</td><td>Effective method</td><td>Power out again</td><td>Factory setting</td><td>0</td></tr>
</table>

When setting the main Location command source is a pulse command (P05-00=0), enter the pulse shape.

Maximum frequency and minimum time width of position pulse commands corresponding to different input terminals:

<table>
<tr><th>P02-02 Rotation direction selection</th><th>P05-15 Command Form Settings</th><th>Pulse shape</th><th>Signal</th><th>Schematic diagram of forward rotation pulse</th><th>Schematic diagram of reverse pulse</th></tr>
<tr><td rowspan="5">0</td><td>0</td><td>Pulse+direction Positive logic</td><td>PULSE
SIGN</td><td></td><td></td></tr>
<tr><td>1</td><td>Pulse+direction Negative logic</td><td>PULSE
SIGN</td><td></td><td></td></tr>
<tr><td>2</td><td>Phase A+Phase B Quadrature pulse
4 octave</td><td>PULSE (phase A)
Sign (phase B)</td><td>
Phase A leads Phase B by 90 °</td><td>
Phase B leads Phase A by 90 °</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">CW+CCW</td><td rowspan="2">PULSE(CW)
SIGN(CCW)</td><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="5">1</td><td>0</td><td>Pulse+direction Positive logic</td><td>PULSE
SIGN</td><td></td><td></td></tr>
<tr><td>1</td><td>Pulse+direction Negative logic</td><td>PULSE
SIGN</td><td></td><td></td></tr>
<tr><td>2</td><td>Phase A+Phase B Quadrature pulse
4 octave</td><td>PULSE (phase A)
Sign (phase B)</td><td>
Phase B leads Phase A by 90 °</td><td>
Phase A leads Phase B by 90 °</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">CW+CCW</td><td rowspan="2">PULSE(CW)
SIGN(CC)</td><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
</table>

<table>
<tr><th rowspan="2">Input terminal</th><th rowspan="2">Maximum frequency</th><th colspan="6">Minimum time width/us</th></tr>
<tr><th>t_1</th><th>t_2</th><th>t_3</th><th>t_4</th><th>t_5</th><th>t_6</th></tr>
<tr><td>High speed pulse input terminal</td><td>4Mpps</td><td>0.125</td><td>0.125</td><td>0.125</td><td>0.25</td><td>0.125</td><td>0.125</td></tr>
</table>

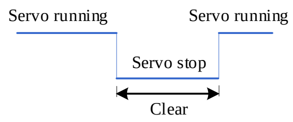
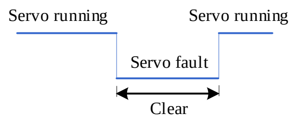
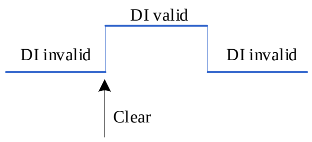
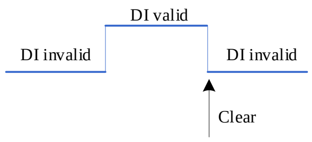
Low speed pulse input terminal	Differential input	500kpps	1	1	1	2	1	1
	Collector input	200kpps	2.5	2.5	2.5	5	2.5	2.5

The rising and falling time of the position pulse command should be less than 0.1us.

P05-16	Name	Clear action selection			Setting method	Shutdown setting	Related modes	P
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the conditions for clearing the position deviation.

Position deviation=(position command position feedback) (Encoder unit)

Set value	Clear condition	Notes
0	Servo enable OFF and clear position deviation in case of fault	
1	Servo enable OFF and clear position deviation pulse in case of fault	
2	Servo enable OFF and clear position deviation through DI input ClrPosErr signal clearing	One DI terminal should be set as the DI function 35 (FunIN.35: ClrPosErr, clear position deviation). It is recommended to select a fast DI terminal for this DI terminal, and it is recommended to set the logic to be effective along the change.  (The rising edge is valid)
		 (The falling edge is valid)

If the absolute value of position deviation is greater than P0A-10 (position deviation too large threshold), FU.B00 (position deviation too large) will occur.

P05-17	Name	Encoder frequency division pulse number			Setting method	Shutdown setting	Related modes	-
	Setting range	35～32767	Unit	P/r	Effective method	Re-energize	Factory setting	2500

Set the number of output pulses for the pulse output terminal PAO or PBO when the motor rotates for 1 rotation.

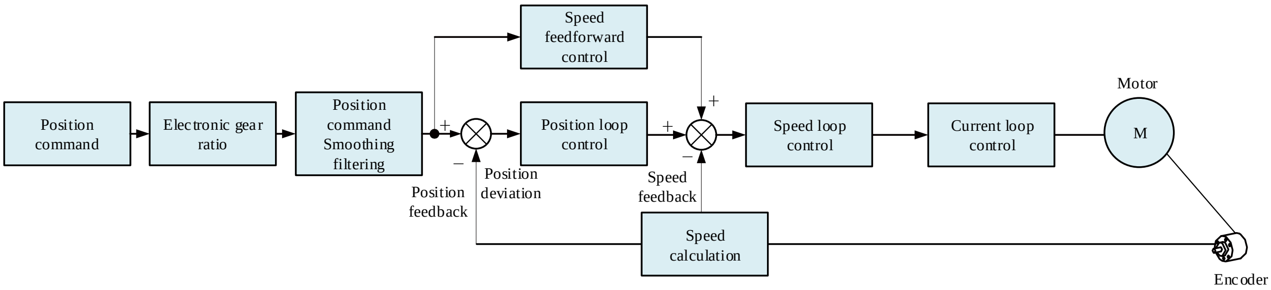
After 4 times the frequency, the pulse output resolution is:

Pulse output resolution of motor rotation for 1 rotation=(P05-17) × four

<table>
<tr><td rowspan="2">P05-19</td><td>Name</td><td colspan="3">Speed feedforward control selection</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～3</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>1</td></tr>
</table>

Sets the source of the speed loop feedforward signal.

Under Position control mode, using Speed feedforward control can improve the response speed of position commands.



Set value	Speed feedforward Source	Notes
0	No Speed feedforward	-
1	Internal Speed feedforward	Use the speed information corresponding to the position command (Encoder unit) as the speed loop feedforward source
2	Use AI1 as Speed feedforward input	Use the speed value corresponding to the analog input from the analog channel AI1 as the speed loop feedforward source
3	Use AI2 as Speed feedforward input	For AI1Parameter settings, please refer to: P03-80, P03-50, P03-51, P03-53, P03-54

The parameters for Speed Feedforward control include P08-18 (Speed Feedforward filter time constant) and P08-19 (Speed Feedforward gain). For parameter settings, refer to“Chapter 7 Adjustment”.

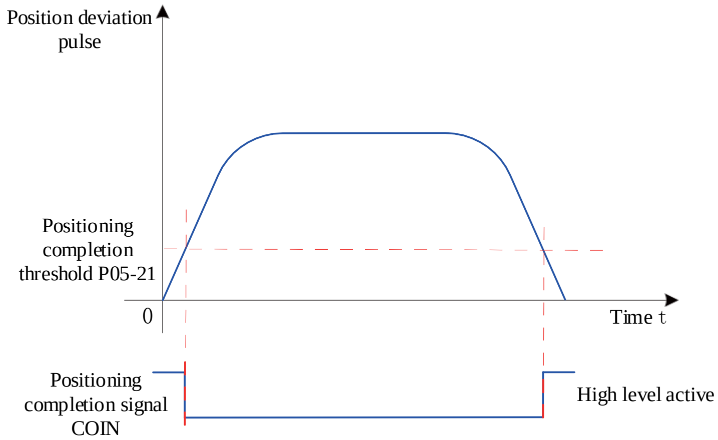
<table>
<tr><td rowspan="2">P05-20</td><td>Name</td><td colspan="3">Positioning Complete/Near Output Condition</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～3</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
</table>

Under Position control mode, when the servo is running and the absolute value of position deviation is within P05-21 (Positioning Completion Threshold) Set value, the servo can output a positioning completion/approach (FunOUT. 5: COIN) signal. Through P05-20, the output conditions of the positioning completion/approach signal can be set.

Set value	Output condition
0	Output when the absolute value of position deviation is less than P05-21
1	Output when the absolute value of position deviation is less than P05-21 and the filtered position command is 0
2	Output when the absolute value of position deviation is less than P05-21 and the position command is 0
3	When the absolute value of position deviation is less than the positioning completion/approaching threshold and the Position command filtering is 0, the output is valid for at least the time set in P05-60

P05-21	Name	Positioning completion threshold			Setting method	running settings	Related modes	P
	Setting range	1～65535	Unit	Encoder/Command Unit	Effective method	Effective immediately	Factory setting	734

Sets the threshold value of the absolute value of position deviation when the servo drive outputs a positioning completion signal (COIN).Positioning completion signal: DO function 5 (FunOUT. 5: COIN, positioning completion signal)



The positioning completion signal is only valid when the servo drive is in the position control mode and running state.

P05-22	Name	Positioning near threshold			Setting method	running settings	Related modes	P
	Setting range	1～65535	Unit	Encoder/Command Unit	Effective method	Effective immediately	Factory setting	65535

Sets the threshold value of the absolute value of position deviation when the servo drive outputs a positioning proximity signal (NEAR).

Positioning proximity signal: DO function 6 (FunOUT. 6: NEAR, positioning proximity signal)

◆Caution:

The positioning approach threshold (P05-22) generally needs to be greater than the positioning completion threshold (P05-21)

The positioning completion threshold (P05-21) only reflects the threshold value of the absolute value of the position deviation when the positioning completion is effective, and is independent of the positioning accuracy.

When the speed Feedforward gain (P08-19) Set value is too large or running at low speed, it will cause a small absolute value of position deviation. If the P05-21Set value is too large, it will cause the positioning completion to be always effective. Therefore, to improve the effectiveness of positioning completion, please reduce the P05-21Set value.

When the positioning completion threshold (P05-21) is small and the position deviation is small, the output condition of the positioning completion/proximity signal can be changed by setting P05-20.

P05-23	Name	Interrupt fixed length enable			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Re-energize	Factory setting	0

Set whether to use the Interrupt fixed length function.

Set value	Interrupt fixed length function
0	Disabled
1	Enabled

When the Interrupt fixed length function is enabled, DI9 is forced to interrupt the fixed length trigger signal, and the logic is valid along the change.When the Home reset function is running, the interrupt fixed length trigger signal is masked;

When the servo motor is running in the Interrupt fixed length function, other internal and external position commands are shielded; After the operation is completed, the conditions for responding to other position commands are determined by

P05-29.

P05-24	Name	Interrupt fixed length displacement			Setting method	running settings	Related modes	P
	Setting range	0～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

Set the position command value when interrupting fixed length operation.

P05-24 Set value is 0, Interrupt fixed length function is invalid.

Actual motor position command during interruption of fixed length operation (Encoder unit)=P05-24 × Electronic gear ratio

The position deviation before interrupting the fixed length operation is large, and the setting of the interrupting fixed length displacement is too small, which will cause the motor to reverse.

P05-26	Name	Interrupt fixed length constant speed running speed			Setting method	running settings	Related modes	P
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

Set the maximum rotational speed that the motor can reach when interrupting fixed length operation.

Set value	Trigger interrupt fixed length front motor speed	Interrupt fixed length maximum speed	Motor rotation during interruption of fixed length operation
0	＜1	1	-
	≥1	Trigger interrupt fixed length front motor speed	Consistent with motor rotation before interruption of fixed length
1～6000	-	P05-26Set value	Determined by P02-02(Rotation direction selection)

P05-27	Name	Interrupt fixed length acceleration and deceleration time			Setting method	running settings	Related modes	P
	Setting range	0～1000	Unit	ms	Effective method	Effective immediately	Factory setting	10

Set the time for changing the speed of the motor from 0 to 1000 rpm when interrupting constant length operation.

Therefore, when the fixed length operation is interrupted, the actual acceleration time t of the motor：

$$t=\frac{|P05-26-\text{Interrupt fixed length front motor speed}|}{1000}\times(P05-27)$$

P05-29	Name	Fixed length lock release signal enable			Setting method	running settings	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

Set whether to release the interrupt fixed length lock signal.

Set value	Fixed length lock release signal	Notes
0	Disabled	After the interruption fixed length positioning is completed, it can directly respond to other position commands
1	Enabled	After the interruption fixed length positioning is completed, it is not allowed to directly respond to other position commands. You need to use the DI function 29 (FunIN.29: XintFree, to release the interrupt fixed length lock state) in order to respond to other position commands.

◆Caution:

Generally, it is recommended that P05-29=1 (enable fixed length lock release signal) be used to prevent motor misoperation caused by interference with position commands entering the servo drive at the end of the interruption of fixed length operation.

P05-30	Name	home reset enable control			Setting method	running settings	Related modes	P
	Setting range	0～6	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the home reset mode and trigger signal source.

Trigger interrupt fixed length front motor speed	Notes	
	Home reset mode	Trigger signal
Close Home Reset	Disable home reset function	
Enable the Home reset function by inputting the HomeingStart signal through DI	Zero return	DI signal FunIN.32 (HomingStart: Home Reset Enable)
Input HomingSta through DI	Electrical return to zero	DI signal FunIN.32 (HomingStart: Home Reset Enable)
TSignal, enabling electrical return to zero function	Zero return	In position mode, power on again, and the first servo enable signal
Start the home reset immediately after powering on	Zero return	Servo enable signal in position mode
Perform an immediate home reset	Electrical return to zero	After successfully returning to zero, P05-30=0
Start electrical zero return command	Home return	Servo enable signal in position mode

For the use of home reset, please refer to“6.2.8 Home reset function”.

P05-31	Name	Home reset mode			Setting method	Shutdown setting	Related modes	P
	Setting range	0～13	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the default motor rotation, deceleration point, and home when setting Zero return.

Set value	Zero return mode			Notes
	Homing direction	Deceleration point	Home	
0	Forward	Home switch	Home switch	Forward/Reverse: consistent with P02-02 (Rotation direction selection) definition; Home switch: DI function FunIN.31 (HomeSwitch) Forward overtravel switch: DI function FunIN.14 (P-OT) Reverse overtravel switch: DI function FunIN.15 (N-OT)
1	Reverse	Home switch	Home ON	
2	Forward	Motor Z signal	Motor Z signal	
3	Reverse	Motor Z signal	Motor Z signal	
4	Forward	Home switch	Motor Z signal	
5	Reverse	Home switch	Motor Z signal	
6	Forward	Forward override switch	Forward override switch	
7	Reverse	Reverse overtravel switch	Reverse overtravel switch	
8	Forward	Forward override switch	Motor Z signal	

9	Reverse	Reverse overtravel switch	Motor Z signal	
10	Forward	Mechanical limit position	Mechanical limit position	
11	Reverse	Mechanical limit position	Mechanical limit position	
12	Forward	Mechanical limit position	Motor Z signal	
13	Reverse	Mechanical limit position	Motor Z signal	

P05-32	Name	The speed of the high-speed search home switch signal			Setting method	running settings	Related modes	P
	Setting range	0～3000	Unit	rpm	Effective method	Effective immediately	Factory setting	100
When setting Zero return (P05-30=1/3/4), the motor speed is searched for the deceleration point signal. Set the maximum speed of the motor when returning to electrical zero (P05-30=2/5). If the speed Set value is too low, it will cause the search for the home switch signal to take too long, and a warning FU.601 (return to home timeout fault) will occur.								

P05-33	Name	The speed of the low speed search home switch signal			Setting method	running settings	Related modes	P
	Setting range	0～1000	Unit	rpm	Effective method	Effective immediately	Factory setting	10
When setting Zero return (P05-30=1/3/4), the motor speed is searched for the home signal. When Zero return is triggered, the motor is already near the home switch. After enabling, the motor will immediately search for the home at the low speed set in P05-33. P05-33 should be low enough to prevent mechanical shock during shutdown.								

P05-34	Name	Acceleration and deceleration time when searching for the home			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1000	Unit	ms	Effective method	Effective immediately	Factory setting	1000
When setting the zero point reset (P05-30=1/2/3/4/5), the motor changes speed from 0 to 1000 rpm. Therefore, during zero point reset operation, the actual acceleration time t of the motor： $t=\frac{P05-32}{1000}\times(P05\text{-}34)$								

P05-35	Name	Limit the time to find the home			Setting method	Shutdown setting	Related modes	P
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	10000
Set the maximum search home time. If P05-35 is set too small or the home is not found within the time limit specified in P05-35, the drive will give a warning FU.601 (Home Timeout Fault).								

<table>
<tr><td rowspan="2">P05-36</td><td>Name</td><td colspan="3">Mechanical home offset</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>-1073741824
～1073741824</td><td>Unit</td><td>Command Unit</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Set the absolute position (P0B-07) value of the motor after zero point reset.
During Zero return, the positional relationship between mechanical home and mechanical home is determined based on the settings in P05-40.
P05-36 is the displacement of the target position away from the mechanical home during electrical return to zero.</td></tr>
</table>

<table>
<tr><td rowspan="2">P05-38</td><td>Name</td><td colspan="3">Servo pulse output source selection</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～2</td><td>Unit</td><td>-</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>0</td></tr>
</table>

Set the output source of the pulse output port.

The Frequency division output function cannot be used in the full closed-loop control mode. At this time, the frequency division output terminal serves as the input terminal for the external raster scale signal.

Set value	Output Source	Notes
0	Encoder frequency division output	When the motor rotates, the encoder feedback signal is output after frequency division according to the Set value of P05-17. When the upper computer is used as closed-loop feedback, it is recommended to adopt encoder frequency division output mode
1	Pulse command synchronization output	Only when P05-00=0, the input pulse command is output synchronously. When multi axis servo pulse synchronous tracking, it is recommended to use pulse command synchronous output mode.
2	Frequency division or synchronous output inhibition	The pulse output terminal has no output. At this time, the frequency division output terminal can be used as the input terminal for the full closed-loop external grating scale signal.

Pulse output hardware terminal：

<table>
<tr><th>Signal name</th><th>Output shape</th><th>Output port</th><th>Maximum pulse frequency</th></tr>
<tr><td>A-phase signal</td><td>Differential output</td><td>PAO+, PAO-</td><td>2Mpps</td></tr>
<tr><td>B-phase signal</td><td>Differential transmission</td><td>PBO+, PBO-</td><td>2Mpps</td></tr>
<tr><td rowspan="2">Z-phase signal</td><td>Differential output</td><td>PZO+, PZO-</td><td>2Mpps</td></tr>
<tr><td>Open collector output</td><td>PZ-OUT, GND</td><td>100kpps</td></tr>
</table>

The signal width of the A/B phase pulse is determined by the motor speed, and the signal width of the Z phase pulse is half of the A/B phase pulse signal width.

The Z-phase signal output polarity is set by P05-41 (Z-pulse output polarity selection).

<table>
<tr><td rowspan="2">P05-39</td><td>Name</td><td colspan="3">Electronic gear ratio switching conditions</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
</table>

Electronic gear ratio switching conditions：

<table>
<tr><th>Set value</th><th>Switching conditions</th><th>Notes</th></tr>
<tr><td>0</td><td>Switch after Command Unit=0 and lasting for 2.5 ms</td><td rowspan="2">Must set 1 DI terminal DI function 24 (FunIN.24: GEAR_SEL, Electronic gear ratio selection)</td></tr>
<tr><td>1</td><td>Real time switching</td></tr>
</table>

P05-02 (Number of position commands per rotation of the motor) is valid when=0.

<table>
<tr><td rowspan="2">P05-40</td><td>Name</td><td colspan="3">Mechanical home offset and limit handling method</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～3</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
</table>

Set the offset relationship between mechanical home and mechanical home during Zero return, and how to handle overtravel switches encountered during Zero return.

<table>
<tr><td rowspan="2">Set value</td><td rowspan="2">Mechanical home offset and limit handling method</td><td colspan="2">Notes</td></tr>
<tr><td>Mechanical home</td><td>Overtravel processor</td></tr>
<tr><td>0</td><td>P05-36 is the coordinate after the home reset. When encountering a limit, the home reset enable is triggered again, and then the home is found in the reverse direction</td><td>The mechanical home and mechanical home do not coincide. After the Zero return is completed, the motor stops at the mechanical home and the mechanical home coordinates are forced to P05-36.</td><td>Give the home reset trigger signal again, servo, and perform the home reset in the reverse direction</td></tr>
<tr><td>1</td><td>P05-36 is the relative offset after the home reset. When encountering a limit, the home reset enable is triggered again, and then the home is found in the reverse direction</td><td>The mechanical home and mechanical home coincide. After the motor has positioned the mechanical home, continue to move the displacement set in P05-36 and stop.</td><td>Give the home reset touch again</td></tr>
<tr><td>2</td><td>P05-36 is the coordinate after the home is reset, and automatically reverses the zero finding when encountering a limit position</td><td>The mechanical home and mechanical home do not coincide. After the Zero return is completed, the motor stops at the mechanical home and the mechanical home coordinates are forced to P05-36.</td><td>Signal, servo, reverse execution of zero point reset</td></tr>
<tr><td>3</td><td>P05-36 is the relative offset after the home is reset, and when encountering a limit, it will automatically reverse the zero finding</td><td>The mechanical home and mechanical home coincide. After the motor has positioned the mechanical home, continue to move the displacement set in P05-36 and stop.</td><td>Servo automatically reverses and continues to perform zero point reset</td></tr>
</table>

After the zero point reset is completed (including Zero return and electrical zero return), the current absolute position of the motor (P0B-07) is consistent with P05-36.

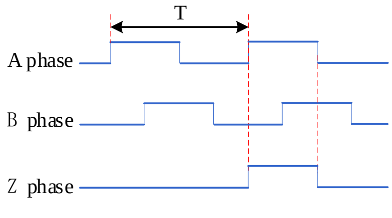
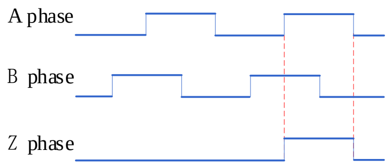
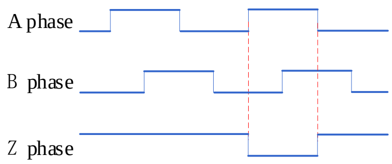
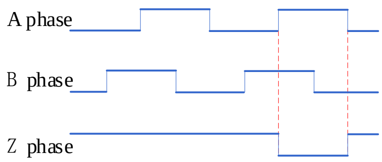
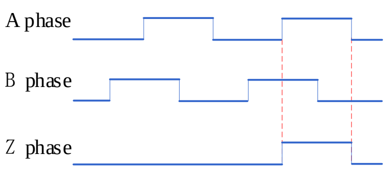
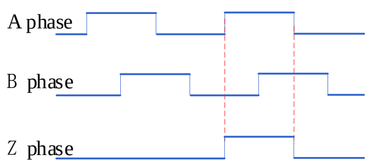
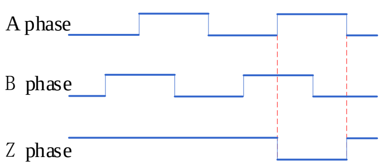
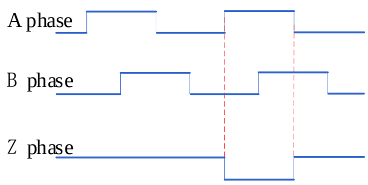
Zero return completion signal (FunOUT. 16: HomeAttach) or electrical zero return completion signal (FunOUT. 17: ElecHomeAttach) are both at the current absolute position of the motor

P0B-07=P05-36 will not be output until it is independent of the servo enable signal status.

Home reset trigger signal, please refer to“6.2.8 Home reset function”.

P05-41	Name	Z pulse output polarity selection			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Re-energize	Factory setting	1

Set the output level of the pulse output terminal Z when the pulse is valid.

P02-03 (Output pulse phase)	P05-41 (Z pulse output polarity)	Schematic diagram of forward rotation and pulse output	Schematic diagram of reverse rotation and pulse output
0	0	 Phase A leads Phase B by 90 °	 Phase B leads Phase A by 90 °
	1	 Phase A leads Phase B by 90 °	 Phase B leads Phase A by 90 °
1	0	 Phase B leads Phase A by 90 °	 Phase A leads Phase B by 90 °
	1	 Phase B leads Phase A by 90 °	 Phase A leads Phase B by 90 °

For applications where the precision of Z signal frequency division output is highly required, it is recommended to use the effective variation edge of Z signal output：

Set value	Z pulse output polarity selection
0	Positive polarity (high level when Z pulse is valid)
1	Negative polarity (low level when Z pulse is valid)

■P05-41=0 The effective change edge is the falling edge;

■P05-41=1 The effective change edge is the rising edge.

P05-43	Name	Position pulse edge selection			Setting method	running settings	Related modes	P
	Setting range	0～1	Unit	1	Effective method	Re-energize	Factory setting	0

Set value	Position pulse edge selection
0	Falling edge is valid
1	Rising edge is valid

The effective edge selection of the pulse command is calculated from the falling edge of the pulse when 0 is set, and from the rising edge of the pulse input when 1 is set.

P05-46	Name	Absolute position linear mode position offset (lower 32 bits)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	-2147483648～2147483647	Unit	Encoder unit	Effective method	Effective immediately	Factory setting	0
P05-48	Name	Absolute Position Linear Mode Position Offset (High 32 bits)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	-2147483648～2147483647	Unit	Encoder unit	Effective method	Effective immediately	Factory setting	0

The effective edge selection of the pulse command is calculated from the falling edge of the pulse when 0 is set, and from the rising edge of the pulse input when 1 is set.

P05-50	Name	Absolute position rotation mode mechanical gear ratio (numerator)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	1-65535	Unit	-	Effective method	Effective immediately	Factory setting	65535
P05-51	Name	Absolute position rotation mode mechanical gear ratio (denominator)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	1-65535	Unit	-	Effective method	Effective immediately	Factory setting	1

Absolute position rotation mode (P02-01=2), the transmission ratio of the mechanical mechanism rotating load to the motor.

P05-52	Name	Absolute position rotation mode Number of pulses for one rotation of the load (lower 32 bits)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	0～4294967295	Unit	Encoder unit	Effective method	Effective immediately	Factory setting	0
P05-54	Name	Absolute position rotation mode Number of pulses for one rotation of the load (high 32 bits)			Setting method	Shutdown setting	Related modes	ALL
	Setting range	0～127	Unit	Encoder unit	Effective method	Effective immediately	Factory setting	0

In the absolute position rotation mode (P02-01=2), rotating the load for one rotation corresponds to the number of pulses the motor rotates.

P05-56	Name	Touch stop return to zero speed judgment threshold			Setting method	running settings	Related modes	P
	Setting	0～1000	Unit	rpm	Effective	Effective	Factory	2

	range				method	immediately	setting	
Determine the speed threshold at which the load reaches the mechanical position during the touch stop return to zero process.								

P05-58	Name	Touch to zero torque limit			Setting method	running settings	Related modes	P
	Setting range	0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	100.0
The positive and negative Maximum torque limit values during the touch stop return to zero process.								

P05-59	Name	Positioning completion window time			Setting method	running settings	Related modes	P
	Setting range	0～30000	Unit	ms	Effective method	Effective immediately	Factory setting	0
The time when the positioning deviation is less than the positioning completion threshold, and it needs to be greater than the set window time to output the effective status of the positioning completion signal.								

P05-60	Name	Positioning completion hold time			Setting method	running settings	Related modes	P
	Setting range	0～30000	Unit	ms	Effective method	Effective immediately	Factory setting	0
When P05-20 is equal to 3, the valid state holding time of the positioning completion (COIN) signal is set to invalid if the position command is not 0 within the holding time Status. If the setting value is 0, it indicates that the signal is in a valid state after output until the next command arrives.								

P05-61	Name	Encoder frequency division pulse number (32 bits)			Setting method	Shutdown setting	Related modes	P
	Setting range	0～262143	Unit	P/r	Effective method	Re-energize	Factory setting	0
When the set value is less than 35, the number of encoder frequency division pulses is determined by P05-17Set value; When the set value is greater than or equal to 35, the number of encoder frequency division pulses is determined by P05-61Set value.								

Group P06: Speed control parameters

P06-00	Name	Main speed command A source			Setting method	Shutdown setting	Related modes	S
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the speed command source of the main speed command A source.

Set value	Command source	Command acquisition method
0	Number given	The speed command A source is set by P06-03.
1	AI1	The source of the speed command A is input from the external analog quantity AI1 channel. The corresponding relationship between the analog quantity voltage and the speed command is set by the function codes P03-50, P03-51, P03-53, P03-54, and P03-80. For the specific corresponding relationship, refer to "Section 6.3.1".
2	AI2	The source of the speed command A is input from the external analog quantity AI2 channel. The corresponding relationship between the analog quantity voltage and the speed command is set by the function codes P03-55, P03-56, P03-58, P03-59, and P03-80. For the specific corresponding relationship, refer to "Section 6.3.1".

◆Caution:

Digital setting belongs to internal speed commands, while AI1 and AI2 commands belong to external speed commands. For hardware interfaces of AI1 and AI2, please refer to "Chapter IV Wiring".

P06-01	Name	Auxiliary speed command B source			Setting method	Shutdown setting	Related modes	S
	Setting range	0～5	Unit	-	Effective method	Effective immediately	Factory setting	1

Set the speed command source for auxiliary speed command B.

Set value	Command source	Command acquisition method
0	Number given	The auxiliary speed command B source is set by P06-03.
1	AI1	The source of the speed command B is input from the external analog quantity AI1 channel. The corresponding relationship between the analog quantity voltage and the speed command is set by the function codes P03-50, P03-51, P03-53, P03-54, and P03-80. Refer to Section 6.3.1 for the specific corresponding relationship.
2	AI2	The source of the speed command B is input from the external analog quantity AI2 channel. The corresponding relationship between the analog quantity voltage and the speed command is set by the function codes P03-55, P03-56, P03-58, P03-59, and P03-80. Refer to Section 6.3.1 for the specific corresponding relationship.
3	-	Invalid
4	-	Invalid
5	Multi segment speed command	The source of auxiliary speed command B is planned by internal multi segment speed commands. Please refer to P12 group parameters for relevant settings of multi segment speed.

◆Caution:

Digital given and multi segment speeds belong to internal speed commands, while AI1 and AI2 commands belong to external speed commands. Please refer to"Chapter IV Wiring"for AI1 and AI2 hardware interfaces.

P06-02	Name	Speed command selection			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

Select speed command source.

<table>
<tr><th>Set value</th><th>Command source</th><th>Command acquisition method</th></tr>
<tr><td>0</td><td>Main speed command A source</td><td>The actual input command source is selected by function code P06-00.</td></tr>
<tr><td>1</td><td>Auxiliary speed command B source</td><td>The actual input command source is selected by function code P06-01.</td></tr>
<tr><td>2</td><td>Main command A source+auxiliary command B source</td><td>The input command source is selected by function codes P06-00 and P06-01 to act together as the actual speed command.</td></tr>
<tr><td>3</td><td>Main command A source/auxiliary command B source switching</td><td>The A/B source switch is performed by the DI function FunIN. 4 (Cmd_SEL) state.
<table>
<tr><th>FunIN. 4 (Cmd_SEL) Status</th><th>Command selection</th></tr>
<tr><td>Invalid</td><td>Main speed command A source</td></tr>
<tr><td>Valid</td><td>Auxiliary speed command B source</td></tr>
</table></td></tr>
<tr><td>4</td><td>Communication given</td><td>Input the speed command from the communication mode operation function code P31-09, with an accuracy of 0.001 rpm.</td></tr>
</table>

◆Caution:

Digital given and multi segment speeds belong to internal speed commands, while AI1 and AI2 commands belong to external speed commands. Please refer to"Chapter IV Wiring" for AI1 and AI2 hardware interfaces.

P06-03	Name	Speed command keyboard set value			Setting method	running settings	Related modes	S
	Setting range	0～65535	Unit	rpm	Effective method	Effective immediately	Factory setting	200

When P06-00 or P06-01 selects a digital given source, set the rotational speed command value through P06-03.

P06-04	Name	Jog speed set value			Setting method	running settings	Related modes	S
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	100

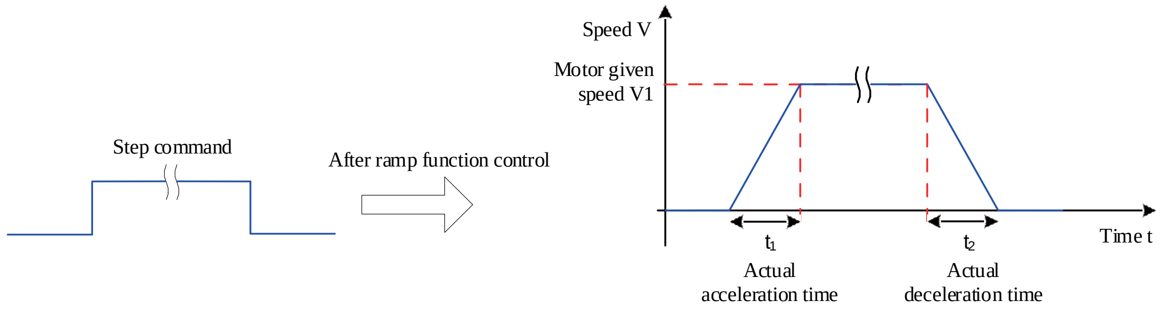
When using the DI jog function, set the Jog running speed command value.

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

P06-05	Name	Speed command acceleration ramp time constant			Setting method	running settings	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	0

P06-06	Name	Speed command deceleration ramp time constant			Setting method	running settings	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	0

Set the acceleration/deceleration ramp time constant for the speed command. The acceleration/deceleration time constant for the multi segment speed command is only determined by the P12 group parameters.



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:

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

Actual acceleration time $t_2 = \frac{speed\ command}{1000} \times \text{speed command acceleration ramp time}$

P06-07	Name	Maximum rotational speed threshold			Setting method	running settings	Related modes	S
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	6000

P06-08	Name	Forward speed threshold			Setting method	running settings	Related modes	S
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	6000

P06-09	Name	Reverse speed threshold			Setting method	running settings	Related modes	S
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	6000

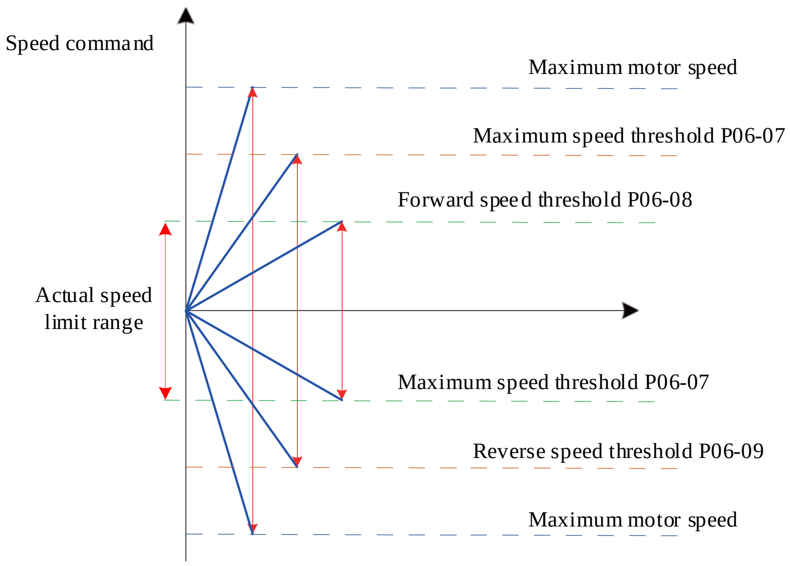
Under Speed control mode, set the speed command limit value. The sources of speed command limit values are as follows:

P06-07: Set the limit value of the speed command in the positive and negative directions. If the speed command in the positive and negative directions exceeds the Set value, it 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.



Therefore, the actual positive and negative direction motor speed commands will be limited to：

|Forward speed command|≤min{Maximum rotational speed, P06-07, P06-08}；|Negative speed command|≤min{Maximum rotational speed, P06-07, P06-09}

P06-11	Name	Torque feedforward control selection			Setting method	running settings	Related modes	S
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

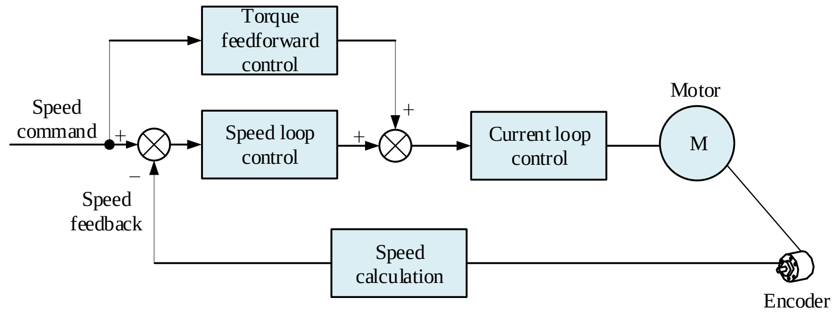
Set whether to enable the internal Torque feedforward function in non Torque control mode.

Using the Torque feedforward function can improve torque command response speed and reduce position deviation during fixed acceleration and deceleration.

Set value	Torque feedforward control selection	Notes
0	Not Applicable	-
1	Internal torque feedforward	The source of the Torque feedforward signal is a speed command: Output from position controller in position mode In speed mode, the speed command given by the user

"Torque feedforward function parameters include torque feedforward gain (P08-20) and torque feedforward filter time constant (P08-21). Please refer to“7.4.4 Feedforward gain” for setting.

In non Torque control mode, the torque feedforward control block diagram is shown in the following figure:

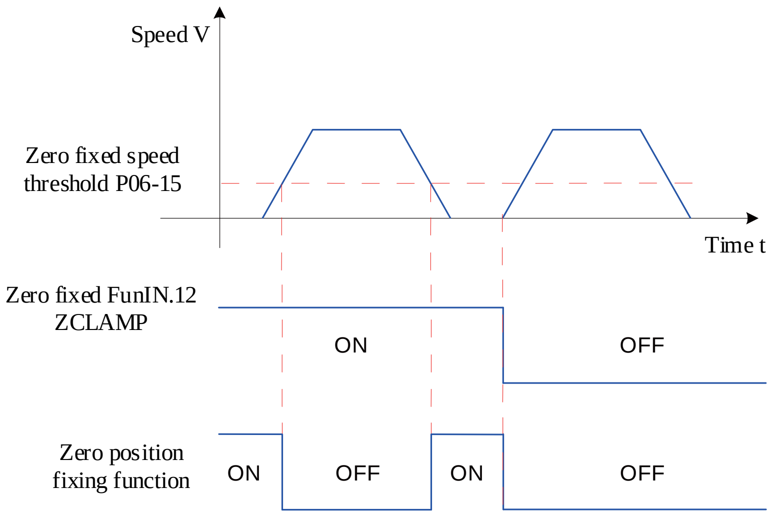


P06-15	Name	Zero fixed speed threshold			Setting method	running settings	Related modes	S
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	10

Zero position fixing function" refers to when the zero position fixing DI signal FunIN.12 (ZCLAMP) is valid in the Speed control mode, and when the speed command amplitude is less than or equal to P06-15Set value, the servo motor enters the zero position locking state. 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.

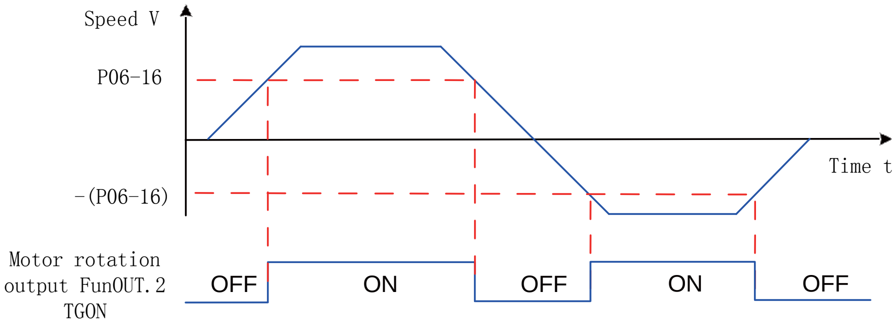
If the zero position fixing DI signal FunIN.12 (ZCLAMP) is invalid, the Zero position fixing function is invalid.



P06-16	Name	Motor rotation speed threshold			Setting method	running settings	Related modes	S
	Setting range	0～1000	Unit	rpm	Effective method	Effective immediately	Factory setting	20

When the absolute value of the filtered actual motor speed reaches P06-16 (motor rotation speed threshold), the motor can be considered to be rotating. At this time, the servo drive can output a motor rotation (FunOUT. 2: TGON) signal to confirm that the motor has rotated. Conversely, when the filtered absolute value of the actual rotational speed of the motor is less than P06-16, it is considered that the motor is not rotating.

The judgment of the motor rotation (FunOUT. 2: TGON) signal is not affected by the drive operation status and control mode.



◆Caution:

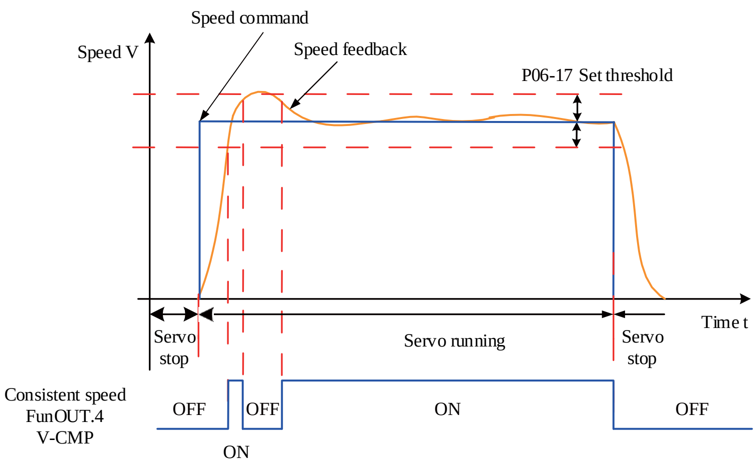
In the figure above, ON indicates that the motor rotation DO signal is valid, and OFF indicates that the motor rotation DO signal is invalid.

The filtering time constant for the actual motor speed can be set through P0A-27 (Speed DO Filtering Time Constant).

P06-17	Name	Speed consensus signal threshold			Setting method	running settings	Related modes	S
	Setting range	0～100	Unit	rpm	Effective method	Effective immediately	Factory setting	10

In Speed control mode, when the absolute value of the deviation between the filtered actual rotation speed of the servo motor and the speed command meets a certain threshold (P06-17), it is considered that the actual rotation speed of the motor has reached the speed command Set value, and the drive can output a speed consistent (FunOUT. 4: V-Cmp) signal. On the contrary, if the absolute value of the deviation between the filtered servo motor actual rotational speed and the speed command exceeds this threshold, the speed coincidence signal is invalid.

When the drive is in a non operating state or in a non Speed control mode, the FunOUT. 4: V-Cmp signal is always invalid.



◆Caution:

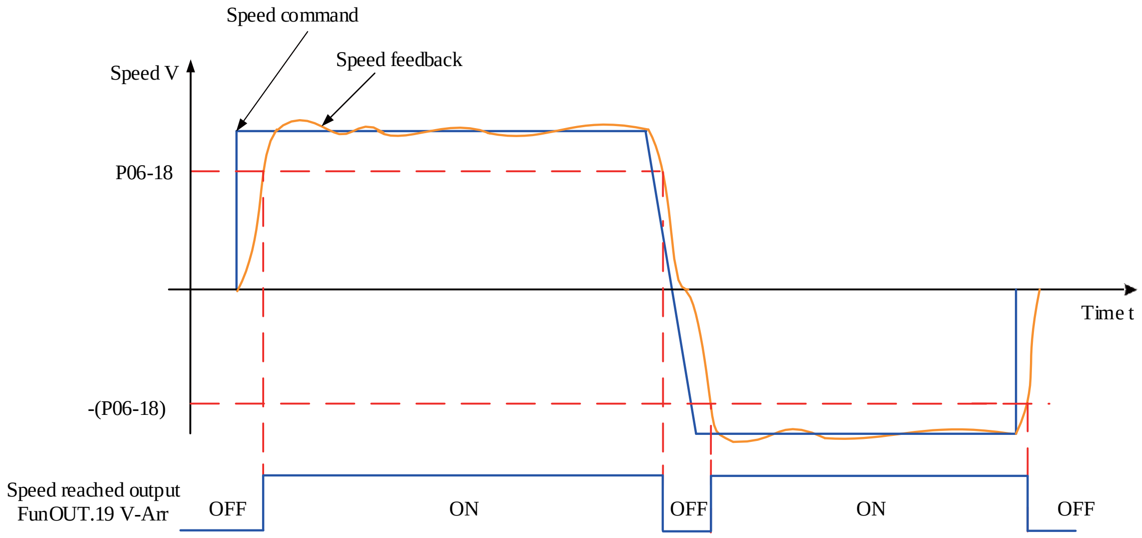
In the figure above, ON indicates that the speed consistent DO signal is valid, and OFF indicates that the speed consistent DO signal is invalid.The filtering time constant for the actual motor speed can be set through P0A-27 (Speed DO Filtering

Time Constant).

P06-18	Name	Speed reaches signal threshold			Setting method	running settings	Related modes	S
	Setting range	10～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	1000

When the filtered absolute value of the actual rotational speed of the servo motor exceeds a certain threshold (P06-18), it is considered that the actual rotational speed of the servo motor reaches the desired value, and at this time, the servo drive can output a speed reaching (FunOUT. 19: V-Arr) signal. Conversely, if the filtered absolute value of the actual rotational speed of the servo motor is not greater than this value, the speed arrival signal is invalid.

The judgment of the speed arrival (FunOUT. 19: V-Arr) signal is not affected by the operating status and control mode of the drive.



◆Caution:

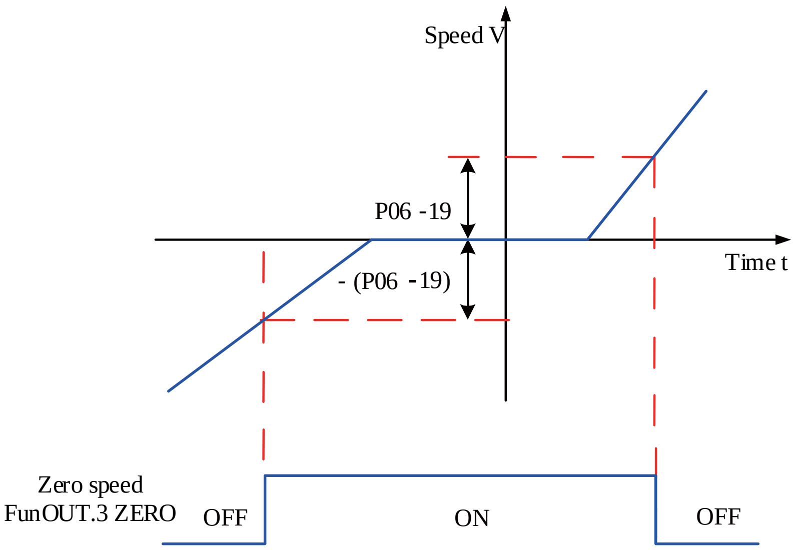
In the figure above, ON represents that the speed arrival DO signal is valid, and OFF represents that the speed arrival DO signal is invalid.

The filtering time constant for the actual motor speed can be set through P0A-27 (Speed DO Filtering Time Constant).

P06-19	Name	Zero speed output signal threshold			Setting method	running settings	Related modes	S
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	10

When the filtered absolute value of the actual rotational speed of the servo motor is less than a certain threshold (P06-19), it is considered that the actual rotational speed of the servo motor is close to standstill, and the servo drive can output a zero speed (FunOUT. 3: V-Zero) signal. On the contrary, if the filtered absolute value of the actual rotational speed of the servo motor is not greater than this value, it is considered that the motor is not in a static state and the zero speed signal is invalid.

The judgment of the zero speed (FunOUT. 3: V-Zero) signal is not affected by the operating status and control mode of the drive.



◆Caution:

In the figure above, ON indicates that the zero speed DO signal is valid, and OFF indicates that the zero speed DO signal is invalid.

The filtering time constant for the actual motor speed can be set through P0A-27 (Speed DO Filtering Time Constant).

Group P07: Torque control parameters

P07-00	Name	Source of main torque command A			Setting method	Shutdown setting	Related modes	T
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the torque command source of the main torque command A.

Set value	Command source	Command acquisition method
0	Number given	The torque command A source is set by P07-03.
1	AI1	The source of torque command A is input from the external analog quantity AI1 channel, and the corresponding relationship between its analog quantity voltage and torque command is set by function codes P03-50, P03-51, P03-53, P03-54, and P03-81. Refer to Section 6.4.1 for specific corresponding relationships.
2	AI2	The source of torque command A is input from the external analog quantity AI2 channel, and the corresponding relationship between its analog quantity voltage and torque command is set by function codes P03-55, P03-56, P03-58, P03-59, and P03-81. Refer to Section 6.4.1 for specific corresponding relationships.

◆Caution:

Digital setting belongs to internal torque commands, while AI1 and AI2 commands belong to external torque commands. Refer to "Chapter IV Wiring"for AI1 and AI2 hardware interfaces.

P07-01	Name	Auxiliary torque command B source			Setting method	Shutdown setting	Related modes	T
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	1

Set the torque command source of auxiliary torque command B.

Set value	Command source	Command acquisition method
0	Number given	The auxiliary torque command B source is set by P07-03.
1	AI1	The source of torque command B is input from the external analog quantity AI1 channel, and the corresponding relationship between its analog quantity voltage and torque command is set by function codes P03-50, P03-51, P03-53, P03-54, and P03-81. Refer to Section 6.4.1 for specific corresponding relationships
2	AI2	The source of torque command B is input from the external analog quantity AI2 channel, and the corresponding relationship between its analog quantity voltage and torque command is set by function codes P03-55, P03-56, P03-58, P03-59, and P03-81. Refer to Section 6.4.1 for specific corresponding relationships

◆Caution:

Number given belongs to internal torque commands, while AI1 and AI2 commands belong to external torque commands. Refer to "Chapter IV Wiring"for hardware interfaces of AI1 and AI2.

<table>
<tr><td rowspan="2">P07-02</td><td>Name</td><td colspan="3">Torque command selection</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>T</td></tr>
<tr><td>Setting range</td><td>0～4</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Select torque command source
<table>
<tr><th>Set value</th><th>Control mode</th><th>Notes</th></tr>
<tr><td>0</td><td>Source of main torque command A</td><td>The actual input command source is selected by function code P07-00.</td></tr>
<tr><td>1</td><td>Auxiliary torque command B source</td><td>The actual input command source is selected by function code P07-01.</td></tr>
<tr><td>2</td><td>Main command A source+auxiliary command B source</td><td>The input command source is selected by function codes P07-00 and P07-01 to act together as the actual torque command.</td></tr>
<tr><td>3</td><td>Main command A source/auxiliary command B source switching</td><td>The A/B source switch is performed based on the DI function FunIN. 4 (Cmd_Sel) state.
<table>
<tr><th>FunIN.4(Cmd_Sel) Status</th><th>Command selection</th></tr>
<tr><td>Invalid</td><td>Source of main torque command A</td></tr>
<tr><td>Valid</td><td>Auxiliary torque command B source</td></tr>
</table></td></tr>
<tr><td>4</td><td>Communication given</td><td>Input torque command through communication mode operation function code P31-11.</td></tr>
</table></td></tr>
</table>

P07-03	Name	Torque command keyboard set value			Setting method	running settings	Related modes	T
	Setting range	-300.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	0
When P07-00 or P07-01 selects the Number given source, set the required torque command value through P07-03. 100.0% corresponds to 1 times the rated torque of the motor.								

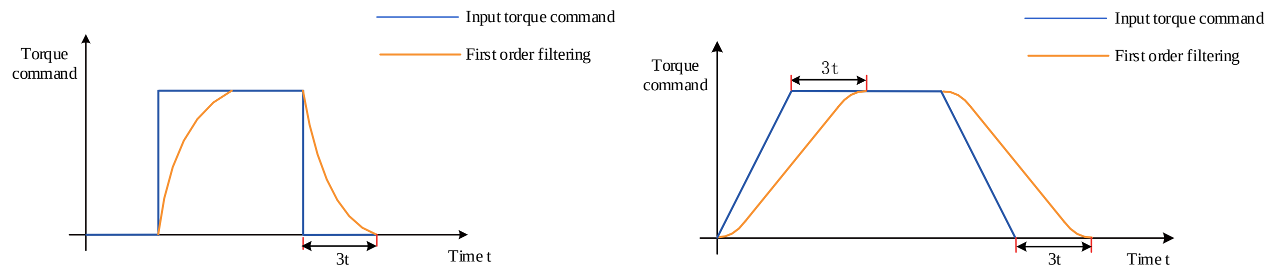
P07-05	Name	Torque command filtering time constant			Setting method	running settings	Related modes	PST
	Setting range	0～30.00	Unit	ms	Effective method	Effective immediately	Factory setting	0.79

P07-06	Name	Second torque command filtering time constant			Setting method	running settings	Related modes	PST
	Setting range	0～30.00	Unit	ms	Effective method	Effective immediately	Factory setting	0.79

Set the Torque command filtering time constant.

By performing low-pass filtering on torque commands, torque commands can be smoother and vibration reduced.

If the filter time constant Set value is too large, it will reduce responsiveness. Please confirm the responsiveness while setting it!



◆Caution:

The servo drive provides two torque command low-pass filters, using filter 1 by default;

In position or speed control mode, use the Gain switching function. When certain conditions are met, you can switch to filter 2. For the setting of Gain switching, refer to "7.4.2 Gain switching".

P07-07	Name	Source of torque limit			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the torque limit source, refer to"6.4.3 Torque command limit".

Set value	Sources are limited
0	Positive and negative internal torque limits
1	Positive and negative external torque limit (using P-CL, N-CL)
2	T-LMT used as external torque limiting input
3	Take the minimum value of positive and negative external torque and external T-LMT as the torque limit (select using P-CL, N-CL)
4	Switch between positive and negative internal torque limits and T-LMT torque limits. (Select using P-CL, N-CL)

◆Caution:

The torque limit function is effective for position, speed, torque, and Hybrid control mode.

P07-08	Name	T-LMT selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	1～2	Unit	-	Effective method	Effective immediately	Factory setting	2

When the external torque limit is enabled (P07-07=2/3/4), select the analog input channel for the torque limit value:

Set value	Command source	Sources are limited
1	AI1	Analog channel AI1 as an external torque limit input source
2	AI2	Analog channel AI2 as an external torque limit input source

Please refer to "6.4.1 Torque command input setting" for AI input related settings. Please refer to "6.4.3 Torque command limit"for the final torque limit value.

P07-09	Name	Positive internal torque limit			Setting method	running settings	Related modes	PST
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	300.0

P07-10	Name	Negative internal torque limit			Setting method	Running settings	Related modes	PST
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	300.0

When P07-07=0 or 4 is set, the positive and negative internal torque limits are set. 100.0% corresponds to 1 times the rated torque of the motor.

◆Caution:

Note 1: When P07-09 and P07-10 Set values are too small, insufficient torque may occur when the servo motor accelerates or decelerates.

Note 2: If the Set value exceeds the Maximum torque of the servo motor and drive used, the actual torque will be limited to the Maximum torque of the servo motor and drive.

Note 3: Please refer to "6.4.3 Torque command limit"for the final torque limit value.

P07-11	Name	Positive external torque limit			Setting method	Running settings	Related modes	PST
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	300.0

P07-12	Name	Negative external torque limit			Setting method	Running settings	Related modes	PST
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	300.0

When P07-07=1 or 3 is set, the positive and negative external torque limits are set. 100.0% corresponds to 1 times the rated torque of the motor. Please refer to "6.4.3 Torque command limit" for the final torque limit value.

P07-17	Name	Speed limit source selection			Setting method	Running settings	Related modes	T
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the speed limit source in Torque control mode.

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.

Set value	Sources are limited	Notes
0	Internal speed limit	The rotational speed limit is determined by P07-19 and P07-20
1	Use V-LMT as external speed limit input	The rotational speed limit in different directions is determined by the rotational speed value corresponding to the input voltage of the analog channel and P07-19 (forward rotation) And P07-20 (reverse)
2	Select the first or second speed limit input through the DI function FunIN.36	DI (FunIN. 36) is invalid: P07-19 is used as the forward and reverse speed limit value DI (FunIN. 36) is valid: P07-20 is used as the forward and reverse speed limit value

◆Caution:

In torque mode, refer to "6.4.4 Speed limit in torque mode" for specific speed limits.

P07-18	Name	V-LMT selection			Setting method	running settings	Related modes	T
	Setting range	1～2	Unit	-	Effective method	Effective immediately	Factory setting	1

When the speed limit source is configured as an external analog quantity (V-LMT) in torque mode, select the analog quantity input channel：

Set value	Command source	Notes
1	AI1	Analog quantity AI1 as input source of external speed limit value
2	AI2	Analog quantity AI2 as input source of external speed limit value

P07-19	Name	Torque control forward speed limit value/Torque control speed limit value 1			Setting method	running settings	Related modes	T
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	3000

P07-20	Name	Torque control reverse speed limit value/Torque control speed limit value 2			Setting method	running settings	Related modes	T
	Setting range	0～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	3000

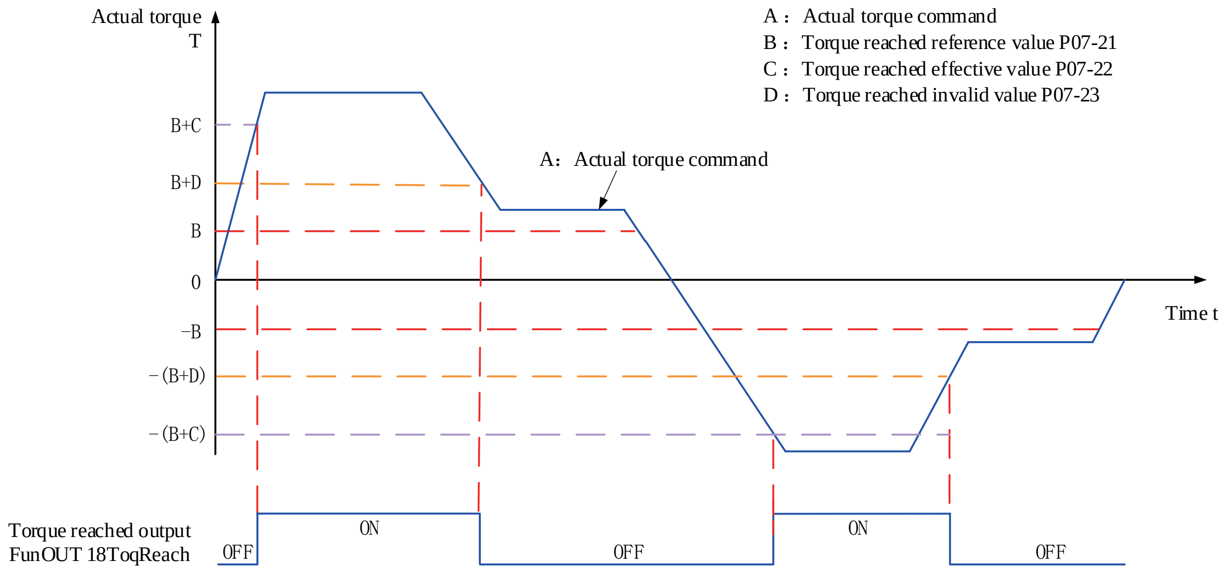
Set the rotational speed limit Number given value in torque mode. Please refer to "6.4.4 Speed limit in torque mode" for details.

P07-21	Name	Torque reaches reference value			Setting method	running settings	Related modes	T
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	0.0

P07-22	Name	Torque reaches effective value			Setting method	running settings	Related modes	T
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	20.0

P07-23	Name	Torque reaches invalid value			Setting method	running settings	Related modes	T
	Setting range	0.0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	10.0

The torque arrival function (FunOUT. 18: ToqReach, Torque Arrival) is used to determine whether the actual torque command has reached the effective value range of the torque. When the range is satisfied, the drive can output the corresponding DO signal for use by the upper computer.



Actual torque command (can be viewed through P0B-02): A;

The torque reaches the reference value P07-21: B;

The torque reaches the effective value P07-22: C;

Torque reaches invalid value P07-23: D;

Where C and D are offsets based on B.

Therefore, when the torque reaching DO signal changes from invalid to effective, the actual torque command must meet the following requirements:

$|A| \geq B+C$

Otherwise, the torque reaching DO signal remains invalid.

On the contrary, when the torque reaching DO signal changes from valid to invalid, the actual torque command must meet the following requirements:

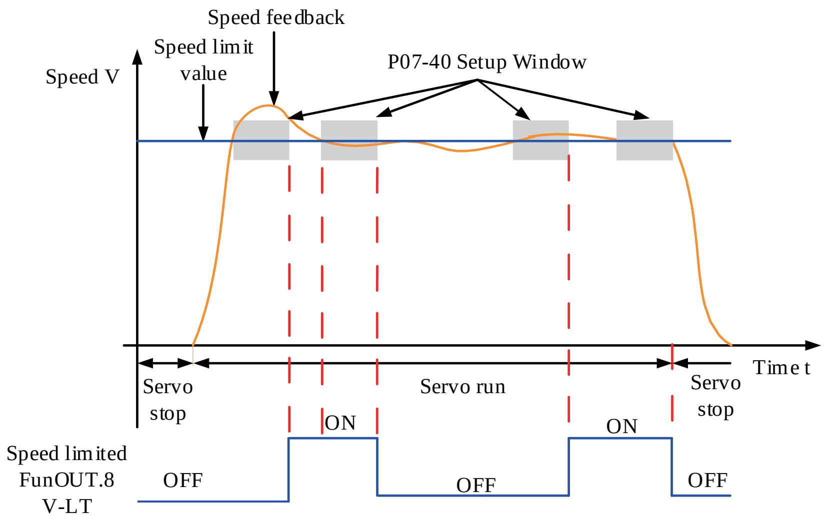
$|A| < B+D$

Otherwise, the torque reaching DO signal remains valid.

<table>
<tr><td rowspan="2">P07-40</td><td>Name</td><td colspan="3">Speed limited window in torque mode</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>T</td></tr>
<tr><td>Setting range</td><td>0.5～30.0</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>1.0</td></tr>
</table>

In torque mode, when the absolute value of the actual rotational speed of the servo motor exceeds the speed limit value (refer to "6.4.4 Speed limit in torque mode") 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. 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.



◆Caution:

In the figure above, ON indicates that the speed limited DO signal is valid, and OFF indicates that the speed limited DO signal is invalid.

Group P08: Gain type parameters

<table>
<tr><td rowspan="2">**P08-00**</td><td>Name</td><td colspan="3">Speed loop gain</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.1～2000.0</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>25.0</td></tr>
<tr><td colspan="9">Sets the proportional gain of the speed loop.
This parameter determines the response of the speed loop. The larger the parameter, the faster the speed loop responds. However, setting it too large may cause vibration, which requires attention.
In position mode, to increase the position loop gain, it is necessary to simultaneously increase the speed loop gain.</td></tr>
</table>

<table>
<tr><td rowspan="2">**P08-01**</td><td>Name</td><td colspan="3">Speed loop integral time constant</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.15～512.00</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>31.83</td></tr>
<tr><td colspan="9">Set the integral time constant of the speed loop.
The smaller the value set, the stronger the integration effect, and the faster the deviation value approaches zero when stopping.
◆Caution:
When P08-01 is set to 512.00, there is no integration effect.</td></tr>
</table>

<table>
<tr><td rowspan="2">**P08-02**</td><td>Name</td><td colspan="3">Position loop gain</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0.0～2000.0</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>40.0</td></tr>
<tr><td colspan="9">Sets the proportional gain of the position loop.
This parameter determines the responsiveness of the position loop. Setting a larger position loop gain can shorten the positioning time. However, excessive setting may cause vibration, which requires attention.
P08-00, P08-01, P08-02, and P07-05 (Torque command filtering time constant) are referred to as the first gain.</td></tr>
</table>

<table>
<tr><td rowspan="2">**P08-03**</td><td>Name</td><td colspan="3">Second speed loop gain</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.1～2000.0</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>40.0</td></tr>
</table>

<table>
<tr><td rowspan="2">**P08-04**</td><td>Name</td><td colspan="3">Second speed loop integral time constant</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.15～512.00</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>40.0</td></tr>
</table>

<table>
<tr><td rowspan="2">**P08-05**</td><td>Name</td><td colspan="3">Second position loop gain</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0.0～2000.0</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>64.0</td></tr>
<tr><td colspan="9">Set the second gain of the position loop and the speed loop. P08-03, P08-04, P08-05, and P07-06 (the second Torque command filtering time constant) are referred to as the second gain.</td></tr>
</table>

Please refer to "7.4.2 Gain switching" for relevant content of Gain switching.

P08-08	Name	Second gain mode setting			Setting method	running settings	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

Sets the switching mode for the second gain.

Set value	Second gain mode
0	The first gain is fixed, and the DI function 3 (FunIN. 3: GAIN_SEL, Gain switching) is used to switch the control of the speed loop to P/PI. GAIN_ SEL signal invalid - PI control GAIN_ SEL signal valid - P control
1	The switching between the first gain (P08-00 to P08-02, P07-05) and the second gain (P08-03 to P08-05, P07-06) is effective, and the switching condition is P08-09.

P08-09	Name	Gain switching condition selection			Setting method	running settings	Related modes	PST
	Setting range	0～10	Unit	-	Effective method	Effective immediately	Factory setting	0

Set conditions for gain switching：

Set value	Conditions for gain switching	Notes
0	First gain fixed	Fixed to first gain.
1	Use external DI switching	Using GAIN-SEL signals for gain switching: GAIN_ SEL signal invalid - first gain (P08-00 to P08-02, P07-05) GAIN_ SEL signal valid - second gain (P08-03 to P08-05, P07-06) When the GAIN-SEL signal cannot be assigned to the DI terminal, it is fixed to the first gain.
2	High torque command	When the absolute value of the torque command exceeds (level+delay) [%] at the last first gain, switch to the second gain; In the last second gain, the absolute value of the torque command was less than (level delay) [%] during the delay time (P08-10) Returns to the first gain when the period continues.
3	High speed command	When the absolute value of the speed command exceeds (level+delay) [rpm] at the last first gain, switch to the second gain. At the last second gain, the absolute value of the speed command was lower than (level delay) [rpm] during the delay time (P08-10) Returns to the first gain when the period continues.
4	Large speed command change rate	Valid only when not in speed control mode: When the absolute value of the rate of change of the speed command exceeds (level+delay) [10 rpm/s] at the last first gain, switch to the second gain. At the last second gain, when the absolute value of the rate of change of the speed command is lower than (level delay) [10 rpm/s] and continues for a period of delay time (P08-10), it returns to the first gain. Speed control mode, fixed as the first gain.

5	Speed command high and low speed threshold	Valid only when not in Speed control mode: When the absolute value of the rate of change of the speed command exceeds (level+delay) [10 rpm/s] at the last first gain, switch to the second gain. At the last second gain, when the absolute value of the rate of change of the speed command is lower than (level delay) [10 rpm/s] and continues for a period of delay time (P08-10), it returns to the first gain. Speed control mode, fixed as the first gain.
6	Large position deviation	Only valid in Position control mode and full closed-loop function: At the last first gain, when the absolute value of the position deviation exceeds (level+delay) [Encoder unit], switch to the second gain. At the last second gain, when the state where the absolute value of the position deviation is lower than (level delay) [Encoder unit] continues for a period of delay time (P08-10), return to the first gain. Position control mode, full closed-loop function, fixed as the first gain.
7	With position command	Only valid in Position control mode and full closed-loop function: At the last first gain, if the position command is not 0, switch to the second gain. At the last second gain, if the position command is 0 and the state continues during the delay time (P08-10), it returns to the first gain. Position control mode, full closed-loop function, fixed as the first gain.
8	Positioning complete	Only valid in Position control mode and full closed-loop function: At the last first gain, if the positioning is not completed, switch to the second gain. At the last second gain, if the positioning incomplete state continues during the delay time (P08-10), it returns to the first gain. Position control mode, full closed-loop function, fixed as the first gain.
9	Large actual speed	Only valid in Position control mode and full closed-loop function: At the last first gain, when the absolute value of the actual speed exceeds (level+delay) [rpm], switch to the second gain. In the last second gain, the absolute value of the actual speed was less than (level delay) [rpm] at the delay time (P08-10) Returns to the first gain when the period continues. Position control mode, full closed-loop function, fixed as the first gain.
10	With position command+actual speed	Only valid in Position control mode and full closed-loop function: At the last first gain, if the position command is not 0, switch to the second gain. At the last second gain, the state where the position command is 0 continues during the delay time (P08-10), which is the second gain; When the position command is 0 and P08-10 time is up, if the absolute value of the actual speed is less than (level) [rpm], the speed integration time constant is fixed at P08-04 (second speed loop integration time constant), and the rest returns to the first gain; If the absolute value of the actual speed is less than (level delay) [rpm], the speed integral also returns to P08-01 (speed loop integral time constant). Position control mode, full closed-loop function, fixed as the first gain.

P08-10	Name	Gain switching delay time			Setting method	running settings	Related modes	PST
	Setting range	0.0～1000.0	Unit	ms	Effective method	Effective immediately	Factory setting	5.0
Set the duration required for the switching condition to meet when returning from the second gain to the first gain.								

P08-11	Name	Gain switching level			Setting method	running settings	Related modes	PST
	Setting range	0～20000	Unit	According to switching conditions	Effective method	Effective immediately	Factory setting	50

Set the level that meets the Gain switching condition.

The generation of actual switching actions is affected by the combination of level and time delay conditions. See the description in P08-09 for specific impact methods. According to different Gain switching conditions, the Unit of the switching level will change accordingly.

P08-12	Name	Gain switching delay			Setting method	running settings	Related modes	PST
	Setting range	0～20000	Unit	According to switching conditions	Effective method	Effective immediately	Factory setting	30

Set the time delay that satisfies the Gain switching condition.

The generation of actual switching actions is affected by the combination of level and time delay conditions. See the description in P08-09 for specific impact methods. According to different Gain switching conditions, the Unit of switching delay will change accordingly.

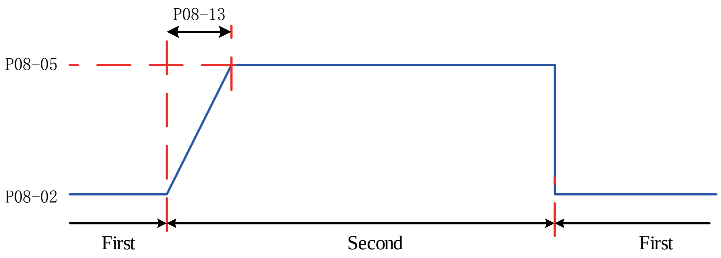
◆Caution:

Please set P08-11 ≥ P08-12. If you set P08-11<P08-12, the internal setting will be P08-11=P08-12.

P08-13	Name	Position gain switching time			Setting method	running settings	Related modes	P
	Setting range	0.0～1000.0	Unit	ms	Effective method	Effective immediately	Factory setting	3.0

If P08-05 (second position loop gain) is much greater than P08-02 (position loop gain) in Position control mode, please set the time for switching from P08-02 to P08-05 after the switching action is generated.

Using this parameter can reduce the impact of increasing the gain of the position loop.



If P08-05 ≤ P08-02, this parameter is invalid and immediately switches to the second gain.

P08-15	Name	Rotational inertia ratio of load			Setting method	running settings	Related modes	PST
	Setting range	0.00～120.00	Unit	Times	Effective method	Effective immediately	Factory setting	1.00

Set the mechanical load inertia ratio relative to the rotational inertia of the motor itself.

Rotational inertia ratio of load=$\frac{\text{Moment of inertia of mechanical loads}}{\text{Motor's own rotational inertia}}$

P08-15=0 indicates that the motor is not loaded; P08-15=1.00 indicates that the mechanical load inertia is equal to the rotational inertia of the motor itself.

Using the Inertia identification function (both offline and online), the drive can automatically calculate and update P08-15 parameter values.

When using the Online Inertia identification mode (P09-03 ≠ 0), the servo drive automatically sets this parameter, which cannot be manually set. When turning off the Online Inertia identification mode (P09-03=0), it can be manually set.

◆Caution:

When the P08-15 parameter value is equal to the actual inertia ratio, the value of the speed loop gain (P08-00/P08-03) can represent the maximum following frequency of the actual speed loop.

P08-18	Name	Speed feedforward filtering time constant			Setting method	running settings	Related modes	P
	Setting range	0.00～64.00	Unit	ms	Effective method	Effective immediately	Factory setting	0.50

Set the filtering time constant for Speed feedforward.

P08-19	Name	Speed feedforward gain			Setting method	running settings	Related modes	P
	Setting range	0.0～100.0	Unit	%	Effective method	Effective immediately	Factory setting	0.0

Under the position control mode and full closed-loop function, multiply the Speed feedforward signal by P08-19 to obtain a result called Speed feedforward, which is part of the speed command.

Increasing this parameter can improve the position command response and reduce the position deviation at a fixed speed.

To adjust, first, set P08-18 as a fixed value; Then, gradually increase the P08-19 Set value from 0 until a certain Set value is reached, and the Speed feedforward achieves an effect.

When adjusting, you should repeatedly adjust P08-18 and P08-19 to find a balanced setting.

◆Caution:

Please refer to P05-19 (Speed Feedforward Control Selection) for the selection of Speed Feedforward function enable and Speed Feedforward signal.

P08-20	Name	Torque feedforward filtering time constant			Setting method	Shutdown setting	Related modes	PS
	Setting range	0.00～64.00	Unit	ms	Effective method	Effective immediately	Factory setting	0.50

Set the filtering time constant for Torque feedforward.

P08-21	Name	Torque feedforward gain			Setting method	running settings	Related modes	PS
	Setting range	0.0～200.0	Unit	%	Effective method	Effective immediately	Factory setting	0.0

In non Torque control mode, multiply the Torque feedforward signal by P08-21, and the result is called Torque feedforward, which is part of the torque command.

Increasing this parameter can improve responsiveness to changing speed commands.

Increasing this parameter can improve the position command response and reduce the position deviation at a fixed speed.

When adjusting the Torque feedforward parameter, first maintain P08-20 (Torque feedforward filtering time constant) as the default value, and gradually increase P08-21 to increase the effect of Torque feedforward; When speed overshoot occurs, keep P08-21 unchanged and increase P08-20. When adjusting, you should repeatedly adjust P08-20 and P08-21 to find a balanced setting.

◆Caution:

Please refer to P06-11 (Torque Feedforward Control Selection) for the enable of the Torque Feedforward function and the selection of the Torque Feedforward signal.

P08-22	Name	Speed feedback filtering options			Setting method	Shutdown setting	Related modes	PS
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

Sets the number of times to average filter the speed feedback.

The greater the number of filters, the smaller the speed feedback fluctuation, but the greater the feedback delay, which should be noted.

Set value	Setting of speed feedback filtering
0	Disable speed feedback averaging filtering
1	Speed feedback twice average filtering
	Speed feedback 4 times average filtering
	Speed feedback 8 times average filtering
	Speed feedback 16 times average filtering

◆Notes：

When P08-22>0, P08-23 (speed feedback low-pass filter cutoff frequency) is invalid.

P08-23	Name	Speed feedback low-pass filter cutoff frequency			Setting method	running settings	Related modes	PS
	Setting range	100～4000	Unit	Hz	Effective method	Effective immediately	Factory setting	4000

Set the cutoff frequency for first order low-pass filtering of speed feedback.

◆Caution:

The smaller the setting, the smaller the speed feedback fluctuation, but the greater the feedback delay.

The cutoff frequency is 4000 Hz, with no filtering effect.

<table>
<tr><td rowspan="2">P08-24</td><td>Name</td><td colspan="3">Pseudo differential feedforward control coefficient</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.0～100.0</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>100.0</td></tr>
<tr><td colspan="9">Set the speed loop control mode.
When this coefficient is set to 100.0, the speed loop adopts PI control (the default control mode of the speed loop), resulting in fast dynamic response;
When set to 0.0, the speed loop integration has a significant effect, filtering out low-frequency interference, but the dynamic response is slower.
By adjusting P08-24, the speed loop can be made to have faster responsiveness without increasing speed feedback overshoot, while also improving the anti-interference ability in the low frequency band.</td></tr>
</table>

Group P09: Self adjusting parameters

<table>
<tr><td rowspan="2">P09-00</td><td>Name</td><td colspan="3">Self adjusting mode selection</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>0～2</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Set different gain adjustment modes, and the relevant gain parameters can be set manually or automatically according to the rigidity table.</td></tr>
</table>

Set value	Self adjusting mode	Notes
0	Parameter self adjustment is invalid, manually adjust the gain parameter.	
1	Parameter self adjustment mode, using a rigidity meter to automatically adjust the gain parameters.	The second set of gain does not automatically change with the rigidity meter
2	Positioning mode to automatically adjust gain parameters using a rigidity meter.	The second set of gains automatically changes with the stiffness meter and is always one stiffness level higher than the first gain, but does not exceed the highest stiffness level.

<table>
<tr><td rowspan="2">P09-01</td><td>Name</td><td colspan="3">Rigidity level selection</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>0～31</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>12</td></tr>
<tr><td colspan="9">Set the rigidity of the servo system. The higher the rigidity level, the stronger the gain, and the faster the response. However, excessive rigidity can cause vibration.
Level 0 is the weakest in rigidity, and level 31 is the strongest.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-02</td><td>Name</td><td colspan="3">Speed feedback filtering options</td><td>Setting method</td><td>running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>0～4</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Set the operating mode of the adaptive notch filter.</td></tr>
</table>

Set value	Working mode of adaptive notch filter
0	The third and fourth sets of adaptive notch filter parameters are no longer automatically updated, but can be manually entered.
1	One adaptive notch filter is valid, and the third set of notch filter parameters are updated in real time based on vibration conditions, and cannot be manually entered.
2	Two adaptive notch filters are valid, and the third and fourth set of notch filter parameters are updated in real time based on vibration conditions, and cannot be manually entered.
3	Only the resonance frequency is tested and displayed in P09-24.
4	Clear the adaptive notch filter and restore the values of the third and fourth groups of notch filters to the factory state.

P09-03	Name	Online Inertia identification mode			Setting method	running settings	Related modes	PST
	Setting range	0～3	Unit	-	Effective method	Effective immediately	Factory setting	0

Set whether to enable Online Inertia Identification and the speed at which the inertia ratio is updated during Online Inertia Identification.

Set value	Online Inertia identification mode	Notes
0	Close Online Inertia identification.	
1	Start Online Inertia identification and slowly change.	Suitable for situations where the actual load inertia ratio is almost constant
2	Open Online Inertia identification, which generally changes.	Suitable for situations where the actual load inertia ratio changes slowly
3	Enable Online Inertia identification to quickly change.	Suitable for situations where the actual load inertia ratio changes rapidly

P09-04	Name	Low frequency response suppression mode selection			Setting method	running settings	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the mode of Low frequency response suppression.

Set value	Low frequency response suppression mode
0	Manually set the parameters of the Low frequency response suppression filter (P09-38 and P09-39)
1	Automatically set the parameters of the Low frequency response suppression filter (P09-38 and P09-39)

P09-05	Name	Offline Inertia identification mode selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the mode of Offline Inertia identification. The Offline Inertia identification function can be enabled through function code P0D-02.

Set value	Offline Inertia identification mode	Notes
0	Positive and negative triangular wave mode	Suitable for occasions where the motor has a short movable stroke.
1	JOG jog mode	Suitable for occasions where the motor has a long movable stroke.

Please refer to "7.2.1 Offline Inertia identification" for offline Inertia identification operations.

P09-06	Name	Inertia identification maximum speed			Setting method	Shutdown setting	Related modes	PST
	Setting range	100～1000	Unit	rpm	Effective method	Effective immediately	Factory setting	500

Set the maximum allowable motor speed command in the Offline Inertia identification mode. The higher the speed during Inertia identification, the more accurate the identification result. Generally, it is sufficient to maintain the default value.

P09-07	Name	Acceleration to maximum speed time constant during Inertia identification			Setting method	Shutdown setting	Related modes	PST
	Setting range	20～800	Unit	ms	Effective method	Effective immediately	Factory setting	125

Set the time for the motor to accelerate from 0 rpm to the maximum speed of Inertia identification (P09-06) under Offline Inertia identification.

P09-08	Name	Waiting time after completion of a single Inertia identification			Setting method	Shutdown setting	Related modes	PST
	Setting range	50～10000	Unit	ms	Effective method	Effective immediately	Factory setting	800

Set the time interval between two consecutive speed commands when using the Positive and Negative Triangular Wave Mode Offline Inertia Identification function (P09-05=1).

P09-09	Name	Complete a single Inertia identification of the number of motor rotations			Setting method	Display	Related modes	PST
	Setting range	0.00～2.00	Unit	r	Effective method	-	Factory setting	-

Displays the number of rotations that the motor needs to rotate when using the Positive and Negative Triangular Wave Mode Offline Inertia Identification function (P09-05=1).

◆ Caution:

When using the Offline Inertia identification function, it is important to ensure that the operational travel of the motor at this stop position is greater than the P09-09 setting value. Otherwise, the P09-06 or P09-07 setting value should be appropriately reduced until this requirement is met.

P09-12	Name	The first set of notch filter frequencies			Setting method	running settings	Related modes	PS
	Setting range	50～4000	Unit	Hz	Effective method	Effective immediately	Factory setting	4000

Set the center frequency of the notch filter, which is the mechanical resonance frequency.

In Torque control mode, when the notch filter frequency is 4000Hz, the notch function is invalid.

P09-13	Name	The first set of notch filter width levels			Setting method	running settings	Related modes	PS
	Setting range	0～20	Unit	-	Effective method	Effective immediately	Factory setting	2

Set the width level of the notch filter, usually keeping the default value.

Notch filter width level: the ratio of notch filter width to notch filter center frequency.

P09-14	Name	The first group of notch filter depth levels			Setting method	running settings	Related modes	PS
	Setting range	0～99	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the depth level of the notch filter. Notch filter depth level: The ratio relationship between input and output at the center frequency of the notch filter.

The larger this parameter, the smaller the notch depth, and the weaker the suppression effect on mechanical vibration. However, setting it too large may lead to system instability, and attention should be paid when using it. Please refer to "7.6 Vibration suppression" for the usage method of notch filter.

P09-15	Name	Second set of notch filter frequencies			Setting method	running settings	Related modes	PS
	Setting range	50～4000	Unit	Hz	Effective method	Effective immediately	Factory setting	4000

P09-16	Name	Second group of notch filter width levels			Setting method	running settings	Related modes	PS
	Setting range	0～20	Unit	-	Effective method	Effective immediately	Factory setting	2

P09-17	Name	The second group of notch filter depth levels			Setting method	running settings	Related modes	PS
	Setting range	0～99	Unit	-	Effective method	Effective immediately	Factory setting	0
The parameters of the second set of notch filters have the same description as the first set of notch filters.								

P09-18	Name	Third group of notch filter frequencies			Setting method	running settings	Related modes	PS
	Setting range	50～4000	Unit	Hz	Effective method	Effective immediately	Factory setting	4000

P09-19	Name	Third group of notch filter width levels			Setting method	Running settings	Related modes	PS
	Setting range	0～20	Unit	-	Effective method	Effective immediately	Factory setting	2

P09-20	Name	The third group of notch filter depth levels			Setting method	Running settings	Related modes	PS
	Setting range	0～99	Unit	-	Effective method	Effective immediately	Factory setting	0
The parameters of the third group of notch filters are described in P09-12, P09-13, and P09-14. ◆ Caution: The third group of notch filters can be configured as adaptive notch filters (P09-02=1 or 2). At this time, the notch filter parameters are automatically updated by the servo drive and cannot be manually modified. When the notch filter frequency is 4000Hz, the notch function is invalid.								

P09-21	Name	Fourth group of notch filter frequencies			Setting method	Running settings	Related modes	PS
	Setting range	50～4000	Unit	Hz	Effective method	Effective immediately	Factory setting	4000

P09-22	Name	Fourth group of notch filter width levels			Setting method	Running settings	Related modes	PS
	Setting range	0～20	Unit	-	Effective method	Effective immediately	Factory setting	2

<table>
<tr><td rowspan="2">P09-23</td><td>Name</td><td colspan="3">The fourth group of notch filter depth levels</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0～99</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">The parameters of the fourth group of notch filters are described in P09-12, P09-13, and P09-14.
◆ Caution:
The fourth group of notch filters can be configured as adaptive notch filters (P09-02=1 or 2). At this time, the parameters are automatically set by the servo drive and cannot be manually modified. When the notch filter frequency is 4000Hz, the notch function is invalid.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-24</td><td>Name</td><td colspan="3">Resonance frequency identification results</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0～2</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When P09-02 (Adaptive notch filter mode selection)=3, the current mechanical resonance frequency is displayed.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-30</td><td>Name</td><td colspan="3">Torque disturbance compensation gain</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.0～100.0</td><td>Unit</td><td>%</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0.0</td></tr>
<tr><td colspan="9">In non Torque control mode, set the magnitude of the disturbance torque compensation gain.
Disturbance torque compensation can suppress the impact of external disturbance torque on speed. The larger the parameter settings, the stronger the compensation effect and the stronger the anti-interference ability. However, if the settings are too large, they may cause vibration and noise, and they need to be used in conjunction with P09-31.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-31</td><td>Name</td><td colspan="3">Torque disturbance observer filter time constant</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PS</td></tr>
<tr><td>Setting range</td><td>0.00～25.00</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0.50</td></tr>
<tr><td colspan="9">In non Torque control mode, set the filtering time constant of the disturbance torque compensation filter.
This parameter has a smoothing effect on P09-30 disturbance torque compensation. The larger the filtering time is set, the slower the disturbance torque compensation takes effect, but the lower the noise.
When adjusting, first, set P09-31 to a larger value; Then, gradually increase P09-30 Set value from 0 until a certain Set value is reached, and the disturbance observer obtains an effect; Finally, gradually reduce P09-31Set value while ensuring that the disturbance observer is always effective.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-38</td><td>Name</td><td colspan="3">Low frequency resonance frequency</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>1.0～100.0</td><td>Unit</td><td>Hz</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>100.0</td></tr>
<tr><td colspan="9">Under position control and full closed-loop functions, set the frequency of the Low frequency response suppression filter. When set to 100.0 Hz, the filter becomes invalid. When P09-04=1 (Automatically set the Low frequency response suppression parameter), this parameter is automatically set by the servo drive.</td></tr>
</table>

<table>
<tr><td rowspan="2">P09-39</td><td>Name</td><td colspan="3">Low frequency resonance frequency filter setting</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～10</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>2</td></tr>
</table>

Under position control and full closed loop functions, set the width level of the Low frequency response suppression notch filter, usually maintaining the default value.

Set value	Low frequency response suppression	Low frequency response suppression
0	P09-38	0, which means only suppressing vibration at the center frequency
1～10	P09-38	P09-38×P09-39×4%

Increasing P09-39 set value can increase the frequency range of low frequency response suppression, but will lead to longer positioning time; However, the Set value is too small to completely suppress low-frequency resonance (such as belt load) in situations where the load vibration frequency may change. When setting the timing, it should be set while debugging.

When P09-04=1 (Automatically set the Low frequency response suppression parameter), this parameter is automatically set by the servo drive.

When P09-38 (low frequency resonance frequency)=100.0 Hz, filtering has no effect.

GROUP P0A: FAULT AND PROTECTION PARAMETERS

P0A-00	Name	Power input phase loss protection selection			Setting method	Running settings	Related modes	-
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

The main circuit power input specifications vary depending on the model of the server drive. Please refer to function code P01-02.

Our company has a servo drive series that supports single-phase 220V, three-phase 220V, and three-phase 380V input voltage levels. When there is a large fluctuation or phase loss in the input voltage, the drive can flexibly select the power input phase loss protection method according to the settings of P0A-00.

Set value	Phase loss protection mode	Notes
0	Enabling fault inhibition warning	For drives with rated power of 1kW and above (P01-02 ≥ 6), when the input voltage of the main circuit is single-phase, FU.420 will occur.
1	Enabling fault and warning	For drives with rated power of 1kW and above (P01-02 ≥ 6), when the input voltage of the main circuit is single-phase, FU.420 will occur.
2	Inhibition fault and warning	For a drive with a rated power of 0.75 kW (P01-02=5), when the input voltage of the main circuit is single-phase, FU.990 will occur.

◆Caution:

When P0A-00=2, the servo drive can meet the requirements of independently powering on and off the main circuit, that is, when the control power supply does not power down, disconnect the main circuit power supply.

When P0A-00=2, it is necessary to ensure that the three-phase 220V or three-phase 380V input is normal because phase loss fault detection cannot be performed, otherwise module damage may occur.

P0A-03	Name	Enable selection of power down saving function			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Whether to perform power down saving function selection:

Set value	Function	Notes
0	Disabled	Do not perform the power down save function
1	Enabled	Perform the power down save function, and the drive will automatically save the encoder feedback pulse count value (P0B-17) during power down. After power up again, it can be viewed through the corresponding function code.

P0A-04	Name	Motor overload protection gain			Setting method	Shutdown setting	Related modes	-
	Setting range	50～300	Unit	%	Effective method	Effective immediately	Factory setting	100

Set the time when the motor overload fault FU.620 will be reported through P0A-04.

Changing this value according to the heating condition of the motor can advance or delay the time of overload protection fault of the motor, with 50% reducing the time by half and 150% increasing to 1.5 times.

The setting of this value should be based on the actual heating condition of the motor and should be used with caution!

P0A-08	Name	Overspeed fault threshold			Setting method	Running settings	Related modes	PST
	Setting range	0～10000	Unit	rpm	Effective method	Effective immediately	Factory setting	0

Set the motor speed threshold when the drive experiences an overspeed fault.

Set value	Determination threshold	Determination conditions for overspeed fault FU.500
0	Maximum rotational speed of motor ×1.2	When the speed feedback value is greater than the overspeed fault threshold multiple times, The drive has encountered an FU.500 (overspeed fault).
1～10000	If P0A-08 ≥ (Maximum rotational speed of motor × 1.2) Over speed fault threshold: Maximum rotational speed of motor × 1.2	
	If P0A-08<(Maximum rotational speed of motor × 1.2) Overspeed fault threshold: P0A-08	

P0A-09	Name	Maximum position pulse frequency			Setting method	Shutdown setting	Related modes	P
	Setting range	100～4000	Unit	kHz	Effective method	Effective immediately	Factory setting	4000

In the position control mode, when the Location command source is a pulse command (P05-00=0), enter the maximum pulse frequency.When the actual pulse input frequency is greater than P0A-09Set value, the servo drive will encounter FU.B01 (abnormal position command input).

P0A-10	Name	Excessive position deviation fault threshold			Setting method	Running settings	Related modes	P
	Setting range	1～1073741824	Unit	Encoder/Command Unit	Effective method	Effective immediately	Factory setting	3145728

Set the fault threshold for excessive position deviation in the position control mode.

When the position deviation is greater than this threshold value, the servo drive will experience FU.B00 (excessive position deviation).

P0A-12	Name	Overspeed protection function enabled			Setting method	Running settings	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

The overspeed protection function enabled:

Set value	Function	Notes
0	Disabled	When in a vertical or towed load application, please set P0A-12 to zero to shield the detection of overspeed faults (FU.234).
1	Enabled	Turn on the overspeed protection function.

P0A-16	Name	Low frequency resonance position deviation judgment threshold			Setting method	Running settings	Related modes	P
	Setting range	1～1000	Unit	Encoder unit	Effective method	Effective immediately	Factory setting	5

Set the servo drive to enable the automatic low frequency response suppression function (P09-04=1), and determine the threshold value for determining the position deviation when the machine undergoes low-frequency resonance. When the position deviation is greater than P0A-16Set value, low-frequency resonance is considered to have occurred; Reducing P0A-16 can improve the detection sensitivity of low-frequency resonance.

P0A-17	Name	Position setting unit selection			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

The unit selection for P05-21, P05-22, and P0A-10 position settings is encoder pulse unit or input command unit.

Set value	Notes
0	Encoder pulse unit
1	Command Unit

P0A-19	Name	DI8 filter time constant			Setting method	Shutdown setting	Related modes	-
	Setting range	0～255	Unit	25ns	Effective method	Re-energize	Factory setting	80

P0A-20	Name	DI9 filter time constant			Setting method	Shutdown setting	Related modes	-
	Setting range	0～255	Unit	25ns	Effective method	Re-energize	Factory setting	80

DI8 and DI9 are high-speed DI input ports. When external input signals have spikes, you can filter them out by setting P0A-19 or P0A-20.

◆Caution:

The oscilloscope on the debugging platform displays DI8 and DI9 signals before filtering, and does not display when the signal width is less than 0.25ms.

P0A-24	Name	Low speed pulse input terminal filtering time constant			Setting method	Shutdown setting	Related modes	P
	Setting range	0～255	Unit	25ns	Effective method	Re-energize	Factory setting	30

When setting the position control mode, Location command source is a pulse command (P05-00=0), and selecting the low speed pulse input terminal (P05-01=0), the filtering time constant for the low speed pulse input terminal is set.

When there is spike interference at the low speed pulse input terminal, P0A-24 can be set to suppress the spike interference to prevent the interference signal from entering the servo drive and causing motor misoperation.

Maximum frequency of input pulse	Recommended filtering parameters (Unit：25ns)
<167k	30
167k～250k	20
250k～500k	10

P0A-25	Name	Speed feedback display value filtering time constant			Setting method	Shutdown setting	Related modes	-
	Setting range	0～5000	Unit	ms	Effective method	Effective immediately	Factory setting	50

Set the filtering time constant when the speed feedback signal is used for display to make the speed display smoother.

<table>
<tr><td rowspan="2">P0A-26</td><td>Name</td><td colspan="3">Motor overload shield enabled</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Set whether to enable motor overload detection.
<table><tr><th>Set value</th><th>功能</th></tr><tr><td>0</td><td>Open motor overload detection.</td></tr><tr><td>1</td><td>Shielded motor overload warning (FU.909) and fault (FU.620) detection.</td></tr></table>◆Caution:
Use the motor overload shielding function carefully, otherwise the motor may be burnt out!</td></tr>
</table>

<table>
<tr><td rowspan="2">P0A-27</td><td>Name</td><td colspan="3">Speed DO filter time constant</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～5000</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>10</td></tr>
<tr><td colspan="9">Set a low-pass filtering time constant for speed information corresponding to speed feedback and position commands.
Through P0A-27, it is possible to set the speed dependent DO output (motor rotation signal TGON, speed consistent V-CMP, speed reaching V-ARR, zero speed signal ZERO) for judging the speed feedback signal. Please refer to "6.3.5 Speed dependent DO output function" for the description of the four DO signals.
Through P0A-27, it is possible to set the filtering time constant when the position command is converted into speed information.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0A-28</td><td>Name</td><td colspan="3">Filtering time constant of orthogonal encoder</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～255</td><td>Unit</td><td>25ns</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>30</td></tr>
<tr><td colspan="9">Setting this parameter can filter and suppress the spike interference in the feedback signal of the incremental orthogonal encoder.
Given the actual rotational speed of the motor, the recommended values for the filter time constant are shown in the following table:
<table><tr><th>Actual motor speed (Unit：rpm)</th><th>Recommended filtering parameters (Unit：25ns)</th></tr><tr><td>4000～6000</td><td>20</td></tr><tr><td><4000</td><td>30</td></tr></table></td></tr>
</table>

<table>
<tr><td rowspan="2">P0A-30</td><td>Name</td><td colspan="3">Filtering time constant of high-speed pulse input terminal</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～255</td><td>Unit</td><td>25ns</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>3</td></tr>
<tr><td colspan="9">Under the Position control mode, the Location command source is a pulse command (P05-00=0). When selecting the high-speed pulse input terminal (P05-01=1), the filtering time constant for the high-speed pulse input terminal is set. When there is spike interference at the high-speed pulse input terminal, P0A-30 can be set to suppress the spike interference to prevent the interference signal from entering the servo drive and causing motor misoperation.
<table><tr><th>Maximum frequency of input pulse</th><th>Recommended filtering parameters(Unit：25ns)</th></tr><tr><td>500k～1M</td><td>5</td></tr><tr><td>>1M</td><td>3</td></tr></table></td></tr>
</table>

P0A-32	Name	Locked rotor over temperature protection time window			Setting method	Running settings	Related modes	-
	Setting range	10～65535	Unit	ms	Effective method	Effective immediately	Factory setting	200

Set the time threshold for the servo drive to detect a locked rotor over temperature fault (FU.630).

By changing P0A-32, you can adjust the detection sensitivity of the over temperature fault of the gambling machine.

P0A-33	Name	Locked rotor overtemperature protection enabled			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

Set whether to enable motor locked rotor over temperature protection (FU.630) detection:

Set value	Function
0	Shield motor locked rotor over temperature protection (FU.630) detection
1	Enable motor locked rotor over temperature protection (FU.630) detection

P0A-36	Name	Encoder multi turn overflow fault selection			Setting method	Shutdown setting	Related modes	ALL
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

In absolute position linear mode (P02-01=1), when it is not necessary to detect encoder multi turn overflow faults, set P0A-36=1 to shield multi turn overflow faults.

Set value	Function
0	Not shielded
1	Shielded

P0A-40	Name	Soft limit setting			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～2	Unit	1	Effective method	Effective immediately	Factory setting	0

Set value	Function
0	Disable soft limit
1	Enable soft limit immediately after powering on
2	Enable soft limit after zero return

P0A-41	Name	Maximum value of soft limit			Setting method	Shutdown setting	Related modes	PST
	Setting range	-2147483648～2147483647	Unit	Command Unit	Effective method	Effective immediately	Factory setting	2147483648

P0A-43	Name	Minimum value of soft limit			Setting method	Shutdown setting	Related modes	PST
	Setting range	-2147483648～2147483647	Unit	Command Unit	Effective method	Effective immediately	Factory setting	-2147483648

Soft limit function settings:
When P0A-40 is equal to 0, the Soft limit function is not enabled.
When P0A-40 is equal to 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 is equal to 2, the Soft Limit function is not enabled after the drive is powered on and before the home is reset. After zero point reset, when the absolute position counter (P0B-07) is greater than P0A-41, a FU.950 warning occurs, and a forward overtravel shutdown is performed; After the 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.

P0A-47	Name	Band brake protection detection enabled			Setting method	Running settings	Related modes	ALL
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

When set value is equal to 0, the band brake protection detection function is not enabled; Enable the Band brake protection detection function when the setting value is equal to 1.

P0A-48	Name	Gravity load detection value			Setting method	Running settings	Related modes	ALL
	Setting range	0～300.0	Unit	%	Effective method	Effective immediately	Factory setting	30.0

When P0D-24 is equal to 1, perform Z-axis gravity load identification. After successful identification, the detection value is written into P0A-48. This detection value can also be manually set.

GROUP P0B: MONITORING PARAMETERS

P0B-00	Name	Actual motor speed			Type	Display	Related modes	PST
	Setting range	-	Unit	rpm			Factory setting	-

Display the actual rotation speed of the servo motor, and after rounding, the accuracy is 1 rpm.
The filtering time constant for P0B-00 can be set through P0A-25 (speed feedback display value filtering time constant).

P0B-01	Name	Speed command			Type	Display	Related modes	PS
	Setting range	-	Unit	rpm			Factory setting	-

In position and speed mode, the current speed command value of the Display drive has an accuracy of 1 rpm.

P0B-02	Name	Internal torque command			Type	Display	Related modes	PST
	Setting range	-	Unit	%			Factory setting	-

Display the current torque command value with an accuracy of 0.1%, and 100.0% corresponds to one time the rated torque of the motor.

P0B-03	Name	Input signal (DI signal) monitoring			Type	Display	Related modes	PST
	Setting range	-	Unit	-			Factory setting	-

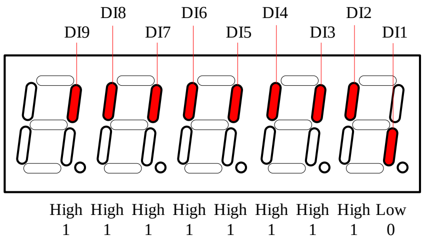
Display the current level status of the 9 hardware DI terminals, unfiltered.

Display mode: The upper half of the digital tube is lit to indicate high level (indicated by "1"); The lower half light indicates low level (indicated by "0").

Taking DI1 terminal as low level and DI2 to DI9 terminal as high level, for example, the corresponding binary code is "111111110", and the drive debugging platform software can read P0B-03

The previous decimal value is: 510.

Panel display is as follows:

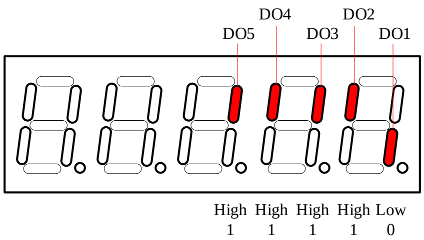


P0B-05	Name	Output signal (DO signal) monitoring			Type	Display	Related modes	PST
	Setting range	-	Unit	-			Factory setting	-

Display the current level status of the 5 DO terminals, unfiltered.

Display method: The bright upper half of the digital tube indicates high level (indicated by "1"); The lower half light indicates low level (represented by "0"). For example, the DO1 terminal is low level, and the DO2 to DO5 terminals are high level. The corresponding binary code is "11110"; The drive debugging platform software can read the current decimal value of P0B-05 as: 30.

Panel display is as follows:



P0B-07	Name	Absolute position counter			Type	Display	Related modes	PST
	Setting range	-	Unit	Command Unit			Factory setting	-

In position mode, display the current absolute position of the motor (Command Unit).

The function code is 32-bit, and the Panel display is decimal data.

P0B-09	Name	Mechanical angle			Type	Display	Related modes	PST
	Setting range	-	Unit	Encoder unit			Factory setting	-

Display the current mechanical angle of the motor (Encoder unit), 0 corresponds to a mechanical angle of 0 °.

Actual mechanical angle $=\frac{\text{P0B}-09}{\text{P0B}-09\ \text{Max}\ +1}\times 360.0°$

Incremental encoder P0B-09 Maximum value: encoder line number × 4-1 (Example: 2500 line incremental encoder, P0B-09 maximum value is 9999)

Absolute encoder P0B-09 maximum value:65535

P0B-10	Name	Electrical angle			Type	Display	Related modes	PST
	Setting range	-	Unit	°			Factory setting	-

Display the current electrical angle of the motor, with an accuracy of 0.1 °.

When the motor rotates, the electrical angle changes within ± 360.0 °; When the motor has four pairs of poles, it undergoes four changes of 0 ° to 359 ° for each rotation of the motor; Similarly, when the motor has five pairs of poles, the electrical angle of the motor undergoes five changes of 0 ° to 359 ° for each rotation.

P0B-11	Name	Input speed information corresponding to position command			Type	Display	Related modes	P
	Setting range	-	Unit	rpm			Factory setting	-

In position mode, the speed value corresponding to the position command of a single position control cycle of the Display drive.

Through P0A-27, it is possible to set the filtering time constant when the position command is converted into speed information.

P0B-12	Name	Average load rate			Type	Display	Related modes	PST
	Setting range	-	Unit	%			Factory setting	-

The percentage of the average load torque of the display in the rated torque of the motor, with an accuracy of 0.1%, and 100.0% corresponds to one time the rated torque of the motor.

P0B-13	Name	Input position command counter			Type	Display	Related modes	P
	Setting range	-	Unit	Command Unit			Factory setting	-

In position mode, during the Servo running process, count and display the number of position commands that have not undergone electronic gear ratio frequency division and multiplication.

The function code is 32-bit, and the Panel display is decimal data.

P0B-15	Name	Encoder position deviation counter			Type	Display	Related modes	P
	Setting range	-	Unit	Encoder unit			Factory setting	-

In the position mode, count and display the position deviation value after frequency division and multiplication of the Electronic gear ratio.

The function code is 32-bit, and the Panel display is decimal data.

◆Caution:

When the set conditions for P05-16 (position deviation clearing condition) are met, P0B-15 can be reset.

P0B-17	Name	Feedback pulse counter			Type	Display	Related modes	PST
	Setting range	-	Unit	Encoder unit			Factory setting	-

In any mode, count the position pulses fed back by the encoder.

The function code is 32-bit, and the Panel display is decimal data.

P0B-19	Name	Total power on time			Type	Display	Related modes	PST
	Setting range	-	Unit	s			Factory setting	-

This function code is used to record the total running time of the servo drive.

The function code is 32-bit, and the Panel display is decimal data.

◆Caution:

When the drive is powered on and off repeatedly in a short time, there may be a deviation of less than 1 hour in the total power on time record.

P0B-21	Name	AI1 sampling voltage value			Type	Display	Related modes	PST
	Setting range	-	Unit	V			Factory setting	-

The actual sampling voltage value of analog channel 1 is displayed with an accuracy of 0.01 V.

P0B-22	Name	AI2 sampling voltage value			Type	Display	Related modes	PST
	Setting range	-	Unit	V			Factory setting	-

The display accuracy of the sampling voltage corresponding to analog channel 2 is 0.01V.

P0B-24	Name	Effective value of phase current			Type	Display	Related modes	PST
	Setting range	-	Unit	A			Factory setting	-

Effective value of servo motor phase current, display accuracy is 0.01A.

P0B-26	Name	Bus voltage value			Type	Display	Related modes	PST
	Setting range	-	Unit	V			Factory setting	-

The DC bus voltage value of the rectified input voltage of the main circuit of the drive is displayed with an accuracy of 0.01 V.

P0B-27	Name	Module temperature value			Type	Display	Related modes	PST
	Setting range	-	Unit	℃			Factory setting	-

The temperature value of the internal module of the drive can be used as a reference value for the actual temperature of the current drive.

P0B-33	Name	Fault logging			Setting method	Running settings	Related modes	PST
	Setting range	0～9	Unit	-	Effective method	Effective immediately	Factory setting	0

Used to select and view the last 10 faults of the servo drive. This function code is used to set the number of faults to be viewed:

Set value	Number of selected faults
0	Current fault
1	Last fault
2	Last 2 fault
……	……
9	Last 9 faults

P0B-34	Name	Fault code for selected times			Type	Display	Related modes	PST
	Setting range	-	Unit	-			Factory setting	-

P0B-35	Name	Selected fault timestamp			Type	Display	Related modes	PST
	Setting range	-	Unit	s			Factory setting	-

P0B-37	Name	Motor speed at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	rpm			Factory setting	-

P0B-38	Name	Motor U-phase current at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	A			Factory setting	-

P0B-39	Name	Motor V phase current at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	A			Factory setting	-

P0B-40	Name	Bus voltage at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	V			Factory setting	-

P0B-41	Name	Input terminal status at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	-			Factory setting	-

P0B-42	Name	Output terminal status at selected fault			Type	Display	Related modes	PST
	Setting range	-	Unit	-			Factory setting	-
P0B-34 through P0B-42 are used to view the corresponding parameter information when a fault occurs in P0B-34Display.								

P0B-53	Name	Position deviation counter			Type	Display	Related modes	P
	Setting range	-	Unit	Command Unit			Factory setting	-
Under the position control mode, the position deviation value is not passed through the electronic gear ratio. The function code is 32-bit, and the Panel display is decimal data. Command Unit is the value converted by the encoder position deviation, which can cause accuracy loss during division operations.								

P0B-55	Name	Actual motor speed			Type	Display	Related modes	PST
	Setting range	-	Unit	rpm			Factory setting	-
Display the actual running speed of the servo motor, with an accuracy of 0.1 rpm. The function code is 32-bit, and the Panel display is decimal data. P0A-25 allows you to set the speed feedback filtering time constant for Display.								

P0B-58	Name	Mechanical absolute position (low 32 bits)			Type	Display	Related modes	ALL
	Setting range	-	Unit	Encoder unit			Factory setting	0
When the Display uses the absolute value function, the mechanical corresponding position feedback has a lower 32-bit value (Encoder unit).								

<table>
<tr><td rowspan="2">P0B-60</td><td>Name</td><td colspan="3">When the Display uses the absolute value function, the mechanical corresponding position feedback has a lower 32-bit value (Encoder unit). Mechanical absolute position (high 32 bits)</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Encoder unit</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When display uses the absolute value function, the position corresponding to the machine is fed back with a high 32-bit value (Encoder unit).</td></tr>
</table>

<table>
<tr><td rowspan="2">P0B-64</td><td>Name</td><td colspan="3">Real time input position command counter</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Command Unit</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">Display the position command counter before the electronic gear ratio division and multiplication, regardless of the current servo state and control mode.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0B-70</td><td>Name</td><td colspan="3">Number of absolute encoder rotations</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>1Rev</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Display the number of rotations of the absolute encoder.</td></tr>
<tr><td rowspan="2">P0B-71</td><td>Name</td><td colspan="3">Absolute encoder position within 1 turn</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Encoder unit</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Display the single turn position feedback value of the absolute value encoder.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0B-77</td><td>Name</td><td colspan="3">Absolute encoder absolute position (low 32 bits)</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Encoder unit</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Display absolute value encoder position feedback value, low 32-bit data.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0B-79</td><td>Name</td><td colspan="3">Absolute encoder absolute position (high 32 bits)</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Encoder unit</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Display absolute value encoder position feedback value, high 32-bit data.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0B-81</td><td>Name</td><td colspan="3">Rotation load single turn position (low 32 bits)</td><td rowspan="2">Type</td><td rowspan="2">Display</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>Encoder unit</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Display the position feedback value of the rotating load when the absolute value system operation mode is in the rotating mode, with lower 32-bit data.</td></tr>
</table>

P0B-83	Name	Rotation load single turn position (high 32 bits)			Type	Display	Related modes	ALL
	Setting range	-	Unit	Encoder unit			Factory setting	0
Display the position feedback value of the rotating load when the absolute value system operation mode is in the rotating mode, with a high 32-bit data.								

P0B-85	Name	Rotation load single turn position			Type	Display	Related modes	ALL
	Setting range	-	Unit	Command Unit			Factory setting	0
Display the position feedback value of the rotating load when the absolute value system operation mode is in the rotating mode, with a high 32-bit data.								

GROUP P0C: COMMUNICATION PARAMETERS

<table>
<tr><td rowspan="2">P0C-00</td><td>Name</td><td colspan="3">Drive shaft address</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>1～247</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>1</td></tr>
<tr><td colspan="9">Set the drive shaft address.
0: Broadcast address. The upper computer can write to all drives through the broadcast address. The drive receives the frame of the broadcast address and performs corresponding operations, but does not respond.
1-247: When multiple servo drives are networked, each drive can only have a unique address, otherwise communication may be abnormal or unavailable.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0C-02</td><td>Name</td><td colspan="3">Serial port baud rate setting</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>0～5</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>2</td></tr>
<tr><td colspan="9">Set the communication rate between the drive and the host computer.</td></tr>
</table>

Set value	Baud rate setting
0	2400Kbp/s
1	4800Kbp/s
2	9600Kbp/s
3	19200Kbp/s
4	38400Kbp/s
5	57600Kbp/s

The communication rate of the servo drive must be consistent with the communication rate of the upper computer, otherwise it cannot communicate.

<table>
<tr><td rowspan="2">P0C-03</td><td>Name</td><td colspan="3">MODBUS data format</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>0～3</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>3</td></tr>
<tr><td colspan="9">Set the data verification method when the drive communicates with the host computer.</td></tr>
</table>

Set value	Data format
0	No check, 2 end bits
1	Even check, 1 end bit
2	Odd check, 1 end bit
3	No check, 1 end bit

The servo drive data format must be consistent with the host computer, otherwise communication cannot proceed.

P0C-08	Name	CAN communication rate setting			Setting method	Running settings	Related modes	PST
	Setting range	0～7	Unit	-	Effective method	Effective immediately	Factory setting	5

Set the communication rate between the drive and the host computer when using CAN communication (CANopen).

Set value	Communication rate
0	20K
1	50K
2	100K
3	125K
4	250K
5	500K
6	1M
7	1M

The communication speed of the servo drive must be consistent with the host computer, otherwise communication cannot proceed.

P0C-09	Name	Communication VDI			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

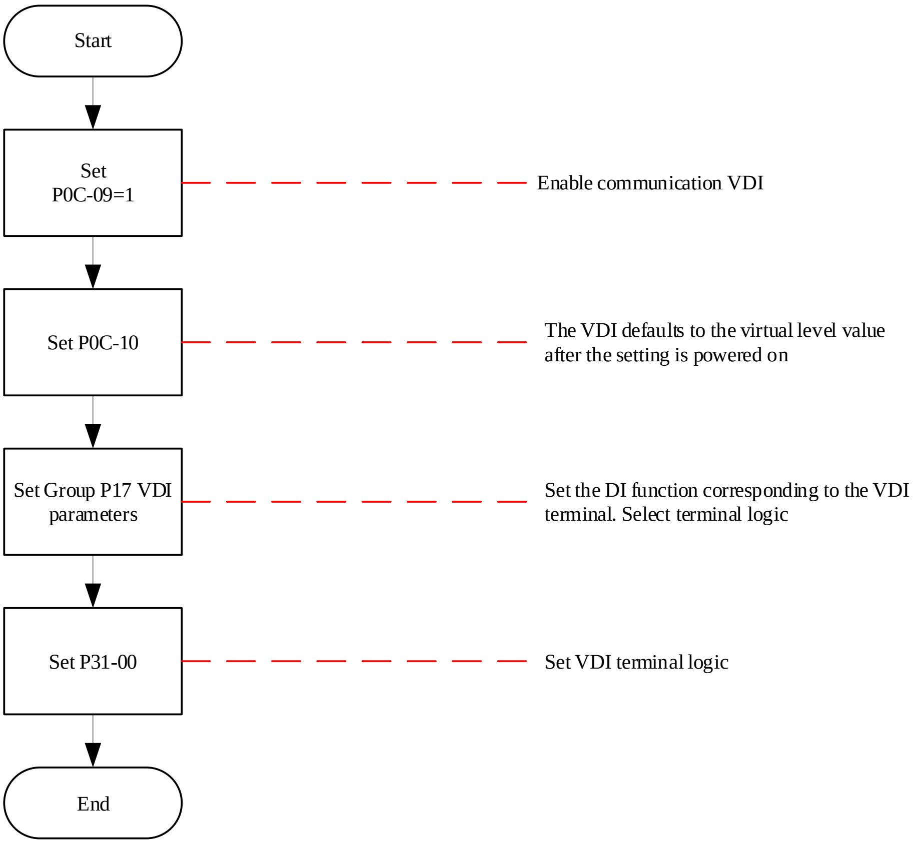
Set whether to use Virtual Digital Input (VDI).

Set value	Baud rate setting
0	Disabled
1	Enabled

P0C-10	Name	VDI default value after power on			Setting method	Running settings	Related modes	PST
	Setting range	0～65535	Unit	-	Effective method	Re-energize	Factory setting	0

Set the VDI default value after power on.

Follow these steps to use VDI:



When first powered on, the VDI terminal logic is determined by P0C-10. After that, the VDI terminal logic is determined by P31-00 (VDI virtual level).

The display of P0C-10 on the panel is decimal, and the P31-00 panel is not visible. After converting to binary, the bit (n)=1 of P0C-10 (P31-00) indicates that the VDI (n+1) terminal logic is "1", and the bit (n)=0 indicates that the VDI (n+1) terminal logic is "0".

P0C-11	Name	Communication VDO			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

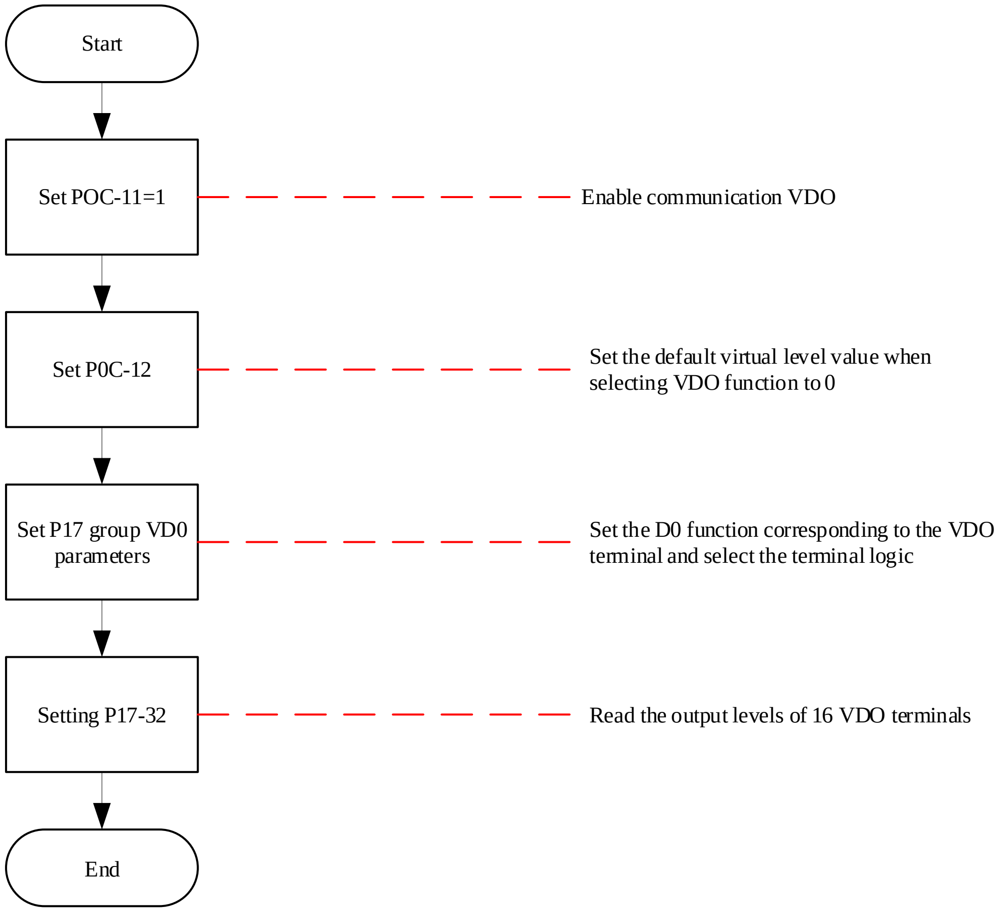
Set whether to use a virtual digital signal output terminal (VDO).

Set value	Communication VDO
0	Disabled
1	Enabled

P0C-12	Name	Default level when VDO function is selected as 0			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～65535	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the default virtual level value when the VDO function selection is 0 (DO function not assigned).

Follow these steps to use VDO:



P0C-12 and P17-32 are displayed in hexadecimal on the panel. After being converted to binary, bit (n)=1 of P0C-12 (P17-32) indicates that the VDO (n+1) terminal logic is "1", and bit (n)=0 indicates that the VDO (n+1) terminal logic is "0". It is recommended that the logic level of the VDO terminal in Group P17 be set to the opposite logic as P0C-12 for differentiation.

P0C-13	Name	Whether the MODBUS communication write function code is updated to the EEPROM			Setting method	Running settings	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	1

Set whether the function written through MODBUS communication is saved to the EEPROM.

Set value	Whether the communication write function code is updated to EEPROM
0	Do not update.
1	Except for the P0B and P0D groups, the set value of other groups of function codes will be stored in the EEPROM in real time.

◆Caution:

The changed value of P0C-13 is always saved in the EEPROM.

By default, the changed parameters do not need to be saved after powering down, because if the function code values are changed in large quantities for a long time and stored in the EEPROM, the EEPROM will be damaged and the drive will experience FU.108 (parameter storage failure). If you need to save the changed parameters after powering down,

please set P0C-13 to 1.

P0C-14	Name	MODBUS error code			Setting method	Display	Related modes	-
	Setting range	0～65535	Unit	1	Effective method		Factory setting	-

Display error codes when a communication failure occurs. The error code is defined as follows:

New protocol (standard protocol)	Old protocol
0x0001: Illegal command code 0x0002: Illegal data address 0x0003: Illegal data 0x0004: Slave station equipment fault	0x0002: Command code is not 0x03/0x06/0x10 0x0004: The CRC check code of the data frame received by the servo calculation is not equal to the data intra check code 0x0008: The accessed function code does not exist 0x0010: The value written to the function code exceeds the upper and lower limits of the function code 0x0080: The written function code can only be modified in the servo shutdown state, while the servo is currently in the running state

P0C-14 is displayed in hexadecimal on the panel.

P0C-16	Name	Whether the CAN communication write function code is updated to the EEPROM			Setting method	Running settings	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Please refer to P0C-13 for specific usage methods.

P0C-25	Name	MODBUS command response delay			Setting method	Running settings	Related modes	PST
	Setting range	0～5000	Unit	ms	Effective method	Effective immediately	Factory setting	1

Set the delay for distance response to the host computer after the slave computer receives the command from the host computer.

P0C-26	Name	MODBUS communication data high-low order			Setting method	Running settings	Related modes	PST
	Setting range	0～1	Unit	1	Effective method	Effective immediately	Factory setting	1

Set the transmission format for 32-bit data when using MODBUS communication.

Set value	32-bit data high-low order
0	High 16 bits come first, low 16 bits come last
1	The low 16 bits come first, and the high 16 bits come last

P0C-30	Name	MODBUS error frame format selection			Setting method	Running settings	Related modes	PST
	Setting range	0～1	Unit	1	Effective method	Effective immediately	Factory setting	1

Set the error reporting protocol when communication errors occur.

Set value	Error frame format selection
0	Old protocal
1	New protocol (standard protocol)

Group P0D: Auxiliary functions parameter

<table>
<tr><td rowspan="2">P0D-00</td><td>Name</td><td colspan="3">Software reset</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
</table>

Software reset operation selection：

Set value	Function	Notes
0	Disabled	
1	Enabled	After enabling software reset, the program in the drive automatically resets without power down (similar to performing a program reset operation when powered on)

Effective conditions:

◆ Servo non enabled state;

◆ No Type 1 non resettable fault occurs;

◆ The EEPROM is not enabled (when P0A-03=1, the Software reset function is invalid).

<table>
<tr><td rowspan="2">P0D-01</td><td>Name</td><td colspan="3">Fault reset</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
</table>

Fault reset operation selection：

Set value	Function	Notes
0	Disabled	
1	Enabled	The first and second types of resettable faults can be reset. When the servo is not running, and the cause is removed, the drive can be stopped from Trouble display and entered into the "rdy" state by enabling the fault reset function. The third type of warning can be directly used with the fault reset function, regardless of the current operating state of the servo.

◆Caution:

For fault classification, please refer to “Chapter 9 Troubleshooting”.

Fault reset only stops the panel from displaying faults, and does not indicate that parameter changes take effect.

This function is invalid for non resettable faults and should be used with caution when the cause of the fault is not resolved.

<table>
<tr><td rowspan="2">P0D-02</td><td>Name</td><td colspan="3">Offline Inertia identification enabled</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>-</td></tr>
</table>

Panel Offline Inertia identification function operation entry. In the parameter display mode, after switching to the "P0D-02" function code, press the "SET" key to enable Offline Inertia identification. For content related to Offline Inertia identification, please refer to “7.2.1 Offline Inertia identification”.

<table>
<tr><td>P0D-03</td><td>Name</td><td>Pparameters reserved</td><td>Setting method</td><td>-</td><td>Related modes</td><td>-</td></tr>
</table>

	Setting range	-	Unit	-	Effective method	-	Factory setting	-

P0D-05	Name	Emergency shutdown			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Emergency shutdown running selection：

Set value	Function
0	Disabled
1	Emergency shutdown enabled

Regardless of the operating state of the drive, when this function is effective, the servo drive will immediately shut down in accordance with the servo OFFShutdown mode (P02-05).

P0D-10	Name	Automatic adjustment of analog channels			Setting method	Shutdown setting	Related modes	-
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	0

Set whether to enable the automatic adjustment function of analog channels, and select the channels to be adjusted.

Set value	Function
0	Disalbed
1	AI1 adjustment
2	AI2 adjustment

Using the automatic adjustment function of the analog channel, the drive will automatically correct the zero drift voltage of the analog channel to improve the accuracy of analog signal detection. The adjusted zero drift value will be automatically stored in the function code corresponding to the servo drive (P03-54 or P03-59).

P0D-11	Name	JOG trial run function			Setting method	-	Related modes	--
	Setting range	-	Unit	-	Effective method	-	Factory setting	-

Panel Jog trial run function entry function code.

By setting this function code on the panel, you can perform the relevant operation modes of the JOG trial run function. For specific operations, please refer to "5.5.1 Jog running". This function is independent of the servo control mode.

P0D-17	Name	DIDO forced input/output enable			Setting method	Running settings	Related modes	-
	Setting range	0～3	Unit	-	Effective method	Effective immediately	Factory setting	0

Set value	Funciton
0	Disabled
1	Forced DI enabled, forced DO not enabled
2	Forced DO enabled, forced DI not enabled
3	Forced DI and DO both enabled

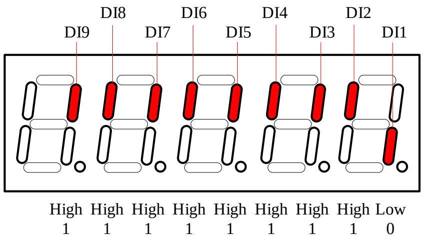
P0D-18	Name	DI forced input given			Setting method	Running settings	Related modes	-
	Setting range	0～0x01FF	Unit	-	Effective method	Effective immediately	Factory setting	0x01FF

When the DI forced input is valid (P0D-17=1 or 3), the level logic of the DI function assigned through this Parameter settingsP03 group is used.

P0D-18 is a hexadecimal display on the panel. When converted to binary, bit (n)=1 indicates that the level logic of the DI function is high, and bit (n)=0 indicates that the level logic of the DI function is low

For example:

The parameter "P0D-18" has a value of 0x01FE and is converted to binary "111111110". Therefore, DI1 is at a low level, and DI2 to DI9 ports are at a high level. You can also monitor the level status information of nine DI ports through P0B-03.



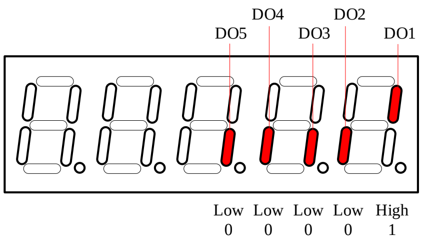
Check whether the DI function has an effect in combination with the DI terminal logic set in Group P03.

P0D-19	Name	DO forced output given			Setting method	Running settings	Related modes	-
	Setting range	0～0x001F	Unit	-	Effective method	Effective immediately	Factory setting	0

When the DO forced output is valid (P0D-17=2 or 3), whether the DO function assigned through this Parameter settingsP04 group is valid.

P0D-19 is a hexadecimal display on the panel. When converted to binary, bit (n)=1 indicates that the DO function is valid, and bit (n)=0 indicates that the DO function is invalid. For example:

The parameter "P0D-19" has a value of 0x1E and is converted into a binary value of "11110". Therefore, the DO function configured for the DO1 port is invalid, and the DO function configured for the DO2 to DI5 ports is valid. After processing according to the P04 group of DO logical level setting information, the corresponding DO port level is output. Assuming that the logical electrical average selection for terminals DO1 to DO5 of P04 group is: 0 - Output L low level when valid, then the display results viewed from P0B-05 are as follows:



<table>
<tr><td rowspan="2">P0D-20</td><td>Name</td><td colspan="3">Absolute encoder reset enabled</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>ALL</td></tr>
<tr><td>Setting range</td><td>0～2</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Reset the encoder Internal fault or reset the encoder to feed back multi turn data by setting P0D-20.
◆ Note: After performing the reset encoder feedback multi turn data operation, the absolute position of the encoder changes abruptly, requiring a mechanical home reset operation.</td></tr>
</table>

Set value	Function
0	Disabled
1	Reset fault
2	Reset fault and multi turn data

<table>
<tr><td rowspan="2">P0D-24</td><td>Name</td><td colspan="3">Gravity load identification</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When P0D-24 is equal to 1, the servo turns on the gravity load identification function. After successful identification, the detection value is written to P0A-48, and P0D-24 returns to 0.</td></tr>
</table>

GROUP P0F: FULL CLOSED-LOOP FUNCTIONAL PARAMETERS

<table>
<tr><td rowspan="2">P0F-00</td><td>Name</td><td colspan="3">Encoder feedback mode</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～2</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Sets the source of the encoder feedback signal during full closed-loop control.</td></tr>
</table>

Set value	Function	Notes
0	Internal encoder feedback	Position feedback signal from servo motor with encoder
1	External encoder feedback	The position feedback signal comes from the full closed loop external encoder using the first set of electronic gear ratios
2	Perform internal and external encoder feedback switching during electronic gear ratio switching	Using DI function 24 (FunIN.24: GEAR_SEL, electronic gear switching) Perform closed loop switching of internal and external positions, DI function: Invalid, internal encoder feedback, using Group 1 Electronic gear ratio Valid, external encoder feedback, using Group 2 Electronic gear ratio

◆Caution:

Using the full closed loop function, when the Location command source is an internal position command, the speed setting unit is for the internal encoder. Please pay attention to the conversion before setting the speed value, otherwise it will cause operation errors.

<table>
<tr><td rowspan="2">P0F-01</td><td>Name</td><td colspan="3">External encoder usage</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When the full closed-loop function is set, the internal and external encoders feedback the pulse counting direction during motor rotation.</td></tr>
</table>

Set value	Function	Notes
0	Use in standard running direction	During motor rotation, the internal encoder pulse feedback counter (P0F-18) and the external encoder pulse feedback counter (P0F-20) have the same counting direction.
1	Use in reverse running direction	During motor rotation, the counting direction of the internal encoder pulse feedback counter (P0F-18) and the external encoder pulse feedback counter (P0F-20) is opposite.

◆Caution:

Before running the motor, be sure to carry out the inspection before trial operation. For specific operations, see "6.1.1Pre running inspection";

2: This function code must be set correctly, otherwise it may cause a speeding accident!

<table>
<tr><td rowspan="2">P0F-04</td><td>Name</td><td colspan="3">External encoder feedback pulse number when the motor rotates for one rotation</td><td>Setting method</td><td>Shutdown setting</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～1073741824</td><td>Unit</td><td>External encoder unit</td><td>Effective method</td><td>Re-energize</td><td>Factory setting</td><td>10000</td></tr>
<tr><td colspan="9">Set the number of external encoder feedback pulses when the servo motor rotates for one rotation.
With this parameter, the quantitative relationship between external encoder feedback pulses and internal encoder</td></tr>
</table>

feedback pulses can be established. Calculate the parameter value by analyzing the mechanical parameters. When the motor and external encoder (raster scale) are rigidly connected, the following methods can also be used to set them: 1) Manually rotate the motor and observe P0F-18 (internal encoder feedback pulse counter) while rotating. After determining that the motor has rotated for a full rotation (P0F-18=servo motor resolution), calculate the change value of P0F-20 (external encoder feedback pulse counter), the absolute value of the change value, and serve as the parameter value of P0F-04. 2) Before rotating the motor, the current value of P0F-18 is X1, and the current value of P0F-20 is Y1; After rotating the motor, the current value of P0F18 is X2, and the current value of P0F-20 is Y2, then: P0F-04=servo motor resolution × （Y2–Y1）/（X2–X1）。 The calculation result must be positive, otherwise you need to press 1 again.When using this method to calculate non rigid connections, there are errors. ◆Caution: Be sure to set P0F-04 correctly, otherwise after the servo operates, FU.B02 (excessive deviation in the full closed loop position) may occur.

P0F-08	Name	Full closed-loop position deviation excessive threshold			Setting method	Running settings	Related modes	P
	Setting range	0～1073741824	Unit	External encoder unit	Effective method	Effective immediately	Factory setting	10000

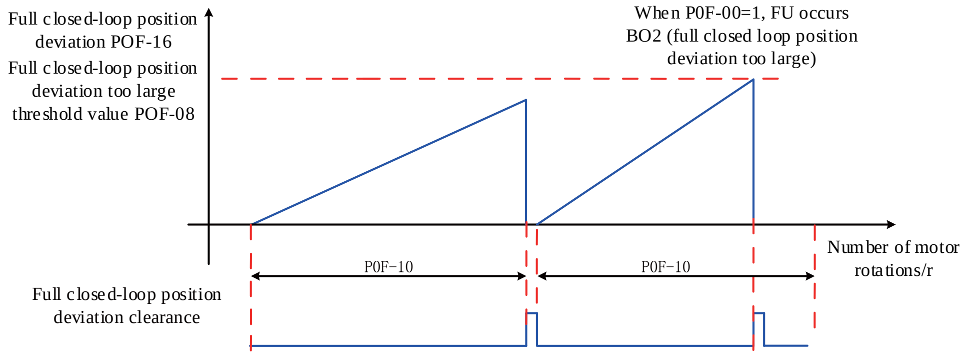
Set the threshold value of the absolute value of the position deviation when the full closed-loop position deviation fault FU.B02 occurs.

When P0F-08=0, the servo drive does not perform FU.B02 detection for excessive full closed-loop position deviation, and always clears the full closed-loop position deviation.

P0F-10	Name	Full closed-loop position deviation clearing setting			Setting method	Running settings	Related modes	P
	Setting range	0～100	Unit	r	Effective method	Effective immediately	Factory setting	0

Set how many rotations the motor rotates to clear the full closed loop position deviation when the drive is running. The number of motor rotations is reflected by the internal encoder feedback pulse number P0F-18.

Set value	Full closed-loop position deviation clearing setting
0	Always clear the full closed loop position deviation.
1～100	The position deviation is always less than P0F-08 within n rotations of the servo motor. At the nth rotation, the fully closed position deviation is cleared, and the position deviation and the number of motor rotations are counted again from 0.
	When the servo motor rotates within n cycles, once the position deviation is greater than P0F-08, the full closed position deviation is immediately cleared. If external encoder feedback (P0F-00=1 or 2) is used, FU.B02 (excessive full closed loop position deviation) will occur.



◆Caution: The number of motor rotations does not reset when the servo is in a non operating state! For example, if P0F-10=10 and the servo is turned OFF, the motor rotates for 5 rotations, and the servo is restored to ON, the first reset will occur when the motor rotates for 5 rotations. After that, for every 10 rotations, the full closed-loop position deviation will be reset.

<table>
<tr><td rowspan="2">P0F-13</td><td>Name</td><td colspan="3">Hybrid vibration compression filtering time constant</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>0～6553.5</td><td>Unit</td><td>ms</td><td>Effective method</td><td>Effective immediately</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">When using external encoder feedback (P0F-00=1 or 2), set the mixing vibration suppression time constant for full closed-loop control.
When using full closed-loop control, gradually increase the Set value and confirm the response change.
When the rigidity of the transmission mechanism between the full closed loop and the inner loop is insufficient, an appropriate time constant can be set to improve the stability of the system, which means that the inner loop effect is generated during the transient state, and the full closed loop effect can be formed after the steady-state state. When the rigidity is sufficient, it can be ignored.</td></tr>
</table>

<table>
<tr><td rowspan="2">P0F-16</td><td>Name</td><td colspan="3">Full closed-loop position deviation counter</td><td>Setting method</td><td rowspan="2">Display</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>-1073741824～1073741824</td><td>Unit</td><td>Exernal encoder unit</td><td>Effective method</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Count and display the absolute value of position deviation under full closed-loop control.
Full closed-loop position deviation=external encoder absolute position feedback - internal encoder absolute position feedback converted value
◆Caution:
The "hybrid control pulse deviation" in the oscilloscope of the drive debugging platform is the same as that of P0F-16, and the actual full closed-loop position deviation is displayed after taking an absolute value.
Using internal encoder feedback, P0F-08=0, or P0F-10=0, the full closed-loop position deviation counter value is always 0.</td></tr>
</table>

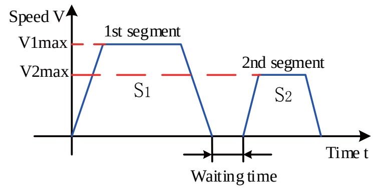
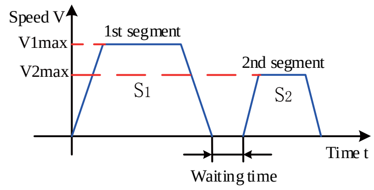
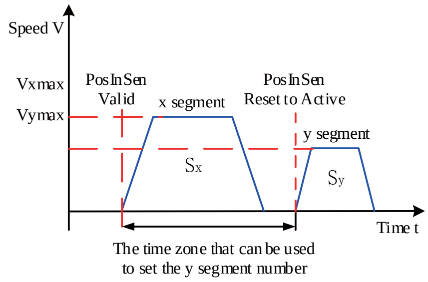
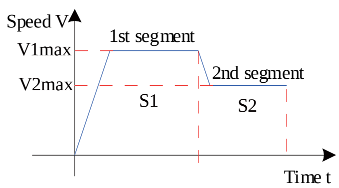
<table>
<tr><td rowspan="2">P0F-18</td><td>Name</td><td colspan="3">Internal encoder feedback pulse counter</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>-1073741824～1073741824</td><td>Unit</td><td>Internal encoder unit</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Count and display the internal encoder feedback pulse number (after the electronic gear ratio, the internal encoder unit).</td></tr>
</table>

<table>
<tr><td rowspan="2">P0F-20</td><td>Name</td><td colspan="3">External encoder feedback pulse counter</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>P</td></tr>
<tr><td>Setting range</td><td>-1073741824～1073741824</td><td>Unit</td><td>External encoder unit</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>0</td></tr>
<tr><td colspan="9">Count and display the external encoder feedback pulse number (after the electronic gear ratio, the external encoder unit).</td></tr>
</table>

Group P11: Multi segment position function parameters

P11-00	Name	Multi segment position operation mode			Setting method	Shutdown setting	Related modes	P
	Setting range	0～3	Unit	-	Effective method	Effective immediately	Factory setting	1

In the position control mode, when P05-00=2 (the main Location command source is a multi segment location command), the multi segment location running mode is set.

Set value	Running mode	Notes	Running waveform
0	Shut down at the end of a single running	Stop the machine after running for one round; Automatic increment switching of segment number; Waiting time can be set between segments; Multi segment position enable is level effective;	 V1max, V2max: maximum operating speed of the first and second sections; S1, S2: displacement of the first and second segments;
1	Cycle running	Cycle operation, the starting segment number after the first round is 1; Automatic increment switching of segment number; Waiting time can be set between segments; Multi segment position enable is level effective;	
2	DI switching running	The segment number can be updated for continuous running; The segment number is determined by the DI terminal logic; The interval time between segments is determined by the command delay time of the upper computer; Multi segment position enable is effective for edge changes;	 x. Y: Segment number. Please refer to P11-01 for the logical relationship between segment number and DI terminal; Sx, Sy: displacement of the x and y segments;
3	Sequential running	It can run for one round and stop the machine; It can be operated circularly, and the starting segment number after the first round is P11-05; Automatic increment switching of segment number; No waiting time between	

		segments; Multi segment position enable is level effective;	

When using the multi segment location function, one DI port must be set to DI function 28 (FunIN.28: PosInSen, multi segment location enabled). For the setting method, please refer to " Group P03 Terminal input parameters".
When each segment of the displacement command finishes running, the positioning completion (COIN) is valid. To determine whether a segment has finished running, please use the DO function 5 (FunOUT. 5: COIN, positioning completion). For the setting method, please refer to " Group P04 Terminal output parameters".
During each operation period, it is necessary to ensure that the servo enable is effective. Otherwise, the drive will immediately shut down in accordance with the servo enable OFF mode set in P02-05. After the shutdown is completed, the positioning completion (COIN) will be invalid;
In the non DI switching operation mode, during a certain period of operation, the servo enable is effective, but if the multi segment position enable is turned off, the servo will abandon the displacement command not sent in this segment and stop. After the stop is completed, the positioning completion (COIN) is effective. Reopen the multi segment position enable, and the running segment number is determined by the setting of P11-02.

P11-01	Name	Number of end segments of displacement command			Setting method	Shutdown setting	Related modes	P
	Setting range	1～16	Unit	-	Effective method	Effective immediately	Factory setting	1

Sets the total number of segments of the position command. Different displacement, running speed, and acceleration time can be set for different segments.
When P11-00 ≠ 2, the multi segment number is automatically incremented and switched, with the switching sequence: 1, 2,..., P11-01.
When P11-00=2, four DIs (either hardware DI or virtual DI) should be set as DI functions 6 to 9 (FunIN. 6: CMD1 to FunIN. 9: CMD4), and the DI logic should be controlled by the upper computer to achieve segment number switching.
Multisegment segment numbers are 4-bit binary numbers, and the corresponding relationship between CMD1 to CMD4 and segment numbers is shown in the following table.

FunIN.9	FunIN.8	FunIN.7	FunIN.6	Segment No.
CMD4	CMD3	CMD2	CMD1	
0	0	0	0	1
0	0	0	1	2
……				
1	1	1	1	16

When the DI terminal logic is valid, the CMD (n) value is 1, otherwise it is 0.

P11-02	Name	Margin treatment method			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

"When using the multi segment position function, a pause occurs. When resuming the multi segment position function, set the segment number of the starting segment.".

◆ Pause:

During multi segment position operation, the servo drive switches to other control modes or Interrupt fixed length function operation;

The internal multi segment position enable signal (FunIN.28: PosInSen) has changed from valid to invalid.

Set value	Margin treatment method	Notes
0	Continue to run the unfinished section	For example, P11-01 (number of end segments of displacement command)=16, when paused, it runs to the 2nd segment, and when the multi segment position function is resumed, it starts running from the 3rd segment.
1	Restart running from segment 1	For example, P11-01 (number of end segments of displacement command)=16, when paused, it runs to the 2nd segment, and when the multi segment position function is resumed, it starts running from the 1st segment.

◆Caution:

Once paused during multi segment position operation, the position commands that have not been completed in this segment will be discarded.

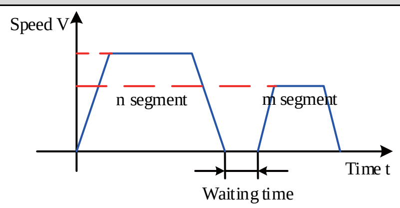
P11-00=2 (DI switching operation). During the operation of this section, a pause can only occur when switching to other control modes or when the Interrupt fixed length function is running. When resuming the operation of the multi section position function, the starting segment number is determined by the DI functions FunIN. 6 to FunIN. 9.

P11-03	Name	Time unit			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

When using the multi segment position function to run, set the unit of acceleration/deceleration time and waiting time.

Acceleration and deceleration time: the time for the servo motor to uniformly shift from 0 rpm to 1000 rpm;

Waiting time: The time interval between the end of this command run and the beginning of the next command run.

Set value	Waiting time unit	Notes
0	ms	
1	s	

In P11-00=3 (sequential mode) mode, P11-03 is invalid, and there is no waiting time between segments.

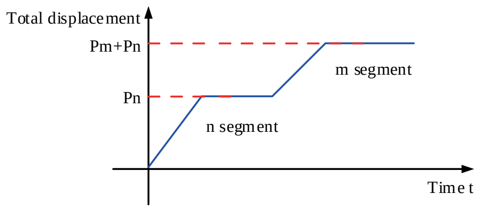
In P11-00=2 (DI switching operation) mode, P11-03 is invalid, and the interval between segments is only determined by the upper computer command delay time.

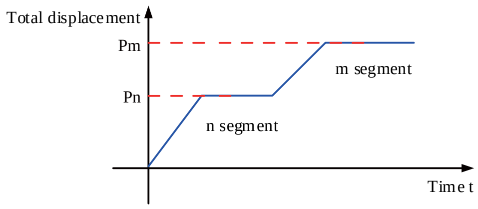
P11-04	Name	Displacement command type selection			Setting method	Shutdown setting	Related modes	P
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Sets the type of displacement command when running with the multi segment position function.

Displacement command: The sum of position commands over a period of time.

The relative displacement is the position increment of the target position relative to the current position of the motor; The absolute displacement is the position increment of the target position relative to the motor home. For example, the displacement of the nth segment is Pn (Pn>0), and the displacement of the nth segment is Pm (Pm>0). Assuming Pm>Pn, the comparison is as follows:

<table>
<tr><th>Set value</th><th>Displacement command type</th><th>Notes</th></tr>
<tr><td>0</td><td>Relative displacement command</td><td>

Actual moving displacement of section m: Pm</td></tr>
<tr><td>1</td><td>Absolute displacement command</td><td>

Actual moving displacement of section m: Pm-Pn</td></tr>
</table>

When the actual movement displacement is negative, the motor rotates in reverse direction.

P11-05	Name	Selection of starting section for sequential operation			Setting method	Shutdown setting	Related modes	P
	Setting range	0～16	Unit	-	Effective method	Effective immediately	Factory setting	0

When using the multi segment position sequential operation mode (P11-00=3), set whether to cycle and the starting segment number after the first round of cycle operation.

Set value	Selection of starting section for sequential operation	Notes
0	Do not cycle	Only run the number of segments set in P11-01 for one round, stop the machine after running, and the motor is in a locked state.
1～16	1～16	The starting segment number after the first round of cyclic running is P11-05Set value. P11-05 should be less than or equal to P11-01.

◆Caution:

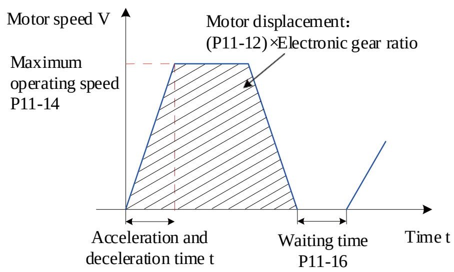
If P11-05 set value is greater than P11-01, P11-05 will be forced to set to 0.

P11-12	Name	Movement displacement of the 1st segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000
The 1st segment of the multi segment position moves the displacement (Command Unit).								

P11-14	Name	Maximum running speed of the 1st segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200
Maximum running speed of the 1st segment in multi segment position. The maximum running speed refers to the uniform speed at which the motor is not in the acceleration and deceleration process. If P11-12 (the 1st segment moving displacement) is too small, the actual rotational speed of the motor will be less than P11-14.								

P11-15	Name	Displacement acceleration and deceleration time of the 1st segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10
The time for the 1st segment of the motor in the multi segment position to uniformly shift from 0 rpm to 1000 rpm. Actual acceleration time to P11-14 (maximum operating speed of the 1st segment of movement): $t=\frac{(P11-14)\times(P11-15)}{1000}$								

P11-16	Name	Waiting time after completion of the 1st segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10
The waiting time before running the next segment of displacement after the completion of the 1st segment of displacement operation at multi segment positions.								



P11-17	Name	Movement displacement of the 2nd segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-19	Name	Maximum running speed of the 2nd segment displacement			Setting method	Running settings	Related modes	P
	Setting	1～6000	Unit	rpm	Effective	Effective	Factory	200

	range				method	immediately	setting	

P11-20	Name	Displacement acceleration and deceleration time of the 2nd segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-21	Name	Waiting time after completion of the 2nd segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-22	Name	Movement displacement of the 3rd segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-24	Name	Maximum operating speed of the 3rd segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-25	Name	Displacement acceleration and deceleration time of the 3rd segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-26	Name	Waiting time after completion of the 3rd segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-27	Name	Movement displacement of the 4th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-29	Name	Maximum operating speed of the 4th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-30	Name	Displacement acceleration and deceleration time of the 4th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-31	Name	Waiting time after completion of the 4th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-32	Name	Movement displacement of the 5th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-34	Name	Maximum operating speed of the 5th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-35	Name	Displacement acceleration and deceleration time of the 5th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-36	Name	Waiting time after completion of the 5th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-37	Name	Movement displacement of the 6th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-39	Name	Maximum running speed of the 6th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-40	Name	Displacement acceleration and deceleration time of the 6th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-41	Name	Waiting time after the completion of the 6th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-42	Name	Movement displacement of the 7th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-44	Name	Maximum running speed of the 7th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-45	Name	Displacement acceleration and deceleration time of the 7th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-46	Name	Waiting time after completion of displacement of the 7th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-47	Name	Movement displacement of the 8th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-49	Name	Maximum running speed of the 8th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-50	Name	Displacement acceleration and deceleration time of the 8th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-51	Name	Waiting time after completing the displacement of the 8th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-52	Name	Movement displacement of the 9th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-54	Name	Maximum operating speed of the 9th segment	Setting	Running	Related	P

		displacement		method	settings	modes	
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-55	Name	Displacement acceleration and deceleration time of the 9th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-56	Name	Waiting time after completion of displacement of the 9th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-57	Name	Movement displacement of the 10th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-59	Name	Maximum running speed of the 10th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-60	Name	Displacement acceleration and deceleration time of the 10th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-61	Name	Waiting time after the 10th segment displacement is completed			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-62	Name	Movement displacement of the 11th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-64	Name	Maximum running speed of the 11th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-65	Name	Displacement acceleration and deceleration time of the 11th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-66	Name	Waiting time after displacement completion of the 11th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-67	Name	Movement displacement of the 12th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-69	Name	Maximum running speed of the 12th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-70	Name	Displacement acceleration and deceleration time of the 12th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-71	Name	Waiting time after displacement completion of the 12th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-72	Name	Movement displacement of the 13th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-74	Name	Maximum operating speed of the 13th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-75	Name	Displacement acceleration and deceleration time of the 13th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-76	Name	Waiting time after completion of displacement of the 13th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-77	Name	Movement displacement of the 14th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-79	Name	Maximum operating speed of the 14th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-80	Name	Displacement acceleration and deceleration time of the 14th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-81	Name	Waiting time after displacement completion of the 14th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-82	Name	Movement displacement of the 15th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824 ～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-84	Name	Maximum operating speed of the 15th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

P11-85	Name	Displacement acceleration and deceleration time of the 15th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-86	Name	Waiting time after displacement completion of the 15th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-87	Name	Movement displacement of the 16th segment			Setting method	Running settings	Related modes	P
	Setting range	-1073741824～1073741824	Unit	Command Unit	Effective method	Effective immediately	Factory setting	10000

P11-89	Name	Maximum operating speed of the 16th segment displacement			Setting method	Running settings	Related modes	P
	Setting range	1～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	200

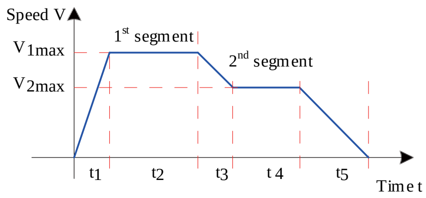
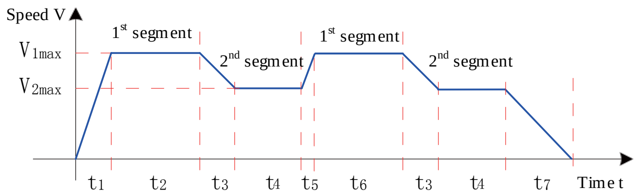
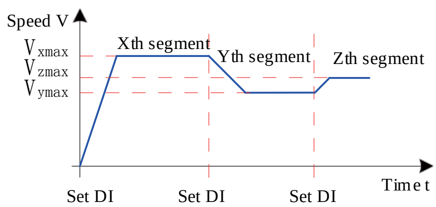
P11-90	Name	Displacement acceleration and deceleration time of the 16th segment			Setting method	Running settings	Related modes	P
	Setting range	0～65535	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

P11-91	Name	Waiting time after displacement completion of the 16th segment			Setting method	Running settings	Related modes	P
	Setting range	0～10000	Unit	ms(s)	Effective method	Effective immediately	Factory setting	10

Group P12: Multi segment speed parameters

P12-00	Name	Multi-segment speed command running mode			Setting method	Shutdown setting	Related modes	S
	Setting range	0～2	Unit	-	Effective method	Effective immediately	Factory setting	1

During speed control, when the speed command source is multi segment speed (P06-01=5, P06-02=1/2/3), set the multi segment speed command operation mode:

Set value	Running mode	Notes	Running waveform
0	Shutdown at the end of a single running	Stop the machine after running for one round; Automatic increment switching of segment number;	 V_{1max}、V_{2max}： Command speed of the first and second segments; t_1： Actual acceleration and deceleration time of the first segment; t_3、t_5： Acceleration and deceleration time of the second period.
1	Cycle running	Cycle running, with the starting segment number of each round being 1; Automatic increment switching of segment number; If the servo enable is effective, the cycle running state is always maintained.	 V_{1max}、V_{2max}： The maximum operating speed of the first and second segments.
2	Switching through external DI	The servo enable is effective for continuous running; The segment number is determined by the DI terminal logic; The running time of each speed command is only determined by the interval between segment number switching; FunIN. 5 (DIR-SEL) can be used to achieve speed command direction switching.	 x. Y: Segment number, please refer to P12-01 for the logical relationship between segment number and DI terminal; V_x、V_y： Speed commands for the x and y segments; The segment number determined by DI does not change, and the segment speed command continues to run regardless of the command run time.

During each speed command operation period, it is necessary to ensure that the servo enable is effective, otherwise, the drive will immediately shut down in accordance with the servo enable OFF mode set in P02-05;

When a certain speed command reaches Set value, the speed arrival (FunOUT. 19: V-Arr) signal is valid.

P12-01	Name	Speed command end point segment number selection			Setting method	Shutdown setting	Related modes	S
	Setting range	1～16	Unit	-	Effective method	Effective immediately	Factory setting	16

Sets the total number of segments for the speed command. Different speeds and running times can be set for different segments, and there are four sets of acceleration times to choose from.

When P12-00 ≠ 2, the multi segment number is automatically incremented and switched, with the switching sequence: 1, 2,..., P12-01.

When P12-00=2, four DIs (either hardware DI or virtual DI) should be set as DI functions 6 to 9 (FunIN. 6: CMD1 to FunIN. 9: CMD4), and the DI logic should be controlled by the upper computer to achieve segment number switching. Multisegment segment numbers are 4-bit binary numbers, and the corresponding relationship between CMD1 to CMD4 and segment numbers is shown in the following table.

FunIN.9	FunIN.8	FunIN.7	FunIN.6	Segment No.
CMD4	CMD3	CMD2	CMD1	
0	0	0	0	1
0	0	0	1	2
……				
1	1	1	1	16

When the DI terminal logic is valid, the CMD (n) value is 1, otherwise it is 0.

P12-02	Name	Runtime Unit Selection			Setting method	Shutdown setting	Related modes	S
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Multiple speed running time unit selection:

Set value	Unit selection
0	sec(second)
1	min(minute)

When the DI terminal logic is valid, the CMD (n) value is 1, otherwise it is 0.

P12-03	Name	Acceleration time1			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	10

P12-04	Name	Deceleration time1			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	10

P12-05	Name	Acceleration time2			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	50

P12-06	Name	Deceleration time2			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	50

P12-07	Name	Acceleration time3			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	100

P12-08	Name	Deceleration time3			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	100

P12-09	Name	Acceleration time4			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	150

P12-10	Name	Deceleration time4			Setting method	Shutdown setting	Related modes	S
	Setting range	0～65535	Unit	ms	Effective method	Effective immediately	Factory setting	150
For each multi segment speed command, four sets of acceleration and deceleration times are available for selection. Acceleration time: the time for the servo motor to uniformly accelerate from 0 rpm to 1000 rpm; Deceleration time: The time when the servo motor decelerates uniformly from 1000 rpm to 0 rpm.								

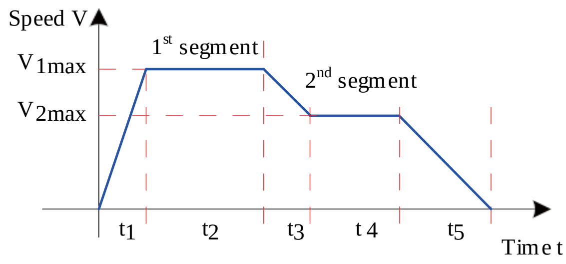
P12-20	Name	Speed command of the 1st segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	0

P12-21	Name	Running time of the 1st segment command			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0
Set the running time of the first speed command. Running time: the shift time from the previous speed command to this speed command+the constant speed running time of this section. If the run time is set to 0, the drive will automatically skip this speed command. When P12-00=2, as long as the segment number determined by the external DI does not change, the segment speed command continues to run, regardless of the command run time.								

P12-22	Name	First acceleration and deceleration time			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

Select the acceleration/deceleration time of the first speed command:

Set value	Acceleration and deceleration time	Notes
0	Zero acceleration/deceleration time	Acceleration time：0 Deceleration time：0
1	Acceleration and deceleration time 1	Acceleration time：P12-03 Deceleration time：P12-04
2	Acceleration and deceleration time 2	Acceleration time：P12-05 Deceleration time：P12-06
3	Acceleration and deceleration time 3	Acceleration time：P12-07 Deceleration time：P12-08
4	Acceleration and deceleration time 4	Acceleration time：P12-09 Deceleration time：P12-10



V_{1max}、V_{2max}：Command speed of the first and second segments;

t_1：Actual acceleration and deceleration time of the 1st segment;

t_3、t_5：Acceleration and deceleration time of the 2nd period;

A certain running time: the shift time when the previous speed command is switched to this speed command+the constant speed running time of this section (for example, the first operating time in the figure is t_1+t_2, the second run time is t_3+t_4, and so on)

Do not set a certain running time to 0, and the drive will skip this speed command and execute the next section;

$$t_1=\frac{V_1}{1000}\times \text{ Acceleration time set for this section of speed}$$

$$t_3=\frac{|V_2-V_1|}{1000}\times \text{ Acceleration time set for the 2}^{nd}\text{ section}$$

P12-23	Name	2nd segment speed command			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	100

P12-24	Name	Command run time of the 2nd segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-25	Name	Acceleration and deceleration time of the 2nd segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-26	Name	Speed command of the 3rd segment			Setting method	Shutdown setting	Related modes	S
	Setting	-6000～6000	Unit	rpm	Effective	Effective	Factory	300

	range				method	immediately	setting	

P12-27	Name	Running time of the 3rd segment command			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-28	Name	Acceleration and deceleration time of the 3rd segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-29	Name	Speed command of the 4th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	500

P12-30	Name	Running time of the 4th segment command			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-31	Name	Acceleration and deceleration time of the 4th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-32	Name	Speed command of the 5th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	700

P12-33	Name	Command run time of the 5th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-34	Name	Acceleration and deceleration time of the 5th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-35	Name	Speed command of the 6th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	900

P12-36	Name	Running time of the 6th segment command			Setting method	Shutdown setting	Related modes	S

	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-37	Name	Acceleration and deceleration time of the 6th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-38	Name	Speed command of the 7th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	600

P12-39	Name	Command run time of the 7th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-40	Name	Acceleration and deceleration time of the 7th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-41	Name	Speed command of the 8th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	300

P12-42	Name	Command run time of the 8th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-43	Name	Acceleration and deceleration time of the 8th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-44	Name	Speed command of the 9th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	100

P12-45	Name	Command run time of the 9th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-46	Name	Acceleration and deceleration time of the 9th segment			Setting method	Shutdown setting	Related modes	S

	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-47	Name	Speed command of the 10th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-100
P12-48	Name	Command run time of the 10th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0
P12-49	Name	Acceleration and deceleration time of the 10th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0
P12-50	Name	Speed command of the 11th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-300
P12-51	Name	Command run time of the 11th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0
P12-52	Name	Acceleration and deceleration time of the 11th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0
P12-53	Name	Speed command of the 12th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-500
P12-54	Name	Command run time of the 12th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0
P12-55	Name	Acceleration and deceleration time of the 12th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0
P12-56	Name	Speed command of the 13th segment			Setting method	Shutdown setting	Related modes	S

	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-700

P12-57	Name	Command run time of the 13th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-58	Name	Acceleration and deceleration time of the 13th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-59	Name	Speed command of the 14th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-900

P12-60	Name	Command run time of the 14th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-61	Name	Acceleration and deceleration time of the 14th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-62	Name	Speed command of the 15th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-600

P12-63	Name	Command run time of the 15th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-64	Name	Acceleration and deceleration time of the 15th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

P12-65	Name	Speed command of the 16th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	-6000～6000	Unit	rpm	Effective method	Effective immediately	Factory setting	-300

P12-66	Name	Command run time of the 16th segment			Setting method	Shutdown setting	Related modes	S

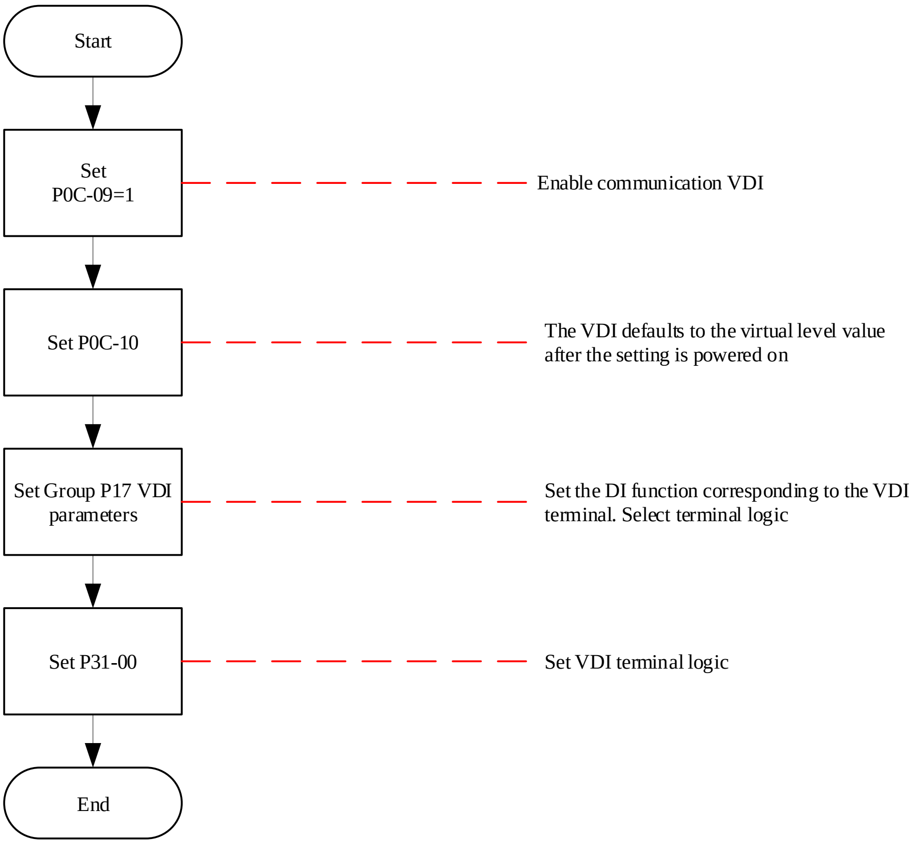
	Setting range	0～6553.5	Unit	s(min)	Effective method	Effective immediately	Factory setting	5.0

P12-67	Name	Acceleration and deceleration time of the 16th segment			Setting method	Shutdown setting	Related modes	S
	Setting range	0～4	Unit	-	Effective method	Effective immediately	Factory setting	0

Group P17: Virtual DIDO parameters

P17-00	Name	VDI1 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Set the DI function corresponding to VDI1 (virtual input terminal 1). Follow these steps to use VDI:



For DI functions, please refer to "Definition of basic functions of DIDO", and for parameter value settings, please refer to the following table.

◆Caution:

When using the DI forced input function, the logic of VDI1 to VDI9 is determined by forced DI (P0D-18).

Set value	DI terminal function	Set value	DI terminal function
0	Do not assign DI functions	19	JOGCMD - (Reverse jog)
1	S-ON (servo enable)	20	PosStep (Step enable)
2	ALM-RST (Fault and Warning Reset)	21	HX1 (Handwheel magnification signal 1)
3	GAIN-SEL(Gain switching)	22	HX2 (Handwheel magnification signal 2)
4	CMD-SEL (Switching of main and auxiliary running commands)	23	HX_ EN (Handwheel enable signal)
5	DIR-SEL (Multi segment running command direction selection)	24	GEAR_ SEL (Electronic gear selection)
6	CMD1(Multi segment running command switching1)	25	ToqDirSel (Torque command direction setting)
7	CMD2(Multi segment running command switching2)	26	SpdDirSel (Speed command direction setting)

8	CMD3(Multi segment running command switching3)	27	PosDirSel (Position command direction setting)
9	CMD4(Multi segment running command switching4)	28	PosInSen (Multi segment position command enable)
10	M1-SEL (Mode switching 1)	29	XintFree(Interrupt fixed length state released)
11	M2-SEL (Mode switching 2)	30	Not applicable
12	ZCLAMP (Zero fixed enable)	31	HomeSwitch(Home switch)
13	INHIBIT (Position command prohibition)	32	HomingStart (Home reset enabled)
14	P-OT (Forward overtravel switch)	33	XintInhibit(Interrupt fixed length inhibited)
15	N-OT (Reverse overtravel switch)	34	EmergencyStop(EmergencyStop)
16	P-CL (Positive external torque limit)	35	ClrPosErr (Clear position deviation)
17	N-CL (Negative external torque Limit)	36	V_ LmtSel (Internal Speed Limit Source)
18	JOGCMD+(Forward jog)	37	PulseInhibit(Pulse command inhibited)

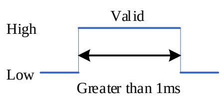
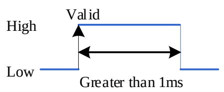
Do not set the parameter values of P17-00 to values other than those in the table above.

P31-00 is not visible on the panel and can only be given through communication

The same DI function cannot be assigned to different DI terminals, otherwise, FU.130 will occur (different DIs repeatedly assign the same function).

P17-01	Name	VDI1terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

The setting makes the DI function selected by VDI1 effective, and the input level logic of the VDI1 terminal.

Set value	VDI1 terminal logic when DI function is valid	P31-00 signal
0	Write 1 Valid	
1	Valid when the write value changes from 0 to 1	

When first powered on, the VDI terminal logic is determined by P0C-10. After that, the VDI terminal logic is determined by P31-00 (VDI virtual level).

The display of P0C-10 on the panel is decimal, and the P31-00 panel is not visible. After converting to binary, the bit (n)=1 of P0C-10 (P31-00) indicates that the VDI (n+1) terminal logic is "1", and the bit (n)=0 indicates that the VDI (n+1) terminal logic is "0".

P17-02	Name	VDI2 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-03	Name	VDI2terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-04	Name	VDI3 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-05	Name	VDI3terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-06	Name	VDI4 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-07	Name	VDI4terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-08	Name	VDI5 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-09	Name	VDI5terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-10	Name	VDI6 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes	Factory setting	0

						effect		

P17-11	Name	VDI6terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-12	Name	VDI7 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-13	Name	VDI7terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-14	Name	VDI8 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-15	Name	VDI8terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-16	Name	VDI9 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-17	Name	VDI9terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-18	Name	VDI10 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-19	Name	VDI10terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-20	Name	VDI11 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes	Factory setting	0

						effect		

P17-21	Name	VDI11terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-22	Name	VDI12 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-23	Name	VDI12terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-24	Name	VDI13 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-25	Name	VDI13terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-26	Name	VDI14 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-27	Name	VDI14terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-28	Name	VDI15 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-29	Name	VDI15terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes	Factory setting	0

						effect		

P17-30	Name	VDI16 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～37	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

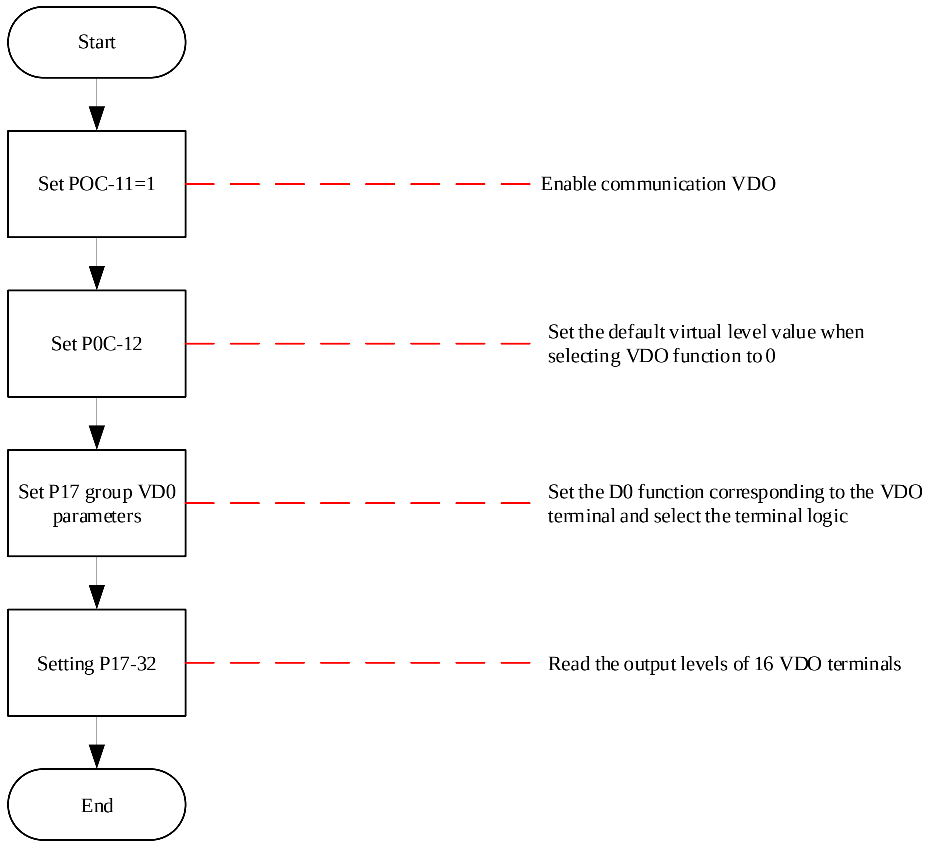
<table>
<tr><td rowspan="2">P17-31</td><td>Name</td><td colspan="3">VDI16terminal logic selection</td><td>Setting method</td><td>Running settings</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>0～1</td><td>Unit</td><td>-</td><td>Effective method</td><td>Shutdown takes effect</td><td>Factory setting</td><td>0</td></tr>
</table>

<table>
<tr><td rowspan="2">P17-32</td><td>Name</td><td colspan="3">VDO virtual level</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>-</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
</table>

Read the virtual level of the VDO terminal.

P0C-12 and P17-32 are displayed in hexadecimal on the panel. After being converted to binary, bit (n)=1 of P0C-12 (P17-32) indicates that the VDO (n+1) terminal logic is "1", and bit (n)=0 indicates that the VDO (n+1) terminal logic is "0".

It is recommended to set the logic level of each VDO terminal to the opposite logic as P0C-12.



P17-33	Name	Offline inertia identification mode selection			Setting method	Shutdown setting	Related modes	PST
	Setting range	0～1	Unit	-	Effective method	Effective immediately	Factory setting	0

Set the DO function corresponding to VDO1.

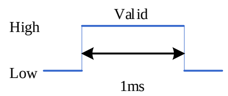
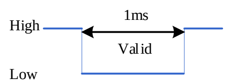
Please refer to "Definition of basic functions of DIDO" for DO functions and the following table for parameter value settings.

Set value	DOFunction name	Set value	DOFunction name
0	Do not allocate DO functions	12	ALMO1: Output 3-digit alarm code
1	S-RDY: Servo ready	13	ALMO2: Output 3-digit alarm code
2	TGON: motor rotation	14	ALMO3: Output 3-digit alarm code
3	ZERO: Zero speed signal	15	Xintcoin: interrupt fixed length completion
4	V-CMP: Consistent speed	16	HomeAttack: Zero return completed
5	COIN: Positioning completed	17	ElecHomeAttack: Electrical zero return completed
6	NEAR: Positioning near	18	ToqReach: Torque reached
7	C-LT: Torque limit	19	V-Arr: Speed reached
8	V-LT: Speed limited	20	AngIntRdy: Angle identification output
9	BK：Band brake	21	DB: DB brake output
10	WARN: Warning	22	CmdOk: Internal command output
11	ALM: Fault	-	-

Do not set the parameter values of P17-33 to values other than those in the table above.

The same DO FUNCTION can be assigned to different DO terminals.

P17-34	Name	VDO1terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Set value	VDO1 terminal logic	P31-00 signal
0	Output 1 when valid	
1	Output 0 when valid	

P17-35	Name	VDO2 terminal function selection	Setting method	Running settings	Related modes	-

	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-36	Name	VDO2terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-37	Name	VDO3 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-38	Name	VDO3terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-39	Name	VDO4 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-40	Name	VDO4terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-41	Name	VDO5 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-42	Name	VDO5terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-43	Name	VDO6 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-44	Name	VDO6 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-45	Name	VDO7 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-46	Name	VDO7terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-47	Name	VDO8 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-48	Name	VDO8 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-49	Name	VDO9 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-50	Name	VDO9 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-51	Name	VDO10 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-52	Name	VDO10 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes	Factory setting	0

						effect		

P17-53	Name	VDO11 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-54	Name	VDO11 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-55	Name	VDO12 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-56	Name	VDO12 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0
P17-57	Name	VDO13 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-58	Name	VDO13 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-59	Name	VDO14 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-60	Name	VDO14 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-61	Name	VDO15 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-62	Name	VDO15 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-63	Name	VDO16 terminal function selection			Setting method	Running settings	Related modes	-
	Setting range	0～22	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

P17-64	Name	VDO16 terminal logic selection			Setting method	Running settings	Related modes	-
	Setting range	0～1	Unit	-	Effective method	Shutdown takes effect	Factory setting	0

Group P30: Communication Reads Servo Related Variables

<table>
<tr><td rowspan="2">**P30-00**</td><td>Name</td><td colspan="3">Communication reads servo status</td><td>Setting method</td><td>Communication Read Only</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">Communication reads the servo running status.
P30-00 is a hexadecimal number that is not visible on the panel. During communication reading, it must be converted to binary, with different bits representing different meanings.</td></tr>
</table>

Bit	Servo status	Notes
bit0	Servo ready	This bit is used to determine whether the DC voltage of the servo main circuit is ready to make the servo drive operational. 0: Servo not ready 1: Servo ready
bit1～bit11	Reserved	-
bit12～bit13	Servo running status	This bit is used to determine the Servo running status. 00: Servo not ready (DC bus voltage of main circuit not established correctly) 01: The servo is ready (the DC bus voltage of the main circuit is correctly established, and the drive is in a operable state) 10: Servo running 11: Servo failure (the first and second types of servo failures occur)
bit14～bit15	Reserved	-

<table>
<tr><td rowspan="2">**P30-01**</td><td>Name</td><td colspan="3">Communication reasd DO function status 1</td><td>Setting method</td><td>Communication read only</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">The communication reads the status of DO functions 1 to 16 in the order of the DO function list.
P30-01 is a hexadecimal number that is not visible on the panel and must be converted to binary during communication reading.</td></tr>
</table>

Bit	DO FUNCTION	Notes
bit0	DO FUNCTION1 (FunOUT. 1: S-RDY, servo ready)	0: Servo not ready 1: Servo ready
……		
bit15	DO FUNCTION16(FunOUT.16 ：HomeAttain ，Zero return output)	0: Zero return not completed 1: Zero return completed

Note: If the DO port or virtual DO is not configured with function 9 (band brake output), FunOUT. 9 in P30-01 will be invalid.

<table>
<tr><td rowspan="2">P30-02</td><td>Name</td><td colspan="3">Communication reads DO FUNCTION status 2</td><td>Setting method</td><td>Communication read only</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">Communication reads the status of DO FUNCTION17 to DO FUNCTION20 in the order of the DO FUNCTION list.
P30-02 is a hexadecimal number that is not visible on the panel and must be converted to binary during communication reading.</td></tr>
</table>

Bit	DO FUNCTION	Notes
bit0	DO FUNCTION17(FunOUT.17： S-ElecHomeAttain，electrical return to zero output)	0: Electrical zero return not completed 1: Electrical zero return completed
……		
bit4～bit15	Reserved	

<table>
<tr><td rowspan="2">P30-03</td><td>Name</td><td colspan="3">Communication reads input pulse command sample value</td><td>Setting method</td><td>Display</td><td>Related modes</td><td>PST</td></tr>
<tr><td>Setting range</td><td>-</td><td>Unit</td><td>-</td><td>Effective method</td><td>-</td><td>Factory setting</td><td>-</td></tr>
<tr><td colspan="9">When the communication reads the location command source as a pulse command (P05-00=1) or inputs a pulse command through a handwheel (assigning a DI function to FunIN.23, and the corresponding DI logic is valid), the pulse input port controls the number of pulses input during a single position control cycle. This parameter is independent of the Servo running mode and the current running state of the servo.</td></tr>
</table>

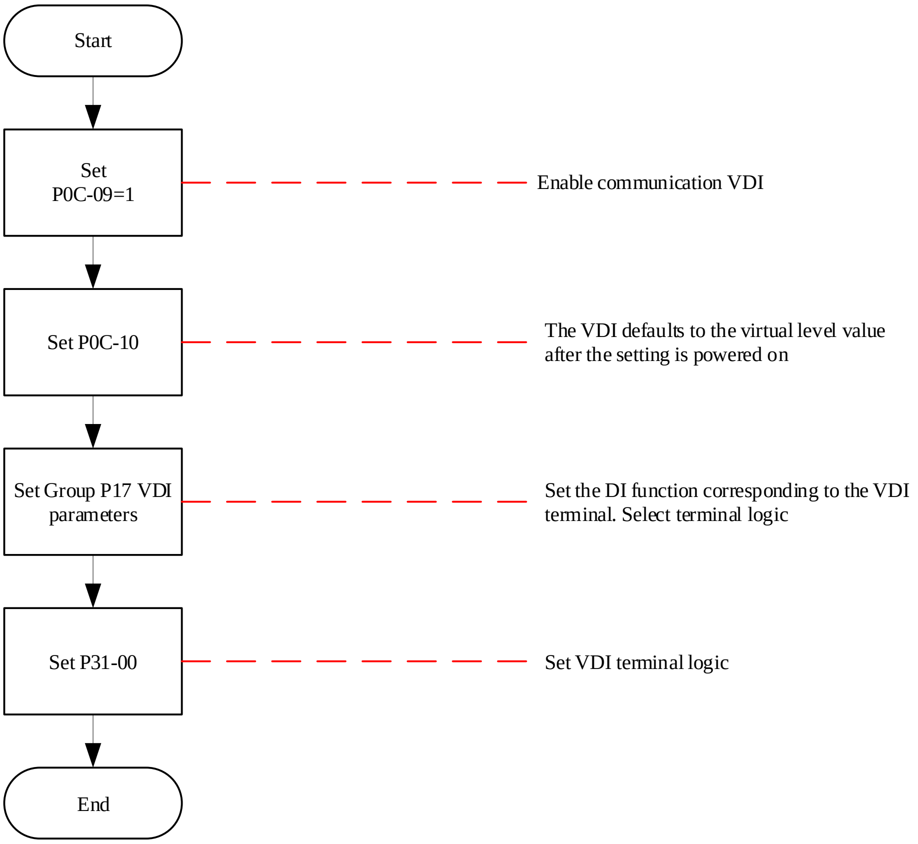
Group P31: Communication given servo related variables

P31-00	Name	Communication given VDI virtual level			Setting method	Running settings	Related modes	PST
	Setting range	0～65535	Unit	-	Effective method	Effective immediately	Factory setting	0

When using the VDI function, set the DI function level corresponding to VDI1 to VDI16.

P31-00 is a decimal number that is not visible on the panel and can only be given through communication.

Follow these steps to use VDI:



When first powering on, the VDI terminal logic is determined by P0C-10 (the default virtual level value of VDI after powering on). After that, the VDI terminal logic is determined by P31-00.

P0C-10 is a decimal display on the panel. After being converted to binary, bit (n)=1 of P31-00 (P0C-10) indicates that the VDI (n+1) terminal logic is "1", and bit (n)=0 indicates that the VDI (n+1) terminal logic is "0".

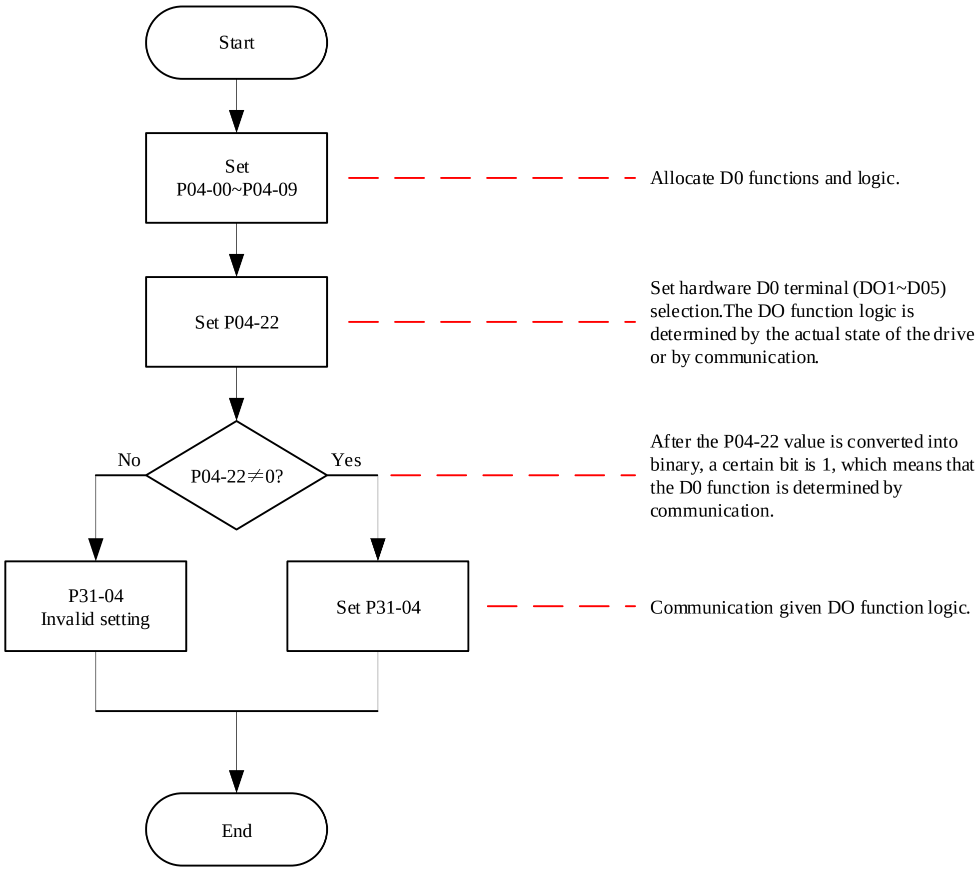
For VDI functions and logical settings, refer to "Group P17 Virtual DIDO parameters".

P31-04	Name	Communication given DO output status			Setting method	Running settings	Related modes	PST
	Setting range	0～31	Unit	-	Effective method	Effective immediately	Factory setting	0

When using DO FUNCTION, according to the setting of function code P04-22, Communication givenDO outputs the status.

P31-04 is a decimal number that is not visible on the panel and can only be given through communication.

Follow these steps to use DO:



Bit (n)=1 in P31-04 indicates that the DO (n+1) function logic assigned to P04 group is valid, and bit (n)=0 indicates that the DO (n+1) function logic is invalid.

P31-09	Name	Communication given speed command			Setting method	Running settings	Related modes	S
	Setting range	-6000.000～6000.000	Unit	rpm	Effective method	Effective immediately	Factory setting	0

In speed control mode, when Speed command source is Communication given, set the speed command value with an accuracy of 0.001 rpm.

P31-09 is a 32-bit function code that is not visible on the panel and can only be given through communication.

P31-11	Name	Communication given torque command			Setting method	Running settings	Related modes	T
	Setting range	-100.000～100.000	Unit	%	Effective method	Effective immediately	Factory setting	0

In the torque control mode, when the Torque command source is communication given, set the torque command value with an accuracy of 0.001%.

100.000% corresponds to one time the rated torque of the motor.

P31-11 is a 32-bit function code that is not visible on the panel and can only be given through communication.

Chapter IX Troubleshooting

1.40 Handling of faults and warnings during startup

1.40.1 Position control mode

1) Fault inspection

Process of starting	Fault phenomenon	Reason	Confirmation method
Turn on the control power supply (L1C、L2C) Main power supply (L1、L2) (L1、L2、L3)	The nixie tube is not lit or does not display "rdy"	1. Control power supply voltage fault	■ After unplugging CN1, CN2, CN3, and CN4, the fault still exists. ■ Measure the AC voltage between (L1C, L2C).
		2. Main power supply voltage fault	■ Single-phase 220V power supply models measure the AC voltage between (L1, L2). The voltage amplitude of the DC bus of the main power supply (voltage between B1/⊕ and 1) is lower than 200V and the digital tube displays "nrd". "nrd". ■ The three-phase 220V/380V power supply model measures the AC voltage between (L1, L2, L3). The voltage amplitude of the DC bus of the main power supply (voltage between B1/⊕ and 1) is lower than 460V and the digital tube displays "nrd".
		3. The burning program terminal is short-circuited	■ Check the terminals of the burning program to confirm whether they are short-circuited.
		4. Servo drive fault	-
	Panel display"FU.xxx"	Refer to Section 9.2 to find the cause and eliminate the fault.	
	◆ After troubleshooting the above faults, the panel should display "rdy".		
The servo enable signal is set to be active (S-ON is ON)	Panel display"FU.xxx"	Refer to Section 9.2 to find the cause and eliminate the fault.	
	The axis of the servo motor is in free running state	1. Servo enable signal invalid	■ Switch the panel to the servo status display and check to see if the panel displays "rdy" instead of "run". ■ Check whether the servo enable signal (DI function 1: S-ON) is set for groups P03 and P17. If set, check whether the corresponding terminal logic is valid; If not set, set and make the terminal logic valid. Please refer to Chapter 8 "P03 Group: Terminal input parameters" for setting methods. ■ "If P03 group has set a servo enable signal and the corresponding terminal logic is valid, but the panel still displays" rdy ", check whether the DI terminal wiring is correct. Refer to Chapter 4.".
		2. Control mode	■ Check whether P02-00 is 1. If it is set to 2 (torque

		selection error	mode) by mistake, the motor shaft is also in free running state due to the default torque command being zero.
	◆ After troubleshooting the above faults, 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 4 "Wiring", and check whether the P05-01 settings match. ■ No position command entered 1. Whether to use DI function 13 (FunIN.13: Inhibit, position command prohibited) or DI function 37 (FunIN.37: PulseInhibit, pulse command prohibited); 2. When P05-00=0 pulse Command source, the upper computer or other pulse output devices do not output pulses. You can use an oscilloscope to check whether there is pulse input at the high/low speed pulse port. Please refer to Chapter 4 "Wiring"; 3. When P05-00=1 step command source, check whether P05-05 is 0. If not, check whether DI function 20 (FunIN.20: PosStep command enable) is set and whether the corresponding terminal logic is valid; 4. When P05-00=2 multi segment Location command source, check whether the P11 group parameters are set correctly. If so, check whether the DI function 28 (FunIN.28: PosInSen, internal multi segment location enable) is set and whether the corresponding terminal logic is valid; 5. If you have used the Interrupt fixed length function, check to see if P05-29 is 1 (after the interrupt fixed length operation is completed, can you directly respond to other position commands). If it is 1, confirm whether to use the DI function 29 (FunIN.29: XintFree, Interrupt fixed length state release) to unlock the state。
	Servo motor rotates in reverse direction	The input position command counter (P0B-13) is negative	■ When P05-00=0 pulse command source, check whether P05-15 (pulse command form) parameter settings correspond to the actual input pulse. If not, P05-15 is set incorrectly or the terminal wiring is incorrect; ■ When P05-00=1 step command source, check the positive and negative values of P05-05; ■ When P05-00=2 multi segment location command source, check the positive and negative displacement of each segment of P11 group; ■ Check whether the DI function 27 (FunIN.27: PosDirSel, position command direction setting)

			has been set and whether the corresponding terminal logic is valid; ■ Check whether P02-02 parameter is set incorrectly.
	◆ After removing the above faults, the servo motor can rotate.		
Uneven rotation at low speed	Unstable speed during low speed rotation	Gain setting is unreasonable	■ Perform automatic gain adjustment.
	Left and right vibration of motor shaft	The rotational inertia ratio of the load (P08-15) is too large	■ If it canrun safely, conduct Inertia identification again; ■ Perform automatic gain adjustment.
	After removing the above faults, the servo motor can rotate normally.		
Normal running	Inaccurate positioning	Generate unsatisfactory position deviation	■ Determine the input position command counter (P0B-13), feedback pulse counter (P0B-17), and mechanical stop position. The confirmation steps are as follows.

2) 2) Steps for checking the cause of faults that are not located on time

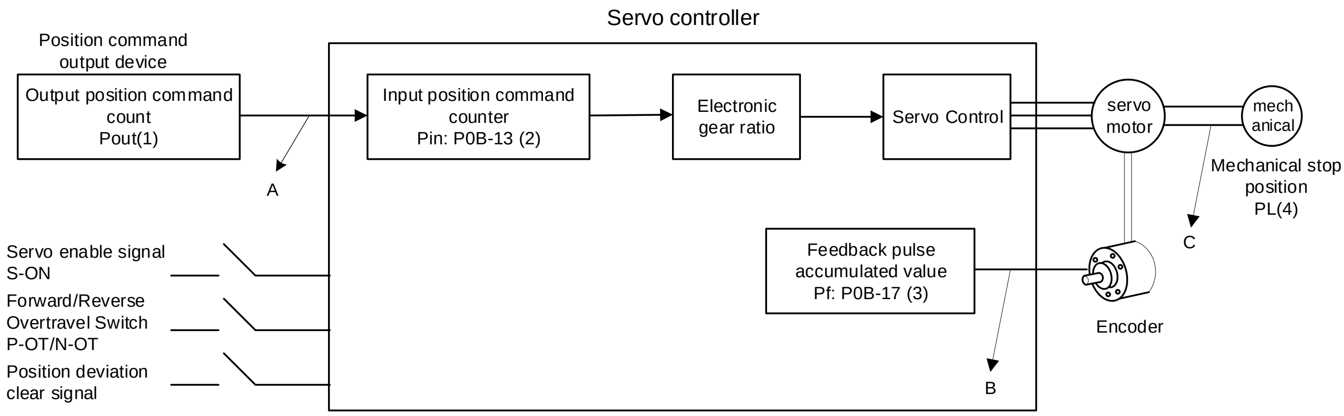


Figure 9-1 Positioning Control Principle Block Diagram

If the positioning error occurs, check the four signals in the figure above:

③ The output position command count value Pout in the position command output device (upper computer or drive internal parameters);

④ The input position command counter Pin received by the servo controller corresponds to parameter P0B-13;

⑤ The feedback pulse accumulation value Pf of the servo motor's built-in encoder corresponds to parameter P0B-17;

⑥ The position PL of the mechanical stop.

There are three reasons for inaccurate positioning, corresponding to A, B, and C in the figure, among which:

A represents: ① In the wiring between the position command output device (specifically referred to as the upper computer) and the servo drive, the input position command count error is caused by the impact of noise;

③ During motor operation, the input position command is interrupted.

Reason: The servo enable signal is set to invalid (S-ON is OFF), the forward/reverse override switch signal (P-OT or N-OT) is valid, and the position deviation clear signal (ClrPosErr) is valid;

B indicates that the encoder feedback position signal is incorrect (the signal is interfered).

C indicates that there is a mechanical position sliding between the machine and the servo motor.

In an ideal state where positional deviation does not occur, the following relationship holds:

- Pout=Pin, output position command count value=input position command counter
- Pin × Electronic gear ratio=Pf, input position command counter × Electronic gear ratio=Feedback pulse accumulation value
- Pf × △ L=PL, feedback pulse accumulation value × 1 position command corresponding to load displacement=position of mechanical stop

In case of inaccurate positioning, inspection methods are:

a) Pout≠Pin

Cause of the fault: A

Troubleshooting methods and steps:

① Check whether the pulse input terminal (low speed or high speed pulse input terminal, please refer to "Wiring" in Chapter 4) uses twisted pair shielded wire;

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

③ The wiring of pulse input terminals must be routed separately from the main circuits (L1C, L2C, L1, L2, L3, U, V, W);

④ Select a low speed pulse input terminal and increase the low speed pulse input pin filtering time constant (P0A-24); On the contrary, select a high-speed pulse input terminal and increase the high-speed pulse input pin filtering time constant (P0A-30).

b) Pin×Electronic gear ratio≠Pf

Reason of the fault: B

Troubleshooting methods and steps:

①Check whether there is a fault during operation, resulting in incomplete execution of the command and the servo being shut down;

② If the position deviation clearing signal (ClrPosErr) is valid, check whether the position deviation clearing method (P05-16) is reasonable.

c) Pf×△L≠PL

Reason of the fault: C

Troubleshooting methods and steps:

Check the connection of the machinery step by step to find the position where relative sliding occurs.

1.40.2 Speed control mode

Process of starting	Fault phenomenon	Reason	Confirmation method
Turn on the control power supply (L1C, L2C)	The nixie tube is not lit or does not display “rdy”	1. Control power supply voltage fault	■ After unplugging CN1, CN2, CN3, and CN4, the fault still exists. ■ Measure the AC voltage between (L1C, L2C).

<table>
<tr><td rowspan="5">Main power supply
(L1, L2)
(L1, L2, L3)</td><td rowspan="3"></td><td>2. Main power supply voltage fault</td><td>■ Single-phase 220V power supply models measure the AC voltage between (L1, L2). The voltage amplitude of the DC bus of the main power supply (B1/⊕, 1-bay voltage) is lower than 200V, and the digital tube displays "nrd".
■ The three-phase 220V/380V power supply model measures the AC voltage between (L1, L2, L3). The voltage amplitude of the DC bus of the main power supply (B1/⊕, 1-bay voltage) is lower than 460V, and the digital tube displays "nrd".</td></tr>
<tr><td>3.The burning program terminal is shorted</td><td>■ Check the terminals of the burning program to confirm whether they are short-circuited.</td></tr>
<tr><td>4.Servo drive fault</td><td>-</td></tr>
<tr><td>Panel display“FU.xxx”</td><td colspan="2">Refer to Section 9.2 to find the cause and eliminate the fault.</td></tr>
<tr><td colspan="3">◆ After troubleshooting the above faults, the panel should display “rdy”.</td></tr>
<tr><td rowspan="4">The servo enable signal is set to be active (S-ON is ON)</td><td>Panel display“FU.xxx”</td><td colspan="2">Refer to Section 9.2 to find the cause and eliminate the fault.</td></tr>
<tr><td rowspan="2">The axis of the servo motor is in free running state</td><td>1.Servo enable signal invalid</td><td>■ Switch the panel to the servo status display and check whether the panel displays "Rdy" instead of "run".
■ Check whether the servo enable signal (DI function 1: S-ON) is set for groups P03 and P17. If set, check whether the corresponding terminal logic is valid; If not set, set and make the terminal logic valid. Please refer to Chapter 8 "P03 Group: Terminal input parameters" for setting methods.
■ If the P03 group has set a servo enable signal and the corresponding terminal logic is valid, but the panel still displays "rdy", check whether the DI terminal wiring is correct. Refer to Chapter 4.</td></tr>
<tr><td>2.Control mode selection error</td><td>■ Check whether P02-00 is 0. If it is set to 2 (torque mode) by mistake, the motor shaft is also in free running state due to the default torque command being zero.</td></tr>
<tr><td colspan="3">◆ After troubleshooting the above faults, the panel should display "run".</td></tr>
<tr><td>Input speed command</td><td>Servo motor does not rotate or rotational speed is incorrect</td><td>The speed command (P0B-01) is 0</td><td>■ AI wiring error
When selecting an analog input command, first check whether the AI analog input channel selection is correct, and then check whether the AI terminal wiring is correct. Please refer to Chapter 4.
■ Speed command selection error
Check whether P06-02 is set correctly.
■ No speed command input or abnormal speed command
1. When selecting an analog input command, first check whether the AI related parameter settings in</td></tr>
</table>

			Group P03 are correct; Then, check whether the input voltage signal from the external signal source is correct, and observe it with an oscilloscope or read it through P0B-21 or P0B-22; 2. When Number given, check whether P06-03 is correct; 3. When multi segment speed command is given, check whether P12 group parameters are set correctly; 4. When communicating, check whether P31-09 is correct; 5. When the jog speed command is given, check whether P06-04 is correct, whether DI functions 18 and 19 have been set, and whether the corresponding terminal logic is valid; 6. Check whether the acceleration and deceleration times P06-05 and P06-06 are set correctly; 7. Check whether the Zero position fixing function is enabled by mistake, that is, check the DI function; 8. Whether the configuration is incorrect, and whether the valid logic of the corresponding DI terminal is correct.
Input speed command	Servo motor rotates in reverse direction	Speed command (P0B-01) is negative	■ When selecting an analog input command, check whether the positive and negative polarity of the input signal is reversed; ■ When number is given, check whether P06-03 is less than 0; ■ When multi segment speed commands are given, check the positive and negative values of each group of speed commands in P12 group; ■ When communication is given, check whether P31-09 is less than 0; ■ When the jog speed command is given, check whether the P06-04 value, the valid logic of DI functions 18 and 19 match the expected steering; ■ Check whether DI function 26 (FunIN.26: SpdDirSel, Speed command direction setting) has been set and whether the corresponding terminal logic is valid; ■ Check whether P02-02 parameters are set incorrectly
	◆ After removing the above faults, the servo motor can rotate.		
Uneven rotation at low speed	Unstable speed during low speed rotation	Gain setting is unreasonable	■ Perform automatic gain adjustment.
	Left and right vibration of motor	Rotational inertia ratio of load	■ If it can run safely, conduct inertia identification again;

	shaft	(P08-15) is too large	■ Perform Automatic gain adjustment.

1.40.3 Torque control mode

<table>
<tr><th>Process of starting</th><th>Fault phenomenon</th><th>Reason</th><th>Confirmation method</th></tr>
<tr><td rowspan="6">Turn on the control power supply
(L1C、L2C)
Main power supply
(L1、L2)
(L1、L2、L3)</td><td rowspan="4">The nixie tube is not lit or does not display “rdy”</td><td>1. Control power supply voltage fault</td><td>■ After unplugging CN1, CN2, CN3, and CN4, the fault still exists.
■ Measure the AC voltage between (L1C, L2C).</td></tr>
<tr><td>2. Main power supply voltage fault</td><td>■ Single-phase 220V power supply models measure the AC voltage between (L1, L2). The voltage amplitude of the DC bus of the main power supply (B1/⊕, 1-bay voltage) is lower than 200V, and the digital tube displays "nrd".
■ The three-phase 220V/380V power supply model measures the AC voltage between (L1, L2, L3). The voltage amplitude of the DC bus of the main power supply (B1/⊕, 1-bay voltage) is lower than 460V, and the digital tube displays "nrd".</td></tr>
<tr><td>3、The burning program terminal is shorted</td><td>■ Check the terminals of the burning program to confirm whether they are short-circuited.</td></tr>
<tr><td>4、Servo drive fault</td><td>-</td></tr>
<tr><td>Panel display“FU.xxx”</td><td colspan="2">Refer to Section 9.2 to find the cause and eliminate the fault.</td></tr>
<tr><td colspan="3">◆ After troubleshooting the above faults, the panel should display “rdy”.</td></tr>
<tr><td rowspan="3">The servo enable signal is set to be active (S-ON is ON)</td><td>Panel display“FU.xxx”</td><td colspan="2">Refer to Section 9.2 to find the cause and eliminate the fault.</td></tr>
<tr><td>The axis of the servo motor is in free running state</td><td>Servo enable signal invalid</td><td>■ Switch the panel to the servo status display and check to see if the panel displays "Rdy" instead of "run".
■ Check whether the servo enable signal (DI function 1: S-ON) is set for groups P03 and P17. If set, check whether the corresponding terminal logic is valid; If not set, set and make the terminal logic valid. Please refer to Chapter 8 "P03 Group: Terminal input parameters" for setting methods.
■ If the P03 group has set a servo enable signal and the corresponding terminal logic is valid, but the panel still displays "rdy", check whether the DI terminal wiring is correct. Refer to Chapter 4.</td></tr>
<tr><td colspan="3">◆ After troubleshooting the above faults, the panel should display "run".</td></tr>
<tr><td>Input torque command</td><td>Servo motor does not rotate</td><td>Internal torque command (P0B-02) is 0</td><td>■ AI wiring error
When selecting analog input commands, check whether the AI terminal wiring is correct. Please refer to Chapter 4.
■ Torque command selection error
Check whether P07-02 is set correctly.
■ No torque command input
1. When selecting an analog input command, first check whether the AI related parameter settings in Group P03 are correct; Then check whether the input</td></tr>
</table>

			voltage signal from the external signal source is correct, and observe it with an oscilloscope or read it through P0B-21 or P0B-22; 2. When number is given, check whether P07-03 is 0; 3. When communicating, check whether P31-11 is 0.
Input torque command	Servo motor rotates in reverse direction	Internal torque command (P0B-02) is negative	■ When selecting an analog input command, check whether the input voltage polarity of the external signal source is reversed, using an oscilloscope or through P0B-21 or P0B-22; ■ When number is given, check whether P07-03 is less than 0; ■ When communicating, check whether P31-11 is less than 0; ■ Check whether DI function 25 (FunIN.25: ToqDirSel, Torque command direction setting) has been set and whether the corresponding terminal logic is valid; ■ Check whether P02-02 parameter is set incorrectly.
	◆ After removing the above faults, the servo motor can rotate.		
Uneven rotation at low speed	Unstable speed during low speed rotation	Gain setting is unreasonable	■ Perform automatic gain adjustment.
	Left and right vibration of motor shaft	Rotational inertia ratio of load (P08-15) is too large	■ If it can run safely, conduct Inertia identification again; ■ Perform automatic gain adjustment.

1.41 Troubleshooting and warning during runtime

1.41.1 Table of fault and warning codes

1) Classification of faults and warnings

The faults and warnings of servo drives can be classified into three levels according to their severity: Type 1, Type 2, and Type 3. The severity level is: Type 1> Type 2> Type 3. The specific classification is as follows:

●Type 1 (referred to as NO.1) non resettable fault;

●Type 1 (referred to as NO.1) resettable fault;

●Type 2 (referred to as NO.2) resettable fault;

●Type 3 (NO.3 for short) resettable warnings.

"Resettable" refers to stopping the panel from the Trouble display state 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 it to logical valid, which can stop the panel from troubleshooting.

Reset method for resettable faults of No.1 and No.2: first turn off the servo enable signal (S-ON set to OFF), then set P0D-01=1 or use DI function 2.

Reset method for NO.3 resettable warning: Set P0D-01=1 or use DI function 2.

⚠Caution:

- For some faults or warnings, you must change the settings to eliminate the cause before resetting, but resetting does not mean that the changes take effect.For changes that need to be powered on again (L1C, L2C) to take effect, the control power must be powered on again; For changes that require a shutdown to take effect, the servo enable must be turned off. After the change takes effect, the servo drive can run normally.

☆Associated function code：

Fucntion code		Name	Setting range	Function	Setting method	Effective time	Factory setting
P0D	01	Fault reset	0：Disabled 1 ： Fault and warning reset	For resettable faults and warnings, stop the display of faults on the panel. After completing the reset, immediately restore to 0: Disabled.	Shutdown setting	Effective immediately	0

☆Associated function NO.:

Code	Name	Fucntion name	Function
FunIN.2	ALM-RST	Fault and warning reset signal	The DI function is edge effective, and the level remains high/low without effect. Depending on the type of alarm, the servo can continue to operate after some alarms are reset. When assigning to a low speed DI, if the DI logic is set to level effective, it will be forced to be effective along the change. The effective level change must be maintained for more than 3ms, otherwise the fault reset function will be invalid. Do not assign a fault reset function to a fast DI, otherwise the function will not work. Invalid, does not reset faults and warnings; Valid, reset faults and warnings.

2) Fault and warning records

The servo drive has a fault recording function, which can record the name of the last 10 faults and warnings, as well as the status parameters of the servo drive when the faults or warnings occur. If repeated faults or warnings have occurred in the last 5 times, the fault or warning code, that is, the drive status, is recorded only once.

After the fault or warning is reset, the fault record will still store the fault and warning; Use the "System Parameter Initialization Function" (P02-31=1 or 2) to clear fault and warning records.

The monitoring parameter P0B-33 allows you to select the number of times the fault or warning distance is n from the current fault, P0B-34 allows you to view the n+1 fault or warning Name, and P0B-35 to P0B-42 allows you to view the status parameters of the servo drive corresponding to the n+1 fault or warning. When no fault occurs, P0B-34 on the panel displays "FU.000".

When viewing P0B-34 (n+1 fault or warning Name) through the panel, the panel displays "FU. xxx", with "xxx" as the fault or warning code; When reading P0B-34 through drive debugging platform software or communication, the decimal data of the code is read and needs to be converted into hexadecimal data to reflect the actual fault or warning code, such as:

The panel displays a fault or warning "FU.xxx"	P0B-34 (decimal)	P0B-34 (hexadecimal)	Notes
FU.101	257	0101	0: Type 1 non resettable fault 101: Fault code

FU.130	8496	2130	2: Type 1 resettable fault 130: Fault code
FU.121	24865	6121	6: Type 2 resettable fault 121: Fault code
FU.110	57616	E110	E: Type 3 resettable warning 110: Warning code

3) Fault and warning code output

The servo drive can output the current highest level of fault or warning codes.

"Fault code output" refers to setting the three DO terminals of the servo drive to DO FUNCTIONS 12, 13, and 14, where FunOUT.12:

ALMO1 (the first bit of alarm code, referred to as AL1), FunOUT.13:

ALMO2 (Alarm Code Bit 2, referred to as AL2), FunOUT.14:

ALMO3 (Alarm Code Bit 3, referred to as AL3).

When different faults occur, the levels of the three DO terminals will change.

a) Type 1 (NO.1) non resettable fault:

Display	Name of faults	Type of faults	Whether can be reset	Coded 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 verification error or parameter not stored in motor ROM	NO.1	No	1	1	1
FU.201	Overcurrent 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	Overspeed	NO.1	No	1	1	0
FU.740	Encoder interference	NO.1	No	1	1	1
FU.A33	Encoder data abnormality	NO.1	No	0	1	0
FU.A34	Encoder loopback verification error	NO.1	No	0	1	0
FU.A35	Z signal loss	NO.1	No	0	1	0

NOTE

- "1" indicates valid, "0" indicates invalid, and does not represent the level of the DO terminal.

b) Type 1 (NO.1) resettable faults:

Display	Name of faults	Type of faults	Whether can be reset	Coded output		
				AL3	AL2	AL1
FU.130	DI Function Duplicate allocation	NO.1	Yes	1	1	1
FU.131	DO FUNCTION allocation overrun	NO.1	Yes	1	1	1
FU.207	D/Q axis current overflow fault	NO.1	Yes	1	1	0
FU.400	Electric overvoltage of main circuit	NO.1	Yes	0	1	1
FU.410	Electric undervoltage of main circuit	NO.1	Yes	1	1	0
FU.602	Angle identification failed	NO.1	Yes	0	0	0

c) Type 2 (NO.2) resettable faults:

Display	Name of faults	Type of faults	Whether can be reset	Coded output		
				AL3	AL2	AL1
FU.121	Servo ON command invalid fault	NO.2	Yes	1	1	1
FU.420	Electric phase loss of main circuit	NO.2	Yes	0	1	1
FU.430	Control electric undervoltage	NO.2	Yes	0	1	1
FU.500	Overspeed	NO.2	Yes	0	1	0
FU.510	Pulse output overspeed	NO.2	Yes	0	1	0
FU.610	Drive overload	NO.2	Yes	0	0	0
FU.620	Motor overload	NO.2	Yes	0	0	0
FU.625	Abnormal closing of band brake	NO.2	Yes	0	0	0
FU.626	Abnormal opening of band brake	NO.2	Yes	0	0	0
FU.630	Locked rotor of motor	NO.2	Yes	0	0	0
FU.650	Heatsink Overtemperature	NO.2	Yes	0	0	0
FU.731	Encoder battery failure	NO.2	Yes	1	1	1
FU.733	Encoder multi turn count error	NO.2	Yes	1	1	1
FU.735	Encoder multi turn count overflow	NO.2	Yes	1	1	1
FU.834	AD sampling overvoltage	NO.2	否	1	1	1
FU.835	High precision AD sampling failure	NO.2	否	1	1	1
FU.B00	Excessive position deviation	NO.2	Yes	1	0	0
FU.B01	Pulse input abnormality	NO.2	Yes	1	0	0
FU.B02	Full closed-loop position deviation too large	NO.2	Yes	1	0	0
FU.B03	Electronic gear ratio setting exceeds the limit	NO.2	Yes	1	0	0
FU.B04	Parameter settings error for full closed-loop function	NO.2	Yes	1	0	0
FU.D03	CAN communication connection interrupted	NO.2	Yes	1	0	1

d) Warning, resettable：

Display	Name of faults	Type of faults	Whether can be reset	Coded output		
				AL3	AL2	AL1
FU.110	Frequency division pulse output setting	NO.3	Yes	1	1	1

Display	Name of faults	Type of faults	Whether can be reset	Coded output		
				AL3	AL2	AL1
	fault					
FU.601	Home return timeout fault	NO.3	Yes	0	0	0
FU.730	Encoder battery warning	NO.3	Yes	1	1	1
FU.831	AI zero drift too large	NO.3	Yes	1	1	1
FU.900	DI emergency braking	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 resistance is too small	NO.3	Yes	1	0	1
FU.939	Broken motor power line	NO.3	Yes	1	0	0
FU.941	Changing parameters requires power on again to take effect	NO.3	Yes	0	1	1
FU.942	Frequent parameter storage	NO.3	Yes	0	1	1
FU.950	Forward overtravel warning	NO.3	Yes	0	0	0
FU.952	Reverse overtravel 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

1.41.2 Troubleshooting

1) FU.101：Servo internal parameters are abnormal

Mechanism of fault generation:

- The total number of function codes changes, usually appearing after the software is updated;
- The parameter value of the function code in P02 and later groups exceeds the upper and lower limits, which usually occurs after the software is updated.

Reason	Confirmation method	Treatment measures
1. Instantaneous drop in control power supply voltage	■ Confirm whether it is in the process of cutting off the control power (L1C, L2C) or there is a momentary power failure.	After the system parameters are restored to initialization (P02-31=1), write the parameters again.
	■ Measure whether the input voltage on the non drive side of the control cable during operation meets the following specifications: 220V drive: Effective value: 220V-240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive: 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 to initialization (P02-31=1), rewrite the parameters.
2. Instantaneous power failure during parameter storage	■ Confirm whether there is an instantaneous power outage during the parameter value storage process.	After powering on again and initializing the system parameters (P02-31=1), rewrite the parameters.

The number of times the parameter has been written exceeds the maximum value within a certain period of time	■ Confirm whether the upper device frequently changes parameters.	Change the parameter writing method and write it again. Or Servo drive fault, replace the servo drive.
4. Updated software	■ Confirm whether the software has been updated.	Reset the drive model and motor model, and the system parameters are restored to initialization (P02-31=1).
5.Servo drive fault	■ After turning on the power supply several times and restoring the factory parameters, but still reporting a fault, the servo drive failed.	Replace the servo drive.

2) FU.102：Programmable logic configuration failure

Mechanism of fault generation:

- The software versions of FPGA and MCU do not match;
- FPGA or MCU related hardware is damaged, causing MCU and FPGA to be unable to establish communication.

Reason	Confirmation method	Treatment measures
1. FPGA and MCU software versions do not match	■ Check the MCU software version number P01-00 and FPGA software version number P01-01 through the panel or drive debugging platform to confirm whether the highest non zero values of the two software version numbers are consistent.	Consult our technical support to update the matching FPGA or MCU software.
2. FPGA fault	■ The fault is still reported after multiple power connections.	Replace the servo drive.

3) FU.104：Programmable logic interrupt fault

To distinguish the mechanism of fault generation, the servo drive can display different internal fault codes under the same external fault code, which can be viewed through P0B-45.

Mechanism of fault generation:

- MCU or FPGA access time out.

<table>
<tr><th>Reason</th><th>Confirmation method</th><th>Treatment measures</th></tr>
<tr><td>1. FPGA fault (FU.104)</td><td rowspan="3">■ The fault is still reported after multiple power connections.</td><td rowspan="3">Replace the servo drive.</td></tr>
<tr><td>2. Communication handshake between FPGA and MCU is abnormal (FU.100)</td></tr>
<tr><td>3. Drive internal calculation timeout (FU.940)</td></tr>
</table>

4) FU.105：Internal program abnormal

Mechanism of fault generation:

- When EEPROM reads/writes function codes, the total number of function codes is abnormal.
- The range of the function code set value is abnormal (usually occurs after updating the program).

Reason	Confirmation method	Treatment measures
1.EEPROM fault	■ Confirm according to the method of FU.101.	After the system parameters are restored to initialization (P02-31=1), power on again.
2.Servo drive fault	■ The fault is still reported after multiple power connections.	Replace the servo drive.

5) FU.108：Parameter storage fault

Mechanism of fault generation:

- Unable to write parameter values to EEPROM;
- Unable to read parameters from EEPROM

Reason	Confirmation method	Treatment measures
1. Parameter writing abnormal	■ After changing a parameter, power on again to see if the parameter value has been saved.	The parameter can not be saved, and the fault still occurred after multiple power-ons. The drive needs to be replaced.
2. Parameter reading abnormal		

6) FU.120：Product matching fault

Mechanism of fault generation:

- The rated current of the motor is greater than the rated current of the drive.

Reason	Confirmation method	Treatment measures
1. The product number (motor or drive) does not exist	■ Internal fault code P0B-45=0120 or 1120. Check whether the motor nameplate matches our company's motor, and confirm whether the P00-00 setting is correct according to the motor nameplate.	Reset P00-00 (motor number) or replace the matching motor according to the motor nameplate.
	■ Internal fault code P0B-45=2120. Check the drive model (P01-02) to see if it is available.	The drive number does not exist. Set the correct drive model according to the drive nameplate.
2. Motor and drive power levels do not match	■ Internal fault code P0B45=3120. Confirm whether the drive model (P01-02) matches the bus motor model (P00-05).	Replace the mismatched product.

7) FU.121：Servo ON command invalid

Mechanism of fault generation:

- When using certain auxiliary functions, redundant servo enable signals are given.

Reason	Confirmation method	Treatment measures
1. In the case of internal enable, the external servo enable signal (S-ON) is valid	■ Confirm whether to use auxiliary functions: P0D-02, P0D-03, and P0D-12, and whether DI function 1 (FunIN. 1: S-ON, servo enable signal) is valid.	Set the DI function 1 (including hardware DI and virtual DI) signal to invalid.

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

Mechanism of fault generation:

- The absolute position mode motor does not match or the motor number is set incorrectly.

Reason	Confirmation method	Treatment measures

Detect motor mismatch or motor number setting error in absolute position mode	■ Check whether the motor nameplate is a multi turn absolute encoder motor. ■ Check if P00-00 (motor number) is correct.	Reset P00-00 (motor number) or replace the matching motor according to the motor nameplate.

9) FU.130：DI function fuplicate allocation

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. When assigning DI functions, the same function is repeatedly assigned to multiple DI terminals	■ Check whether P03-02/P03-04... P03-20, P17-00/P17-02... P17-30 have the same non zero DI function number set.	Reassign the P03 and P17 parameters assigned the same non zero function number to different function numbers, and then power on the control again to make the change effective. Alternatively, turn off the servo enable signal and give a "reset signal" to make the change effective.
2. The DI function number exceeds the number of DI functions	■ Whether the MCU program has been updated.	After the system parameters are restored to initialization (P02-31=1), power on again.

10) FU.131：DO FUNCTION allocation overrun

Mechanism of fault generation:

- The DO FUNCTION number exceeds the number of DO FUNCTIONs.

Reason	Confirmation method	Treatment measures
The DO FUNCTION number exceeds the number of DO FUNCTIONs.	■ Whether the MCU program has been updated.	After the system parameters are restored to initialization (P02-31=1), power on again.

11) FU.136：Data verification error or parameter not stored in motor encoder ROM

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Drive and motor types do not match	■ Confirm that P00-00 is set correctly according to the drive and motor nameplates. ■ 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 drive and 17bit servo motor, it should be ensured that P00-00=14130.
2. Parameter verification error or no parameter stored in the ROM of the bus type incremental encoder	■ Check whether our standard encoder cable is selected and the cable has no broken skin or wire, and the terminals on both sides have no poor contact, and it is reliably connected. ■ Measure the signals at both ends of the encoder cable: PS+, PS -,+5V, GND, and observe whether the signals on both sides are consistent. Refer to hardware wiring for signal definition.	Use our standard encoder cable, ensure a tight connection between the terminals at the motor end, tighten the screws at the drive end, and replace the encoder cable with a new one if necessary. Encoder cables and power lines (L1, L2, L3, U, V, W) should not be bundled, but routed separately.
3. Drive fault	■ Power on again and still report a fault.	Replace the servo drive.

FU.201：Overcurrent 2

Mechanism of fault generation:

- The hardware has detected an overcurrent.

Reason	Confirmation method	Treatment measures
1. The input command is synchronized with the ON servo or the input command is too fast	■ Check whether the command has been entered before the servo panel displays "Rdy".	Command timing: After the servo panel displays "Rdy", first turn on the servo enable signal (S-ON), and then input the command. If allowed, add a command filtering time constant or increase the acceleration and deceleration time.
2. Braking resistance is too small or short circuited	■ If using a built-in braking resistor (P02-25=0), confirm whether B2 and B3 are reliably connected with wires. If so, measure the resistance value between B1/⊕ and B3; ■ If using an external braking resistor (P02-25=1/2), measure the value of the external braking resistor between B1/⊕ and B2. ■ For brake resistor specifications, refer to "6.1.7 Brake setting".	If a built-in braking resistor is used and the resistance value is "0", adjust it to use an external braking resistor (P02-25=1/2), and remove the wires between B2 and B3. The resistance value and power can be selected in accordance with the specifications of the built-in braking resistor; If an external braking resistor is used and the resistance value is less than P02-21, refer to "2.1.4 Braking Resistance Specifications", replace it with a new resistor, and reconnect it between B1/⊕ and B2. Be sure to set P02-26 (external braking resistor power) P02-27 (external braking resistor value) to be consistent with the actual parameters of the external braking resistor used.
3.Poor contact of motor cable	■ Check whether the connection between both ends of the drive power cable and the UVW side of the drive in the motor cable is loose.	Fasten any loose or detached wiring.
4. Motor cable grounding	■ After ensuring that the power cable and motor cable of the drive are securely connected, measure the insulation resistance between the UVW end of the drive and the ground wire (PE) to see if it is a megaohm (M Ω) value.	Replace the motor when the insulation is poor.
5. Motor UVW cable short circuit	■ Unplug the motor cable and check whether there is a short circuit between the motor cable UVWs, and whether there are burrs in the wiring.	Connect the motor cables correctly.
6. The motor is burnt out	■ Unplug the motor cable and measure whether the resistance between the motor cables UVW is balanced.	Replace the motor if it is unbalanced.
7. Unreasonable gain setting, motor oscillation	■ Check whether the motor vibrates or has a sharp sound during startup and operation. You can also check the "current feedback" on the drive debugging platform.	Perform gain adjustment.
8.Encoder wiring error,	■ Check whether our standard encoder cable is	Re-weld, plug in, or replace the encoder

Reason	Confirmation method	Treatment measures
aging and corrosion, encoder plug looseness	selected and whether the cable has aging, corrosion, and loose connectors. ■ Turn off the servo enable signal and manually rotate the motor shaft to see if P0B-10 changes with the rotation of the motor shaft.	cable.
9. Drive fault	■ Unplug the motor cable and power on again, but still report a fault.	Replace the servo drive.

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

Mechanism of fault generation:

- Abnormal current feedback causes internal register overflow in the drive;
- The encoder feedback abnormality caused the internal register failure of the drive.

Reason	Confirmation method	Treatment measures
1.DQShaft current overflow	■ When the fault is still reported after multiple power connections, the servo drive has failed.	Replace the servo drive.

13) FU.208：FPGA system sampling operation timeout

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. MCU communication timeout	Internal fault code P0B-45=1208: ■ Internal chip damage	Replace servo drive
2. Encoder communication timeout	Internal fault code P0B-45=2208： ■ Encoder wiring error ■ Encoder cable loose ■ Encoder cable is too long ■ Encoder communication is interfered ■ Encoder failed	■ Our standard cables are preferred for cables. If non-standard cables are used, it is necessary to check whether the cables meet the specification requirements and whether twisted pair shielded wires are used; ■ Check whether the plugs at both ends of the encoder are in good contact and whether the needle is retracted; ■ Please contact the manufacturer; ■ The wiring should be separated from strong and weak currents as much as possible, and the motor cable and encoder cable should not be bundled. The ground connection between the motor and the drive should be good; ■ Replace the servo motor.
3. Current sampling timeout	Internal fault code P0B-45=3208： ■ Check whether there is interference from large equipment on site, or whether there are multiple interference sources such as multiple power supply frequency conversion devices in the cabinet; ■ The internal current sampling chip is damaged.	■ Try to separate the strong and weak current on site and do not bundle them; ■ Replace the servo drive.

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 rewire and shorten the line length.
5. FPGA operation timeout	Internal fault code P0B-45=0208： ■ Investigate the cause according to 1/2/3/4 of the cause.	Treat according to 1/2/3/4 of the cause.

14) FU.210：Output short circuit to ground

Mechanism of fault generation:

- During the drive power-on self-test, an abnormality in the motor phase current or bus voltage was detected.

Reason	Confirmation method	Treatment measures
1. The drive power cable (UVW) is short-circuited to ground	■ Unplug the motor cable and measure whether the drive power cable UVW is shorted to ground (PE).	Reconnect the wiring or replace the drive power cable.
2. Motor short circuit to ground	■ After ensuring that the power cable and motor cable of the drive are securely connected, measure the insulation resistance between the UVW end of the drive and the ground wire (PE) to see if it is a megaohm (M Ω) value.	Replace the motor.
3. Drive fault	■ Remove the drive power cable from the servo drive, the fault is still reported after multiple power connections	Replace the servo drive.

15) FU.220：Phase sequence error

Mechanism of fault generation:

- The drive performs angle identification and recognizes that the phase sequence of the drive UVW and the motor UVW does not match.

Reason	Confirmation method	Treatment measures
Phase sequences of drive UVW and motor UVW do not correspond	■ After multiple power cycles, the angle recognition still reports a FU.220 fault	After multiple power cycles, the angle recognition still reports a FU.220 fault

16) FU.234：Overspeed

Mechanism of fault generation:

- In torque control mode, the torque command direction is opposite to the speed feedback direction;
- In position or Speed control mode, the speed feedback is in the opposite direction to the speed command direction.

Reason	Confirmation method	Treatment measures
1. UVW phase sequence wiring error	■ Check whether the connections between both ends of the drive power cable, the motor cable UVW end, and the drive UVW end correspond to	Follow the correct UVW phase sequence for wiring.

Reason	Confirmation method	Treatment measures
	each other.	
During power-on, the interference signal causes the initial phase detection error of the motor rotor	■ The UVW phase sequence is correct, but if the servo drive is enabled, it will report FU.234.	Power on again.
Encoder model error or wiring error	■ Confirm that P00-00 (motor number) is set correctly according to the drive and motor nameplates.	Replace with a matching drive and motor. Reconfirm P00-00 (motor number) and encoder wiring
Encoder wiring error, aging and corrosion, encoder plug looseness	■ Check whether our standard encoder cable is selected and whether the cable has aging, corrosion, and loose connectors. ■ Turn off the servo enable signal and manually rotate the motor shaft to see if P0B-10 changes with the rotation of the motor shaft.	Re-weld, plug in, or replace the encoder cable.
5. Under vertical axis working condition, the gravity load is too large	■ Check whether the vertical axis load is too large, and adjust P02-09 to P02-12band brake parameters to see if the fault can be eliminated	Reduce the vertical axis load, or increase rigidity, or shield the fault without affecting safety and use.

Caution:

- Please set P0A-12=0 to shield the overspeed fault under towed and vertical axis conditions.

17) FU.400: Main circuit electric overvoltage

Mechanism of fault generation:

- The DC bus voltage between B1/⊕ and 1 exceeds the fault value:
- 220V drive: normal value: 310V, fault value: 420V;
- 380V drive: normal value: 540V, fault value: 760V.

Reason	Confirmation method	Treatment measures
1. The input voltage of the main circuit is too high	Check the specifications of the drive input power supply and measure whether the input voltage at the drive side (L1, L2, L3) of the main circuit cable meets the following specifications: 220V drive: Effective value: 220V-240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive: Effective value: 380V-440V Allowable deviation: - 10%~+10% (342V~484V)	Replace or adjust the power supply according to the specifications on the left.
2. The power supply is in an unstable state or affected by lightning strikes	■ Monitor whether the input power supply of the drive is affected by lightning strikes, and measure whether the input power supply is stable and meets the above specifications.	After connecting the surge suppressor, connect the control power and main circuit power again. If the fault still occurs, replace the servo drive

Reason	Confirmation method	Treatment measures
3. Braking resistor failure	■ If using a built-in braking resistor (P02-25=0), confirm whether B2 and B3 are reliably connected with wires. If so, measure the resistance value between B1/⊕ and B3; ■ If using an external braking resistor (P02-25=1/2), measure the value of the external braking resistor between B1/⊕ and B2. Refer to "6.1.7Brake setting" for brake resistor specifications.	If the resistance value is "∞" (infinite), the internal wire of the braking resistor is broken: If using a built-in braking resistor, adjust it to use an external braking resistor (P02-25=1/2), and remove the wires 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 (external braking resistor power) P02-27 (external braking resistor value) to be consistent with the actual parameters of the external braking resistor used.
4. The external braking resistance value is too large, and the maximum braking energy cannot be fully absorbed	■ Measure the external braking resistance between B1/B2 and compare it with the recommended value.	Replace the external braking resistor with the recommended value and reconnect it between B1/⊕ and B2. Be sure to set P02-26 (external braking resistor power) P02-27 (external braking resistor value) to be consistent with the actual parameters of the external braking resistor used.
The maximum braking energy exceeds the absorbable value when the motor is running at sudden acceleration and deceleration	■ 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 period.	First, ensure that the input voltage of the main circuit is within the specification range, and then increase the acceleration and deceleration time if allowed
6. There is a large deviation in the bus voltage sampling value	Observe whether the parameter P0B-26 (bus voltage value) is within the following range: 220V drive: P0B-26 ＞ 420V 380V drive: P0B-26 ＞ 760V Measure whether the voltage value of the DC bus between B1/⊕ and 1 is normal and less than P0B-26.	Consult our technical support.
7.Servo drive fault	■ After several times of power down, the main circuit is reconnected, but the fault is still reported.	Replace the servo drive.

18) FU.410：Electric undervoltage of main circuit

Mechanism of fault generation:

- The DC bus voltage between B1/⊕ and 1 is lower than the fault value:
- 220V drive: normal value: 310V, fault value: 200V;
- 380V drive: normal value: 540V, fault value: 380V.

Reason	Confirmation method	Treatment measures
1. The main circuit power supply is unstable or powered off	■ Check the specifications of the drive input power supply and measure whether the input voltages on the non drive side and drive side (L1, L2, L3) of the main circuit cable meet the following specifications： 220V drive: Effective value: 220V-240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive: Effective value: 380V-440V Allowable deviation: - 10%~+10% (342V~484V) All three phases require measurement.	Increase power capacity.
2. Instantaneous power failure occurs		
3. Power supply voltage drops during operation	■ Monitor the input power supply voltage of the drive to see if the same main circuit has too many power supplies turned on and other settings have caused insufficient power capacity and voltage drop.	
4. In case of phase loss, the drive that should operate with a 3-phase power supply is actually operating 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 circuit power cord correctly: Three phase: L1, L2, L3; Single phase: L1, L2
5.Servo drive fault	■ Observe whether parameter P0B-26 (bus voltage value) is within the following range： 220V drive: P0B-26 ＜ 200V 380V drive: P0B-26 ＜ 380V After multiple times of power down, the main circuit (L1, L2, L3) is reconnected and still reports a fault.	Replace the servo drive.

19) FU.420：Electric phase loss of main circuit

Mechanism of fault generation:

- One or two phases are missing from the three-phase drive.

Reason	Confirmation method	Treatment measures
1.Poor wiring of three-phase input line	■ Check whether the cables between the non drive side and the drive main circuit input terminals (L1, L2, L3) are in good condition and firmly connected	Replace the cable and connect the main circuit power cord correctly:
2.Three-phase specification drives operate on a single-phase power supply	■ Check the input power specification of the drive, check the actual input voltage specification, and measure whether the input voltage of the main circuit meets the following specifications： 220V drive: Effective value: 220V-240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive:	For a 0.75 kW three-phase drive (drive model P01-02=5), it is allowed to operate on a single-phase power supply. If the input voltage meets the specifications on the left, P0A-00=2 can be set (disabling faults and warnings for power input phase loss protection); In other cases, if the input voltage does not
3.The three-phase power supply is unbalanced or the		

three-phase voltage is too low	Effective value: 380V-440V Allowable deviation: - 10%~+10% (342V~484V) All three phases require measurement.	meet the left specifications, please replace or adjust the power supply according to the left specifications.
4.Servo drive fault	■ After multiple times of power down, the main circuit (L1, L2, L3) is reconnected and still reports a fault.	Replace the servo drive.

20) FU.430：Control electric undervoltage

Mechanism of fault generation:

- 220V drive: normal value: 310V, fault value: 190V;
- 380V drive: normal value: 540V, fault value: 350V.

Reason	Confirmation method	Treatment measures
1. The control power supply is unstable or powered off	■ Confirm whether it is in the process of cutting off control power (L1C, L2C) or there is a transient power failure.	Power on again. If there is an abnormal power loss, ensure that the power supply is stable.
	■ Measure whether the input voltage of the control cable meets the following specifications： 220V drive: Effective value: 220V-240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive: Effective value: 380V-440V Allowable deviation: - 10%~+10% (342V~484V)	Increase power capacity.
2.Poor contact of control wires and cables	■ Detect whether the cable is connected, and measure whether the voltage at the drive side of the control cable (L1C, L2C) meets the above requirements.	Reconnect the wiring or replace the cable.

21) FU.500：Overspeed

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Motor cable UVW phase sequence error	■ Check whether the connections between both ends of the drive power cable, the motor cable UVW end, and the drive UVW end correspond to each other.	Follow the correct UVW phase sequence for wiring.
2. P0A-08Parameter settings error	■ Check whether the overspeed fault threshold is less than the maximum motor speed required for actual operation: Overspeed fault threshold=1.2 times the maximum motor speed (P0A-08=0); Overspeed fault threshold=P0A-08 (P0A-08 ≠ 0, and P0A-08 ＜ 1.2 times the maximum motor speed).	Reset the overspeed fault threshold based on mechanical requirements.
3. The input command exceeds the overspeed fault threshold	■ Confirm whether the motor speed corresponding to the input command exceeds the overspeed fault threshold. Position control mode, Command source is the	■ In position control mode: When Location command source is a pulse command, reduce the frequency of the pulse command on the premise of ensuring

Reason	Confirmation method	Treatment measures
	pulse command: motor speed (rpm)= $\frac{\text{Input pulse frequency (HZ)}}{\text{Encoder resolution}} \times \text{Electronic gear ratio} \times 60$ For this drive, Encoder resolution=1048576 (P/r)	accurate final positioning, or reduce the electronic gear ratio if the operating speed allows; ■ In speed control mode: Check the input speed command value or speed limit value (P06-06 to P06-09), and confirm that they are within the overspeed fault threshold; ■ In 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 adjustments or adjust mechanical operating conditions.
5.Servo drive fault	■ After powering on and running again, the fault still occurred.	Replace the servo drive.

22) FU.510：Pulse output overspeed

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
The output pulse frequency exceeds the upper frequency limit allowed by the hardware (2MHz)	■ When P05-38=0 (encoder frequency division output), calculate the output pulse frequency corresponding to the motor speed when a fault occurs, and confirm whether it exceeds the limit. Output pulse frequency(Hz)= $\frac{\text{Motor speed(rpm)}}{60} \times \text{P05} - 17$	Reduce P05-17 (encoder frequency division pulse number) so that the output pulse frequency is less than the upper frequency limit allowed by the hardware within the entire speed range required by the machine.
	■ 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 -, with a maximum pulse frequency of 500 kpps. Open collector input terminals: PULHI, PULSE+, PULSE -, SIGN+, SIGN -, with a maximum pulse frequency of 200 kpps. High speed pulse input pin: Differential input terminals: HPULSE+, HPULSE -, HSIGN+, HSIGN -, maximum pulse frequency: 2Mpps.	Reduce the input pulse frequency to within the upper frequency limit 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 already high, but does not exceed the upper frequency limit allowed by the hardware, anti interference measures should be taken (twisted pair shielded wire should be used for pulse input wiring, and pin filter parameters P0A-24 or P0A-30 should be set) to prevent interference pulses from being superimposed on the actual pulse command, causing false alarm faults.

23) FU.602：Angle identification failed

24) FU.610：Drive overload

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Parameter settings error	■ Check whether P01-02 (drive model) setting is accurate; ■ Check whether the gain (P08 group parameters) or rigidity (P09-00, P09-01) settings are reasonable.	Set P01-02 according to the number corresponding to the drive model; Adjust the parameters reasonably based on the current feedback effect.
2. The drive load rate is too high (Excessive load inertia)	■ Confirm that P0B-12 (average load rate) is too large (over 80%), and then use Inertia identification to detect whether the inertia is too large.	Select a new type of drive and choose a higher power drive.
3. The drive load rate is too high (Mechanical jamming)	■ Confirm that P0B-12 (average load rate) is too high (over 80%), and then observe whether there is any jamming phenomenon during load operation.	Remove mechanical jamming.
4. Motor locked	■ Check whether the value of P0A-33 (Locked Rotor Overtemperature Protection Enable) is 0. If the Locked Rotor Protection is disabled, the drive will report FU.610 when it is truly locked.	Refer to FU.630 fault handling methods.

25) FU.620：Motor overload

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Motor wiring and encoder wiring are incorrect and defective	■ Compare the correct "wiring diagram" and check the wires between the motor, drive, and encoder.	Connect the cables according to the correct wiring diagram; Preferably use our standard cables; When using self-made cables, please follow the hardware wiring instructions to make and connect them.
2. The load is too heavy, and the effective torque output by the motor exceeds the rated torque, resulting in long-term continuous running	■ Confirm the overload characteristics of the motor or drive; ■ Check whether the average load rate of the drive (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 large	■ Calculate the mechanical inertia ratio or perform Inertia identification, and check the inertia ratio P08-15; ■ Confirm the single operation cycle when the servo motor is 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 and sounds abnormally during operation.	Readjust the gain.
5. Drive or motor model	■ For this series of products: Check the bus motor	Check the drive nameplate and set the correct

Reason	Confirmation method	Treatment measures
setting error	model P00-05 and drive model P01-02.	drive model (P01-02) and motor model to match.
6. The motor is locked due to mechanical factors, resulting in excessive load during operation	■ Confirm the operation command and motor speed (P0B-00) from the drive debugging platform or Panel display： 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) Confirm whether the Running command is not 0 and the motor speed is 0 in the corresponding mode.	Eliminate mechanical factors.
7.Servo drive fault	After powering off, power on again, and still report a fault.	Replace the servo drive.

Caution:

- The fault can be cleared or the power supply can be restarted only after 30s of overload.

26) FU.625：Abnormal turning-off of band brake

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
Motor band brake not turned on	■ Confirm whether the motor band brake terminal signal is valid and whether the motor band brake switch is damaged.	Reconnect the wiring according to the correct wiring, or replace the motor.

27) FU.626：Abnormal turning-on of band brake

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
Abnormal turning-on of motor band brake	■ Confirm whether the motor band brake terminal signal is valid and whether the motor band brake switch is damaged.	Reconnect the wiring according to the correct wiring, or replace the motor.

28) FU.630：Locked rotor motor overheat protection

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Drive UVW output is out of phase or phase sequence is connected	■ Carry out a test run of the motor without load and check the wiring.	Reconnect the wires according to the correct wiring, or replace the cables.

incorrectly		
2. Drive UVW output disconnection or encoder disconnection	■ Check the wiring.	Reconnect the wires according to the correct wiring, or replace the cables.
3. Motor locked due to mechanical factors	■ Confirm the operation command and motor speed (P0B-00) from the drive debugging platform or Panel display： Operation command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) In torque mode Operation command: P0B-02 (Internal torque command) Confirm whether the operation command is not 0 and the motor speed is 0 in the corresponding mode.	Troubleshoot mechanical factors.

29) FU.650：Heatsink OT

Mechanism of fault generation:

- The drive power module temperature is above the over temperature protection point.

Reason	Confirmation method	Treatment measures
1.The ambient temperature is too high	■ Measuring ambient temperature	Improve cooling conditions for servo drives and reduce ambient temperature.
2.After overloading, reset the overload fault by turning off the power supply and repeating it several times	■ Check the fault record (set P0B-33, check P0B-34) for any overload faults or warnings (FU.610, FU.620, FU.630, FU.650, FU.909, FU.920, FU.922).	Change the fault reset method and wait for 30s after overloading before resetting. Increase the capacity of the drive and motor, increase the acceleration and deceleration time, and reduce the load.
3. The fan is broken	■ Whether the fan operates during operation.	Replace the servo drive.
4. Installation of servo drive direction and spacing with other servo drives are unreasonable	■ Confirm whether the installation of servo drive is reasonable.	Install according to the Installation of servo drive standard.
5.Servo drive fault	■ Restart after 5 minutes of power failure and still report a fault.	Replace the servo drive.

30) FU.731:Encoder battery failure

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures

Battery not connected during power failure	■ Confirm whether it is connected during power failure	Set P0D-20=1 to clear the fault
Encoder battery voltage too low	■ Measure battery voltage	Replace with a new battery that matches the voltage

Caution:

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

31) FU.733：Encoder multi turn count error.

Mechanism of fault generation:

- Encoder multi turn count error.

Reason	Confirmation method	Treatment measures
Encoder failure	■ Set P0D-20=1 to clear the fault, and FU.733 still occurs after powering on again	Replace the motor

32) FU.735：Encoder multi turn count overflow

Mechanism of fault generation:

- Detect encoder multi turn count overflow.

Reason	Confirmation method	Treatment measures
Detect encoder multi turn count overflow when P02-01=1	-	Set P0D-20=1 to clear the fault and power on again

33) FU.740：Encoder interference

Mechanism of fault generation:

- The encoder Z signal is interfered, resulting in excessive changes in the electrical angle corresponding to the Z signal.

Reason	Confirmation method	Treatment measures
Encoder wiring error	■ Check the encoder wiring.	Reconnect the wiring according to the correct wiring diagram
2.Encoder cable is loose	■ Check whether the on-site vibration is too large, causing the encoder cable to loosen or even damage the encoder.	Reconnect the wiring and ensure that the encoder terminals are securely connected.
3.Encoder Z signal is interfered	■ Check the field wiring： Whether there are large equipment around that generates interference, or whether there are multiple interference sources such as multiple power supply frequency conversion devices in the cabinet. ■ Place the servo in the "Rdy" state, manually rotate the motor shaft counterclockwise, and monitor whether P0B-10 (electrical angle) smoothly increases or decreases, with 5 0-360 degrees corresponding to each turn. (Refers to Z-series motors, or 4 0-360 ° for X-series motors). If there is an abnormal mutation in P0B-10 during rotation, the encoder itself has a significant problem.	Preferably use our standard cable; If non-standard wiring is used, it is necessary to check whether the cable meets the specification requirements and whether twisted pair shielded wires are used. The wiring should be separated from strong and weak currents as much as possible. The motor cable and encoder cable should not be bundled, and the ground contact between the motor and the drive should be good. Check whether the plugs at both ends of the encoder are in good contact, and whether there is any retraction of the needle.

Reason	Confirmation method	Treatment measures
	If there is no alarm during rotation, but an alarm occurs during Servo running, there is a high possibility of interference.	
4.Encoder failure	■ Replace the encoder cable that can be used normally. If the fault no longer occurs after replacement, it indicates that the original encoder cable is damaged. ■ Place the motor in the same position, power on it multiple 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 significant problem and the servo motor needs to be replaced.

34) FU.834：AD sampling overvoltage fault

Mechanism of fault generation:

- The value of AI sampling is greater than 11.5V.

Reason	Confirmation method	Treatment measures
1. AI channel input voltage is too high	■ Measure the input voltage of AI channel and check whether the actual sampled voltage (P0B-21 or P0B-22) is greater than 11.5V	Adjust the input voltage while checking the sampled voltage until the sampled voltage does not exceed 11.5V.
1. AI channel input voltage is too high	■ Refer to the correct wiring diagram to check the AI channel wiring	Use twisted pair shielded wire to rewire and shorten the line length. Increase the AI channel filtering time constant: AI1 filter time constant: P03-51 AI2 filter time constant: P03-56

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

Mechanism of fault generation:

- The high-precision AD circuit is interfered.

Reason	Confirmation method	Treatment measures
1. Interference in high-precision AI channel wiring	■ Refer to the correct wiring diagram to check the AI channel wiring	Use twisted pair shielded wire to rewire and shorten the line length.

36) FU.A33：Encoder data abnormal

Mechanism of fault generation:

- Encoder internal parameters are abnormal.

Reason	Confirmation method	Treatment measures
1. The serial encoder cable is disconnected or loose	■ Check the wiring.	Confirm whether the encoder cable is misconnected, disconnected, or in poor contact. If the motor cable and encoder cable are bundled together, please separate the wiring.
2. Abnormal reading and writing of serial encoder parameters	■ The encoder fails when a fault is still reported after multiple power connections.	Replace the servo motor.

37) FU.A34：Confirm whether the encoder cable is misconnected, disconnected, or in poor

contact. If the motor cable and encoder cable are bundled together, please separate the wiring.

38) Replace the servo motor.

Mechanism of fault generation:

- After powering on, the initial phase information of the rotor of the 2500 line incremental encoder was read incorrectly.

Reason	Confirmation method	Treatment measures
1. Drive and motor types do not match	■ According to the nameplate of the drive and motor, confirm that our LCDA630P series drive and 17bit servo motor are used, and check whether P00-00 (motor number) is 14130.	Replace with a matching motor and drive.
2.Encoder cable is disconnected	■ Check whether there is an open circuit in the encoder cable and whether both ends of the cable are securely connected to the motor and drive.	Replace the intact encoder cable and tighten the connection.

39) FU.A35：Encoder Z signal loss

Mechanism of fault generation:

- The Z signal of the 2500 line incremental encoder is lost or the AB signal jumps along the same direction.

Reason	Confirmation method	Treatment measures
1.Encoder fault causes Z signal loss	■ After using a good encoder cable and correctly wiring, manually rotate the motor shaft to see if the fault is still reported	Replace the servo motor.
2.Loss of encoder Z signal due to poor wiring or incorrect connection	■ Manually rotate the motor shaft to see if the fault is still reported	Check if the encoder cable is in good contact, rewire or replace the cable.

40) FU.B00：Excessive position deviation

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Drive UVW output is out of phase or phase sequence is connected incorrectly	■ Carry out a test run of the motor without load and check the wiring.	Reconnect the wires according to the correct wiring, or replace the cables.
2. Drive UVW output disconnection or encoder disconnection	■ Check the wiring.	Reconnect the wiring, and the servo motor power cable and drive power cable UVW must correspond one by one. If necessary, replace the cable with a new one and ensure its reliable connection.
3. Motor locked due to mechanical factors	■ Confirm the operation command and motor speed (P0B-00) from the drive debugging platform or Panel display: Operation command in position mode: P0B-13 (Input position command counter) Operation command in speed mode: P0B-01 (speed command) Operation command in torque mode: P0B-02 (internal torque command) Confirm whether the operation command is not 0 and the motor speed is 0 in the corresponding mode.	Troubleshoot mechanical factors.
4. Low servo drive gain	■ Check the servo drive position loop gain and speed loop gain: First gain: P08-00 to P08-02 Second gain: P08-03 to P08-05	Perform Manual gain adjustment or Automatic gain adjustment.
5. High input pulse frequency	■ When Location command source is a pulse command, whether the input pulse frequency is too high. ■ The acceleration and deceleration time is 0 or too small.	Reduce the position command frequency or decrease the Electronic gear ratio. When using the upper computer to output position pulses, a certain acceleration time can be set in the upper computer;
6. The fault value (P0A-10) is too small relative to operating conditions	■ Confirm whether the position deviation fault value (P0A-10) is set too small.	If the acceleration and deceleration time cannot be set on the upper computer, the position command smoothing parameters P05-04 and P05-06 can be increased.
7. Servo drive/motor fault	Monitor the operating waveform through the oscilloscope function of the drive debugging platform: position command, position feedback, speed command, and torque command.	Increase P0A-10Set value.

41) FU.B01：Pulse input abnormal

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1.The input pulse frequency is greater than the set maximum position pulse frequency (P0A-09)	■ Check whether P0A-09 (maximum position pulse frequency) is less than the maximum input pulse frequency required for normal mechanical operation.	Reset P0A-09 based on the maximum position pulse frequency required for 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	■ Firstly, through the oscilloscope function of the drive debugging platform software, check whether there is a sudden increase in the position command, or check whether the servo drive input position command counter (P0B-13) is greater than the number of upper computer output pulses. ■ Then, check the line grounding.	First, the pulse input cable must use twisted pair shielded wire and be routed separately from the drive power line. Secondly, when using a low speed pulse input port (P05-01=0) and selecting differential input, the "ground" of the upper computer must be reliably connected to the "GND" of the drive; When selecting an open collector input, the "ground" of the upper computer must be reliably connected to the "COM" of the drive; Using a high-speed pulse input port (P05-01=1), only differential input can be used, and the "ground" of the upper computer must be reliably connected to the "GND" of the drive. Finally, increase the pin filtering time P0A-24 or P0A-30 of the pulse input terminal according to the selected hardware input terminal.

42) FU.B02：Full closed-loop position deviation too large

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
1. Drive UVW output is out of phase or phase sequence is connected incorrectly	■ Carry out a test run of the motor without load and check the wiring.	Reconnect the wires according to the correct wiring, or replace the cables.
2. Drive UVW output is disconnected or internal/external encoder is disconnected	■ Check the wiring.	Reconnect the wiring, and the servo motor power cable and drive power cable UVW must correspond one by one. If necessary, replace the cable with a new one and ensure its reliable connection.

Reason	Confirmation method	Treatment measures
3. Motor locked due to mechanical factors	■ Confirm the operation command and motor speed (P0B-00) from the drive debugging platform or Panel display： Operation command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) Operation command in torque mode: P0B-02 (Internal torque command) Confirm whether the operation command is not 0 and the motor speed is 0 in the corresponding mode.	Troubleshoot mechanical factors.
4. Low servo drive gain	■ Check the servo drive position loop gain and speed loop gain： First gain: P08-00 to P08-02 Second gain: P08-03 to P08-05	Perform manual gain adjustment or automatic gain adjustment.
5. High input pulse frequency	■ When Location command source is a pulse command, whether the input pulse frequency is too high. ■ The acceleration and deceleration time is 0 or too small.	Reduce the position command frequency or decrease the Electronic gear ratio. When using the upper computer to output position pulses, a certain acceleration time can be set in the upper computer; If the acceleration and deceleration time cannot be set on the upper computer, the position command smoothing parameters P05-04 and P05-06 can be increased.
6. The fault value (P0F-08) is too small relative to operating conditions	■ Confirm whether the fault threshold value (P0F-08) of the full closed-loop position deviation is set too low.	Increase P0F-08Set value.
7. Servo drive/motor fault	Monitor the operating 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.

43) FU.B03：Electronic gear setting overrun

Mechanism of fault generation:

- Any group of Electronic gear ratios exceeds the limit: (0.001 × Encoder resolution/100004000 × Encoder resolution/10000).

Reason	Confirmation method	Treatment measures
Electronic gear ratio set value exceeds the above range	■ If P05-02=0, determine the ratio of parameters P05-07/P005-09, P05-11/P05-13 ■ If P05-02>0, determine the ratio of encoder resolution/P05-02, P05-07/P05-09, P05-11/P05-13	Will: Encoder resolution/P05-02, P05-07/P05-09, P05-11/P05-13 The ratio is set within the above range.
Change of parameter order	■ Change the electronic gear ratio association parameter： During P05-02, P05-07, P005-09, and P05-11/P05-13, due to the unreasonable change sequence, the electronic gear ratio exceeded the limit during the transition process of calculating the electronic gear ratio.	Use the fault reset function or power on again.

44) FU.B04：Parameter settings error for full closed-loop function

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
In the full closed-loop position mode, the Location command source is an internal position command, but the internal and external loop switching mode is used	■ Check if P0F-00 is 2； ■ Confirm whether the location command source is an internal location command: multi segment location command, Interrupt fixed length function.	When using the full closed-loop function and the Location command source is an internal location command, only the external encoder feedback mode can be used, that is, P0F-00 can only be 1.

45) FU.D03：CAN communication connection interrupted

Mechanism of fault generation:

- CAN communication timeout.

Reason	Confirmation method	Treatment measures
CAN communication connection interrupted: Slave station shutdown	■ Check the status of the master station PLC CAN communication card lamp： The ERR light of the master station PLC flashes at a frequency of 1Hz, and some of the slave station PLCs have their ERR lights permanently on (when using PLC background software, D78xx can be monitored in the component monitoring table of the master station, where xx represents the station number in decimal, and a corresponding D78xx of 5 for some configured stations indicates that the slave station has failed)	Check the connection of the communication cable between the slave station and the master station with the ERR light permanently on; Check the communication baud rate P0C-08 of the slave station with the ERR light permanently on, and adjust it to be consistent with the master station.

Reason	Confirmation method	Treatment measures
CAN communication connection interrupted: Master station shutdown	■ Check the status of the master station's PLC CAN communication card lamp: The ERR lights of all slave stations' PLCs are permanently on (when using PLC background software, D78xx can be monitored in the component monitoring table of the master station, where xx represents the station number and decimal system. All configured stations have corresponding D78xx values of 5, indicating that the master station has failed).	Check the cable connection of the master station.

46) 8.2.3 Method of handling warnings

FU.110：Frequency division pulse output setting fault

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
Encoder frequency division pulse number does not meet the range	■ Incremental code disk: The number of encoder frequency division pulses cannot exceed the encoder resolution; 17 bit bus incremental encoder with resolution of 1048576 (P/r); 2500 line incremental encoder with a resolution of 10000 (P/r); ■ Absolute value code disk: The number of frequency division pulses of the encoder cannot exceed 1/4 of the encoder resolution.	Reset the encoder frequency division pulse number (P05-17) to meet the specified range.

47) FU.601：Home return timeout fault

Mechanism of fault generation:

- When using the Home reset function (P05-30=1 to 5), the home is not found within the time set in P05-35.

Reason	Confirmation method	Treatment measures
1. Home switch fault	■ When the home is reset, it is always searching at a high speed without a low speed searching process ■ After the home reset high-speed search, it has been in the reverse low-speed search process	If using hardware DI, confirm that the DI function 31 has been set for P03 group, and then check the wiring condition of the DI terminal. When manually changing the logic of the DI terminal, monitor whether the drive receives the corresponding DI level change through P0B-03. If not, it indicates that the DI switch wiring is incorrect; If yes, there is an error in the home regression operation. Please refer to Section 6.2.8 to correctly operate this function. If using virtual DI, refer to 10.4 to check whether the VDI usage process is correct.

The time limit for finding the home is too short	■ Check whether the time set in P05-35 is too small	Increase P05-35
3. The speed of the high-speed search home switch signal is too low	■ Check the distance from the zero return start position to the home switch to determine whether the speed value set in P05-32 is too small, resulting in a long time to search for the home switch	Increase P05-32

48) FU.730:Encoder battery warning

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
Battery not connected during power failure	■ Confirm whether it is connected during power failure	Replace with a new battery that matches the voltage
Encoder battery voltage too low	■ Measure battery voltage	

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

49) FU.831：AI zero drift too large

Mechanism of fault generation:

- When the input voltage of the AI (including AI1 and AI2) terminal is 0V, the voltage sampled by the drive is greater than 500mV.

Reason	Confirmation method	Treatment measures
1. Wiring error or interference	■ Refer to the correct wiring diagram to check the wiring.	Use twisted pair shielded wire to rewire and shorten the line length. Increase the AI channel filtering time constant: AI1 filter time constant: P03-51 AI2 filter time constant: P03-56
2.Servo drive fault	■ 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.

50) FU.900：DI emergency braking

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
DI function 34: braking, triggered	■ Check whether the DI function 34: EmergencyStop brake and its corresponding DI terminal logic are set to valid.	Check the operation mode and release the DI brake effective signal on the premise of confirming safety.

51) FU.909：Motor overload warning

Mechanism of fault generation:

- The 60Z series 200W and 400W motors accumulate excessive heat and reach the warning value.

Reason	Confirmation method	Treatment measures
1. Motor wiring and encoder wiring are incorrect or poor	■ Compare the correct wiring diagram and check the wiring between the motor, drive, and encoder.	Connect the cables according to the correct wiring diagram; Preferably use our standard cables; When using self-made cables, please follow the hardware wiring instructions to make and connect them.
2. The load is too heavy, and the effective torque output by the motor exceeds the rated torque, resulting in long-term continuous operation	■ Confirm the overload characteristics of the motor or drive; ■ Check whether the average load rate of the drive (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	■ View the mechanical inertia ratio or perform Inertia identification to view the inertia ratio P08-15. ■ Confirm the single operation cycle when the servo motor is in cyclic operation.	Increase the acceleration and deceleration time.
4. Improper gain adjustment or excessive rigidity	■ Observe whether the motor vibrates and sounds abnormally during operation.	Readjust the gain.
5. Drive or motor model setting error	■ For this series of products: Check the bus motor model P00-05 and drive model P01-02.	Check the drive nameplate and set the correct drive model (P01-02) and motor model to match.
6. The motor is locked due to mechanical factors, resulting in excessive load during operation	■ Use the drive debugging platform or panel to view the operation command and motor speed (P0B-00): Operation command in position mode: P0B-13 (Input position command counter) Running command in speed mode: P0B-01 (Speed command) Operation command in torque mode: P0B-02 (Internal torque command) Confirm whether the operation command is not 0 or very large and the motor speed is 0 in the corresponding mode.	Eliminate mechanical factors.
7.Servo drive fault	■ After powering off, power on again.	Please replace the servo drive if the fault is still reported after powering on again

52) FU.920：Braking resistor overload alarm

Mechanism of fault generation:

- The accumulated heat of the braking resistor is greater than Set value.

Reason	Confirmation method	Treatment measures
1. The external braking resistor has poor wiring, falls off, or is disconnected	■ Remove the external braking resistor and directly measure whether the resistance value is "∞" (infinite); ■ Measure whether the resistance value between B1/⊕ and B2 is "∞" (infinite).	Replace the external braking resistor with a new one, and connect it between B1/⊕ and B2 after the measured resistance value is consistent with the nominal value.
2.When using the built-in braking resistor, the cable between the power terminals B2 and B3 may be short or fall off		Select a good cable and connect both ends of the external braking resistor between B1/⊕ and B2.
3.When using an external braking resistor, P02-25 (braking resistor setting) is selected incorrectly	Measure whether the resistance value between B2 and B3 is "∞" (infinite).	Connect B2 and B3 directly with good cables.
4.When using an external braking resistor, the actual selected external braking resistor value is too large	■ View P02-25 parameter values; ■ Measure the external resistance value between the actually selected B1/B2 and compare it with the brake resistance specification table to see if it is too large; ■ Check whether the P02-27 parameter value is greater than the actual selected external resistance value between B1/B2 and B2.	Set correctly P02-25: P02-25=1 (using external resistance and natural cooling) P02-25=2 (using external resistance, forced air cooling)
5.P02-27 (external braking resistance value) is greater than the actual external braking resistance value		Refer to the brake resistor specification table and correctly select a resistor with a suitable resistance value.
6. The input voltage of the main circuit exceeds the specification range		The setting P02-27 is consistent with the actual selected external resistance value.
7. The rotational inertia ratio of the load is too large	■ Measure whether the input voltage at the drive side of the main circuit cable meets the following specifications： 220V drive: Effective value: 220V~240V Allowable deviation: - 10%~+10% (198V~264V) 380V drive: Effective value: 380V~440 Allowable deviation: - 10%~+10% (342V~484V)	Adjust or replace the power supply according to the specifications on the left.
8. The motor speed is too high, the	■ Perform rotation Inertia identification; Or manually calculate the total inertia of the machine based on	Select a large capacity external braking resistor and set P02-26 to be consistent with

Reason	Confirmation method	Treatment measures
deceleration process is not completed within the set deceleration time, and it is in a continuous deceleration state during periodic movement	the mechanical parameters; ■ Whether the actual load inertia ratio exceeds 30.	the actual value; Select a large capacity servo drive; Reduce the load if allowed; Increase the acceleration and deceleration time when allowed; If allowed, increase the motor operating cycle.
9.Insufficient capacity of servo drive or braking resistor	■ Check the speed curve of the motor during periodic movement to see if the motor is in a deceleration state for a long time.	
10. The external braking resistor has poor wiring, falls off, or is disconnected	■ Check the single cycle speed curve of the motor and calculate whether the maximum braking energy can be fully absorbed.	
10.Servo drive fault	-	Replace with a new servo drive.

53) FU.922：External braking resistance is too small

Mechanism of fault generation:

- P02-27 (value of external braking resistance) is less than P02-21 (minimum value of external braking resistance allowed by the drive).

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

54) FU.939：Broken motor power line

Mechanism of fault generation:

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

Reason	Confirmation method	Treatment measures
Broken motor power line	■ Check whether there is a difference of more than 5 times between the effective value of phase current (P0B-24) and the internal torque command (P0B-02), and whether the actual motor speed (P0B-00) is less than 1/4 of the motor's rated rotational speed.	Check the motor power cable wiring, reconnect, and replace the cable if necessary.

55) FU.941：Changing parameters requires power on again to take effect

Mechanism of fault generation:

- When the function code attribute "Effective Time" of the servo drive is "Re energize", after the parameter value of the function code is changed, the drive reminds the user of the need to power on again.

Reason	Confirmation method	Treatment measures
Change the effective function code after changing re energizing	■ Confirm whether the function code with "effective time" changed to "power on again" has been changed.	Power on again.

56) FU.942：Frequent parameter storage

Mechanism of fault generation:

- The number of function codes modified simultaneously exceeds 200.

Reason	Confirmation method	Treatment measures
Very frequent and massive modification of function code parameters and storage in EEPROM (P0C-13=1)	■ Check whether the upper computer system frequently and quickly modifies the function code.	Check the operation mode. For parameters that do not need to be stored in the EEPROM, set P0C-13 to 0 before writing to the upper computer.

57) FU.950：Forward overtravel warning

Mechanism of fault generation:

- The DI terminal logic corresponding to DI function 14 (FunIN.14: P-OT, forward override switch) is valid.

Reason	Confirmation method	Treatment measures
DI function 14: Disable forward drive, terminal logic is valid	■ Check whether DI function 14 is set on 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 operation mode, and if it is safe to do so, give a negative command or rotate the motor to invalidate the terminal logic of the "forward overtravel switch".

58) FU.952：Reverse overtravel warning

Mechanism of fault generation:

- The DI terminal logic corresponding to DI function 15 (FunIN.15: N-OT, reverse override switch) is valid.

Reason	Confirmation method	Treatment measures
DI function 15: Reverse drive is prohibited, and terminal logic is valid.	■ Check whether DI function 15 is set on 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 operation mode and, on the premise of ensuring safety, give a negative command or rotate the motor to invalidate the terminal logic of the "reverse overtravel switch".

59) FU.980：Encoder internal fault

Mechanism of fault generation:

- Encoder algorithm error.

Reason	Confirmation method	Treatment measures
Encoder internal fault	■ When a fault is still reported after multiple power connections, the encoder generates a fault.	Replace the servo motor.

60) FU.990：Input phase loss warning

Mechanism of fault generation:

- Drives below 1 kW are allowed to operate in single phase, but power input phase loss faults and warnings (P0A-00) are enabled.

Reason	Confirmation method	Treatment measures
P0A-00=1 (Power input phase loss protection selection: enable faults and warnings) When a 0.75 kW three-phase drive (drive model P01-02=5) is allowed to operate on a single-phase power supply, a warning will be reported when connected to the single-phase power supply.	■ Confirm whether it is a three-phase drive that allows single-phase operation	If the drive is actually a three-phase drive and the main circuit power line is connected to a three-phase power supply, and a warning is still reported, proceed as per FU.420; If the drive 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, but a warning is still reported, set P0A-00 to 0.

61) FU.994：CAN address conflict

Reason	Confirmation method	Treatment measures
CAN address conflict	■ Confirm whether there is duplicate allocation between slave stations P0C-00	Assign the addresses of each slave station to ensure that P0C-00 is not duplicated.

1.41.3 Internal fault

Please contact our technical personnel when the following faults occur.

FU.602: Angle identification failed;

FU.220: Phase sequence error;

FU.A40: Parameter identification failed;

FU.111: Servo internal parameter abnormality

Chapter X Communication

The servo drive has Modbus (RS-232, RS-485) communication and CANopen communication functions. With the upper computer communication software, it can achieve multiple functions such as parameter modification, parameter query, and servo drive status monitoring.

1.42 MODBUS communication

RS-485 communication protocol adopts single master and multiple slave communication mode, which can support networking of multiple servo drives. RS-232 communication protocol does not support networking of multiple servo drives.

1.42.1 Hardware wiring and EMC considerations

1） RS-232 connection diagram

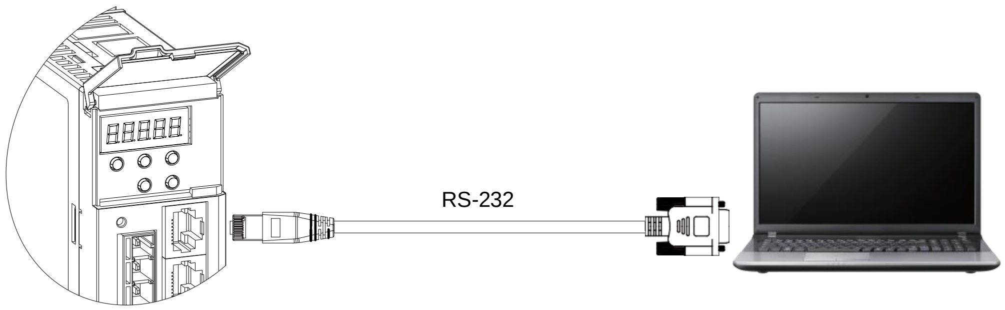


Figure 10-1 RS-232 Connection Diagram

2） RS-485 connection diagram

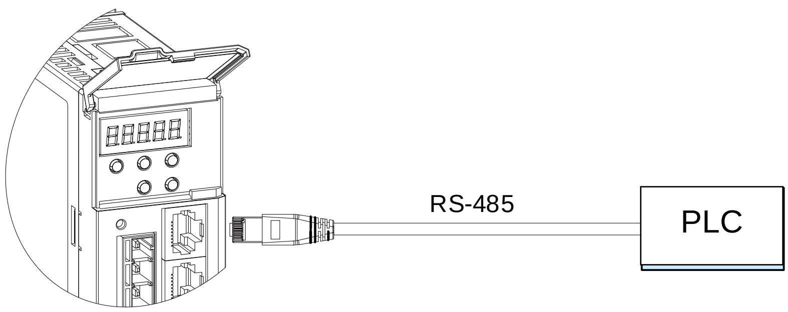


Figure 10-2 RS-485 Connection Diagram

3） When the number of nodes is large, a hand in hand bus structure is recommended for the 485 bus

If a branch line connection is required, the shorter the branch length from the bus to the node is, the better. It is recommended not to exceed 3m.

Resolutely eliminate star connections. The schematic diagram of common bus structures is as follows：

a) Recommended solution: hand in hand connection structure
RS485 bus

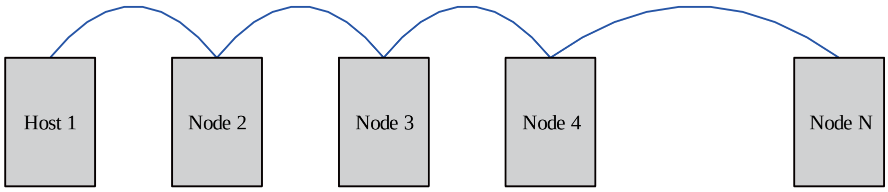


Figure 10-3 Recommended Hand in Hand Connection Structure Diagram

b) General scheme: branch line connection structure

RS485 bus

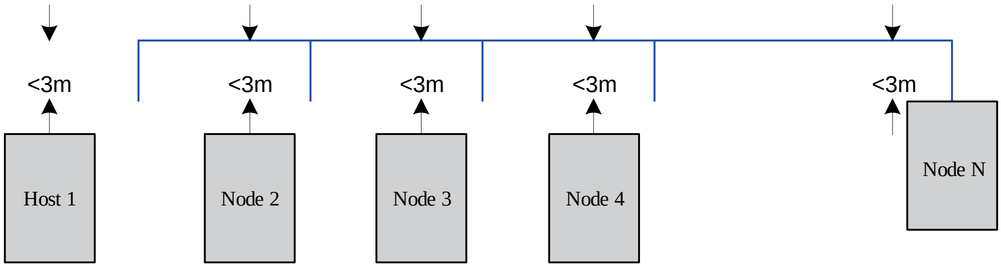


Figure 10-4 Schematic Diagram of Branch Line Connection Structure

c) Error scheme: Star connection structure

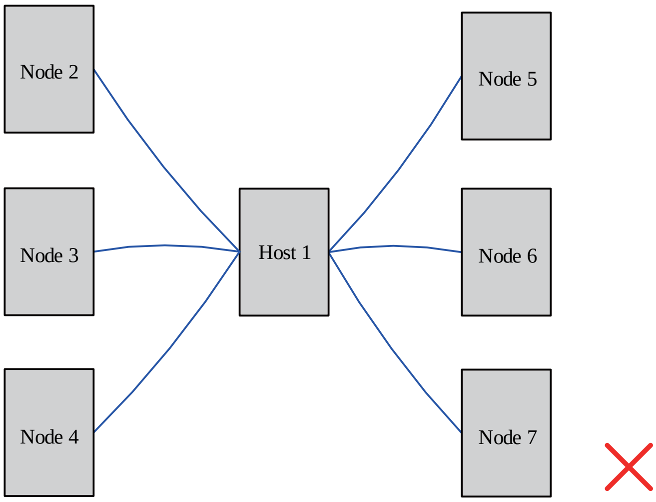


Figure 10-5 Wrong Star Connection Method

NOTE

- Connect the correct bias and termination resistors, refer to Question 1 for details;
- 485 communication lines must use cables with twisted pairs;
- Connect the 485 circuit reference ground GND of each node through a third cable, wherein the 485 circuit reference ground of the 630P servo drive is GND;
- When using shielded cables on site, it is recommended to connect both ends of the shielding layer to PE at the same time. It is not allowed to connect one end to GND, one end to PE, or both ends to GND, otherwise the port may be damaged.
- Use hand in hand mode for bus layout, refer to Question 3 for details;
- Use additional ground wires to connect the PE of each node, refer to"10.1.2 EMC LAYOUT REQUIREMENTS".

- The 485 bus needs to be arranged separately from other interfering cables. Refer to "10.1.2 EMC LAYOUT REQUIREMENTS".

1.42.2 EMC LAYOUT REQUIREMENTS

1） Site Layout Requirements

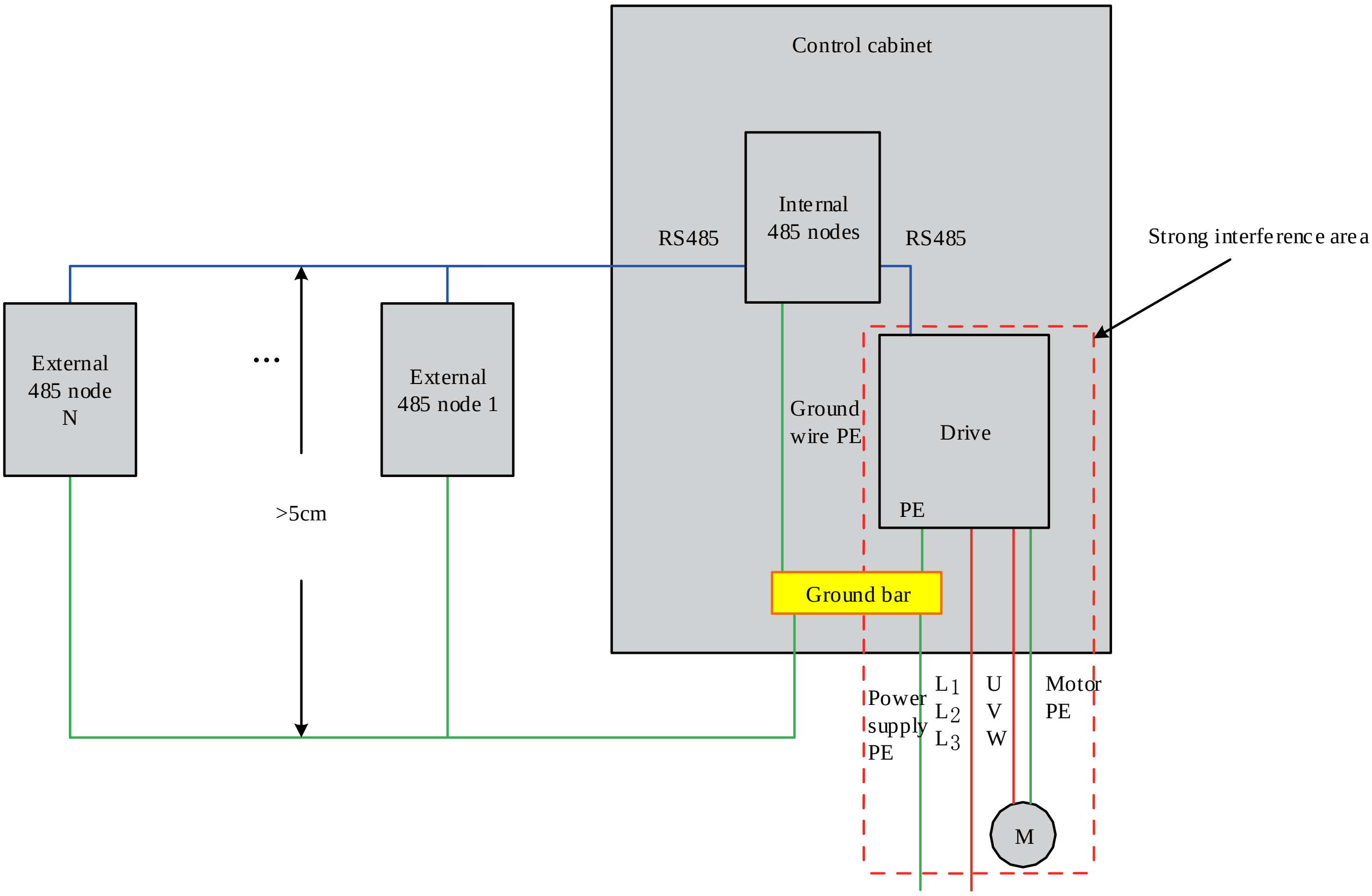


Figure 10-6 Regional Layout Diagram

NOTE

● Isolate the interference source from sensitive equipment;

● The interference equipment and cables occupy the smallest area, such as near the outlet.

2） Requirements for PE connection of ground wire

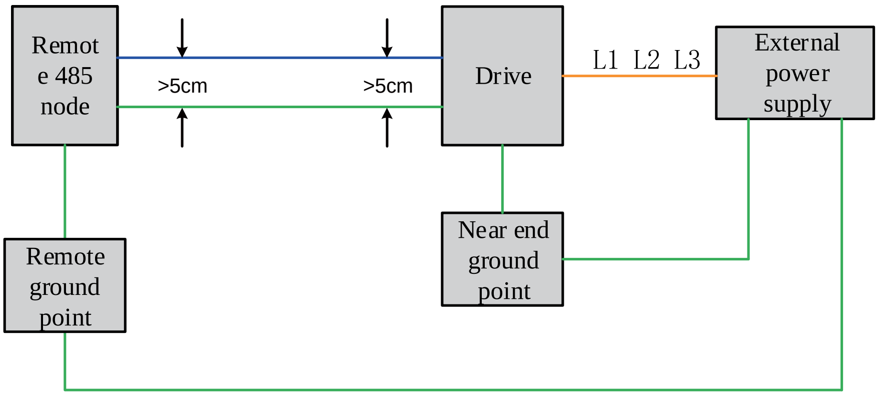


Figure 10-7 Schematic Diagram of PE Wiring for Ground Wire

NOTE

● The ground wire PE must use a cable thicker than AWG12.

- The ground wire PE is connected to the ground terminal of the node or to the ground bar of the cabinet where the node is located.

Note: The distance between the ground wire PE and the bus is greater than 5cm.

3） Cable layout requirements

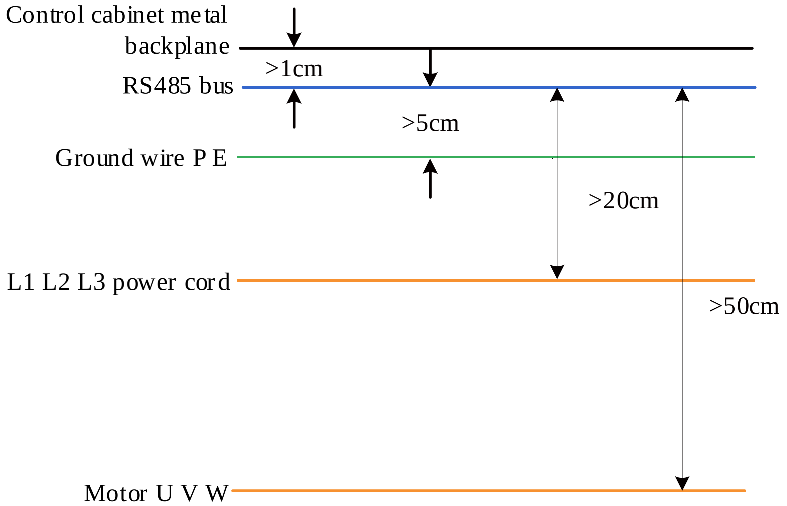


Figure 10-8 Schematic Diagram of Cable Layout

NOTE

- Maintain a distance of more than 20cm between the 485 bus and the strong current cable;
- Maintain a distance of more than 50cm between the 485 bus and the motor UVW power line;
- Maintain a distance of more than 5cm between the 485 bus and the field ground wire;
- Maintain a distance of more than 1cm between the 485 bus and the back plate of the metal cabinet.

1.42.3 The relationship between transmission distance, node, and transmission rate for 485 interface field applications

Order No.	Speed	Transmission distance	Number of nodes	Wire diameter
1	57.6kpbs	100m	128	AWG26
2	19.2kbps	1000m	128	AWG26

Caution:

- RS485 can simultaneously connect 32 servo drives. To connect more servo drives, an amplifier must be installed, and a maximum of 247 servo drives can be expanded.
- RS-485 communication is adopted. If the upper computer only supports RS-232, it can be connected through an RS-232/RS-485 converter.

1.42.4 Communication parameter setting

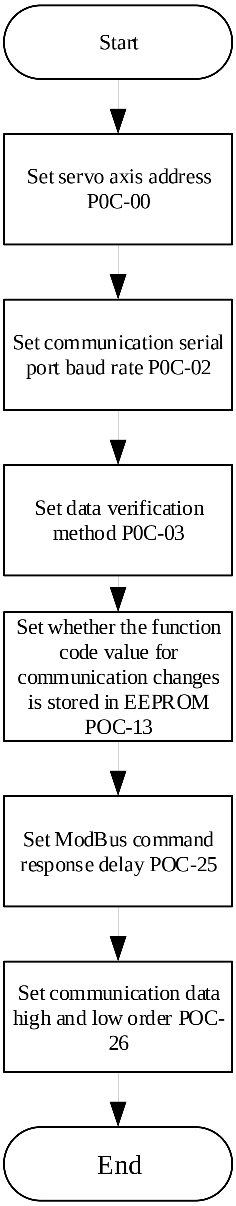


Figure 10-9 Communication parameter setting process

1）Set the drive shaft address P0C-00：

When multiple servo drives are networked, each drive can only have a unique address, otherwise communication may be abnormal and unable to communicate. Including:

0: Broadcast Address

1-247: slave address

The upper computer can write to all slave drives through the broadcast address, and the slave drive receives the frame of the broadcast address to perform corresponding operations, but does not respond.

2）Set the communication rate between drive and host computer P0C-02

The communication rate of the servo drive must be set consistent with the communication rate of the upper computer, otherwise communication cannot be performed.

When multiple servo drives are networking, when the baud rate of a drive communication is inconsistent with the host computer, it will cause communication errors on this axis or affect communication on other axes.

3）Set the data verification method P0C-03 when the drive communicates with the host

computer

The LCDA630P provides two data verification methods: even verification (P0C-03=1) and odd verification (P0C-03=2), or no verification (P0C-03=0).

a) Even or odd parity test

The actual transmission bits of each frame of data are 11 bits: 1 start bit, 8 data bits, 1 check bit, and 1 end bit.

10	9	8～1	0
End bit	Check bit	Data bit	Start bit

b) No verification

Select no verification mode, and there are two formats for data frames to choose from：

① The actual transmission bits of each frame of data are 11 bits, including 1 start bit, 8 data bits, and 2 end bits.

10～9	8～1	0
End bit	Data bit	Start bit

② The actual transmission bit of a byte is 11 bits, including 1 start bit, 8 data bits, and 1 end bit.

10	9	8～1	0
Invalid bit	End bit	Data bit	Start bit

The data bits are in hexadecimal.

- The data frame format of the upper computer must conform to the above format, otherwise it cannot communicate with the drive.

4）Set whether the function code for communication changes is stored in real-time in EEPRROMP0C-13

The servo drive provides a real-time saving function for the function code (P0C-13=1). After the corresponding function code value is modified, it is stored in real-time in the EEPROM, with a power down saving function. However, this function needs to be used with caution：

a) If the value of the function code only needs to be changed once, and the value is used later, the real-time saving function of the function code can be enabled (P0C-13=1);

b) If it is necessary to frequently change the value of the function code, it is recommended to turn off the real-time saving function of the function code (P0C-13=0), otherwise the service life of the EEPROM will be reduced due to frequent rewriting of the EEPROM.

- If the EEPROM is frequently erased for a certain period of time, the drive will receive a warning FU.942 (servo parameters are stored frequently in the EEPROM)!
- After the EEPROM is damaged, the drive will experience other non resettable faults!

5）Set MODBUS communication response delay P0C-25

Add a delay to the servo response through the function code P0C-25. After receiving the command, the servo will delay the time set by P0C-25 before returning to the host.

6）Set communication data high and low order P0C-26

Servo drive function code Display format: HXX-YY

Including:

20: Function code group number, hexadecimal data;

YY: Offset within the function code group, which is decimal data and must be converted to hexadecimal data in the communication data frame.

The communication address of the servo drive's function code is a 16 bit address, which consists of a function code group number (high 8 bits)+an intra group offset (low 8 bits).

If the data range of the function code is within the range of - 65536 to+65535, it is a 16 bit function code, occupying only one offset within the function code group, and only one address. It does not involve the high and low order of communication data. For example, P02-00 has a communication address of 0x0200.

If the data range of the function code exceeds - 65536 to+65535, it belongs to a 32-bit function code, occupying two consecutive offset numbers within the function code group, and occupying two consecutive addresses. However, the communication address is only determined by the address with the lower offset number, and the high and low order of the communication data must be set correctly. Otherwise, data read and write errors will result.

For example, P11-12 (the first segment moving displacement) occupies two consecutive offset numbers within the function code group, namely P11-12 and P11-13. The communication address 0x110C with a lower offset number (P11-12) stores the lower 16 bits of the function code value, and the communication address 0x110D with a higher offset number (P11-13) stores the upper 16 bits of the function code value.

When presetting the "1st segment moving displacement" to 0x40000000 (decimal is 1073741824), the value of P11-12 should be set to 0x0000, and the value of P11-13 should be set to 0x4000.

When writing a function code, it is necessary to determine the sequence of "0x0000" and "0x4000" in the communication frame according to the settings in P0C-26.

NOTE

- The servo drive does not support independent operation of the upper 16 bits of the 32-bit function code!
- When using communication to modify a function code, it is necessary to pay attention to the setting range, unit, effective time, setting type, positive and negative decimal conversion, etc. of the function code. For details, please refer to the description of the function code.

Caution:

- Some manufacturers' PLC/touch screen MODBUS instruction programming uses a register address that is not equal to the actual register address, but is equal to the actual register address plus 1. This is because the starting address of the standard MODBUS instruction register is 1, while the actual register address of many devices starts from 0 (for example, this servo drive). Considering compatibility, The PLC/touch screen manufacturer has subtracted 1 from the programming register address during actual physical transmission. When conducting MODBUS communication between such PLC/touch screens and servo drives, programmers need to be clear about this point in order to correctly read and write the function code of the servo drive. For example, when programming, the read (write) register address is 0x0201, and the actual read (write) function code is P02-00, not P02-01.

- If you cannot determine whether the register address during PLC/touch screen MODBUS instruction programming is equal to the actual register address, you can select two adjacent function codes with unequal values and use the 0x03 (read) instruction to read the larger function code. If the read function code value is equal to the smaller function code value, it indicates that the register address during programming is equal to the actual register address plus 1.

☆Associated function code：

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
P0C-00	Drive shaft address	0～247	-	Set Drive Shaft Address	Running settings	Effective immediately	1
P0C-02	Serial port baud rate setting	0：2400 1：4800 2：9600 3：19200 4：38400 5：57600	Kbp/s	Set the communication rate between the drive and the host computer	Running settings	Effective immediately	2
P0C-03	MODBUS data format	0: No check, 2 end bits 1: Even check, 1 end bit 2: Odd check, 1 end bit 3: No check, 1 end bit	-	Set the data verification method when the drive communicates with the host computer	Running settings	Effective immediately	3
P0C-13	Whether the MODBUS communication write function code is updated to the EEPROM	0: Do not update EEPROM 1: Update EEPROM except for P0B and P0D groups	-	Set whether the function code value of communication changes is stored in EEPROM	Running settings	Effective immediately	1
P0C-25	MODBUS command response	0～5000	ms		Running settings	Effective immediately	1

Function code	Name	Setting range	Unit	Function	Setting method	Effective time	Factory setting
	delay						
P0C-26	MODBUS communication data high-low order	0-High 16 bits come first, low 16 bits come last 1-Low 16 bits come first, high 16 bits come last	1	Set the transmission format for 32-bit data when using MODBUS communication	Running settings	Effective immediately	1

1.42.5 MODBUS communication protocol

The function code of the servo drive is divided into 16 bits and 32 bits according to the data length. Data reading and writing operations can be performed on the function code through the MODBUSRTU protocol. When writing function code data, the command code varies depending on the data length.

Operation	Command code
Read 16/32 bit function code	0x03
Write a 16 bit function code	0x06
Write 32-bit function code	0x10

1）**Read function code: 0x03**

In the MODBUSRTU protocol, both 16-bit and 32-bit function codes are read using the command code: 0x03

Request frame format：

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis addresses 1 to 247. ◆ Note: Here, 1-247 are decimal numbers, which are converted to hexadecimal numbers when ADDR is filled in.
CMD	Command code: 0x03
DATA[0]	The starting function code group number, such as function code P06-11, 06, is the group number. ◆ Note: Here, 06 is a hexadecimal number, and there is no need for decimal conversion when filling in DATA [0]
DATA[1]	The offset within the initial function code group, such as function codes P06-11, 11, is offset. ◆ Note: Here, 11 is a decimal number. When filling in DATA [1], it should be converted to hexadecimal 0x0B
DATA[2]	Number of read function codes (high 8 bits), hexadecimal
DATA[3]	Number of read function codes (lower 8 bits), hexadecimal
CRCL	CRC check valid byte (lower 8 bits)
CRCH	CRC check valid byte (high 8 bits)
END	Greater than or equal to 3.5 characters of idle time, one frame ends

Response frame format：

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis address, hexadecimal
CMD	Command code, 0x03
DATALENGTH	Number of function code bytes, equal to the number of read function codes N * 2
DATA[0]	Start function code value, high 8 bits
DATA[1]	Starting function code value, low 8 bits
DATA[…]	-
DATA[N*2-1]	Last function code value, lower 8 bits
CRCL	CRC check low significant byte
CRCH	CRC Check high significant byte
END	Greater than or equal to 3.5 characters of idle time, one frame ends

In the MODBUSRTU protocol, the command code for writing a 16 bit function code is 0x06; Write 32-bit function code using command code: 0x10.

2）Write a 16 bit function code(0x06)

⚠Caution:

- It is prohibited to write 32-bit function codes using 0x06, otherwise unpredictable errors will occur!

Request frame format:

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis addresses 1 to 247. ◆ Note: Here, 1-247 are decimal numbers, which are converted to hexadecimal numbers when ADDR is filled in.
CMD	Command code: 0x06
DATA[0]	The starting function code group number, such as function code P06-11, 06, is the group number. ◆ Note: Here, 06 is a hexadecimal number, and there is no need for decimal conversion when filling in DATA [0]
DATA[1]	The offset within the initial function code group, such as function codes P06-11, 11, is offset. ◆ Note: Here, 11 is a decimal number. When filling in DATA [1], it should be converted to hexadecimal 0x0B
DATA[2]	Write data high byte, hexadecimal
DATA[3]	Write data low byte, hexadecimal
CRCL	CRC check low significant byte
CRCH	CRC Check high significant byte
END	Greater than or equal to 3.5 characters of idle time, one frame ends

Response frame format:

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis address, hexadecimal.
CMD	Command code: 0x06
DATA[0]	The group number of the function code to be written. If the function code H06-11 is written, it is 0x06
DATA[1]	Offset of the written function code. If the function code H06-11 is written, it is 0x0B
DATA[2]	Write data high byte, hexadecimal
DATA[3]	Write data low byte, hexadecimal
CRCL	CRC check low significant byte
CRCH	CRC Check high significant byte
END	Greater than or equal to 3.5 characters of idle time, one frame ends

3）Write 32-bit function code（0x10）

⚠Caution:

- It is prohibited to write a 16-bit function code using 0x10, otherwise unpredictable errors will occur!

Request frame format:

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis addresses 1 to 247. ◆ Note: Here, 1-247 are decimal numbers, which are converted to hexadecimal numbers when ADDR is filled in.
CMD	Command code: 0x10
DATA[0]	The starting function code group number to be written, such as H11-12 and 11, is the function code group. ◆ Note: Here, 11 is a hexadecimal number, and there is no need for decimal conversion when filling in DATA [0]
DATA[1]	The intra group offset of the written start function code, such as writing function codes H11-12 and 12, is the intra group offset. ◆ Note: Here, 12 is a decimal number, which should be converted to hexadecimal 0x0C when filling in DATA [1]
DATA[2]	The number of function codes is 8 bits M (H) high, and the length of the 32-bit function code is 2.
DATA[3]	Low 8 bits of function code M (L)
DATA[4]	The number of function codes corresponds to the number of bytes M * 2.
DATA[5]	For example, write only P05-07, and DATA [4] is P04.
DATA[6]	Write the upper 8 bits of the start function code in hexadecimal
DATA[7]	Write the lower 8 bits of the start function code, hexadecimal
DATA[8]	Write the upper 8 bits of offset+1 within the start function code group, hexadecimal
CRCL	Write the lower 8 bits of offset+1 within the start function code group, hexadecimal
CRCH	CRC check low significant byte
END	CRC Check high significant byte

Response frame format:

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis address, hexadecimal.
CMD	Command code: 0x10
DATA[0]	The group number of the function code to be written. If the function code H11-12 is written, it is 0x11
DATA[1]	Offset of the written function code. If the function code H11-12 is written, it is 0x0C
DATA[2]	The number of written function codes is 8 digits higher
DATA[3]	The number of written function codes is 8 bits lower
CRCL	CRC check low significant byte
CRCH	CRC Check high significant byte
END	Greater than or equal to 3.5 characters of idle time, one frame ends

4）Error response frame

Error Frame Response Format：

START	Greater than or equal to 3.5 characters of idle time, indicating the beginning of a frame
ADDR	Servo axis address, hexadecimal.
CMD	Command code+0x80

DATA[0]～[3]	DATA|errorcode
CRCL	CRC check low significant byte
CRCH	CRC Check High Significant Byte
END	Greater than or equal to 3.5 characters of idle time, one frame ends

Error code：

Error code	Coding Description
0x0001	Illegal command code
0x0002	Illegal data address
0x0003	invalid data
0x0004	Slave equipment failure

5）Communication examples(P0C-26=0)

a) Host sends request frame

01	03	02	02	00	02	CRCL	CRCH

This request frame represents reading 0x0002 word long data from a register starting with the function code P02-02 of the drive with the axis address 01.

Slave response frame：

01	03	04	00	01	00	00	CRCL	CRCH

This response frame indicates that the slave returns 2 word long (4 bytes) data with data content of 0x0001,0x0000.

If the slave response frame is：

01	83	02	CRCL	CRCH

The response frame indicates that a communication error occurred, and the error code is 0x02; 0x83 indicates an error.

b) Host sends request frame：

01	06	02	02	00	01	CRCL	CRCH

The request frame indicates that 0x0001 is written to the function code P02-02 of the drive with axis address 01.

Slave response frame：

01	06	02	02	00	01	CRCL	CRCH

This response frame indicates that the host successfully wrote the function code.

If the slave response frame is:

01	86	02	CRCL	CRCH

The response frame indicates that a communication error occurred, and the error code is 0x02; 0x86 indicates an error.

c) Read 32-bit function code P05-07：

Host request frame：

01	03	05	07	00	02	CRCL	CRCH

Slave response frame:

01	03	04	00	01	00	00	CRCL	CRCH

This response frame indicates that the value of the P05-07 function code is 0x00000001.

6）32-bit function code addressing

When using the MODBUS command to read and write 32-bit function codes, the communication address is determined by the address with the lower offset number in the function code group. Operations are performed on the offset numbers in two function code groups at a time.

For example, the MODBUS command to read "1st segment moving displacement" P11-12 is:

Servo axis address	03	11	0C	00	02	CRCL	CRCH

If the "first segment moving displacement" is known to be 0x40000000 (decimal is 1073741824):

If P0C-26=1 (low 16 bits first, high 16 bits last), the response frame is:

Servo axis address	03	04	00	00	40	00	CRCL	CRCH

If P0C-26=0 (high 16 bits first, low 16 bits last), the response frame is:

Servo axis address	03	04	40	00	00	00	CRCL	CRCH

For example, write a MODBUS command of "0x12345678" to "1st segment moving displacement":

If P0C-26=1 (low 16 bits first, high 16 bits last)

Servo axis address	10	11	0C	00	02	04	56	78	12	34	CRCL	CRCH

If P0C-26=0 (high 16 bits first, low 16 bits last)

Servo axis address	10	11	0C	00	02	04	12	34	56	78	CRCL	CRCH

For example, when writing a 32-bit function code P05-07, the data is 0x00100000 (decimal is 1048576):

If P0C-26=0 (high 16 bits first, low 16 bits last), the response frame is：

01	10	05	07	00	02	04	00	00	00	10	CRCL	CRCH

7）CRC verification

The communication between the upper computer and the servo drive must adopt a consistent CRC verification algorithm, otherwise CRC verification errors will occur. The servo drive uses a 16 bit CRC, with the low byte first and the high byte second. The CRC function is as follows：

```
Uint16COMM_CrcValueCalc(constUint16*data,Uint16length)
{
    Uint16crcValue=0xffff;
    int16i;
    while(length--)
    {
        crcValue^=*data++;
        for(i=0;i<8;i++)
        {
            if(crcValue&0x0001)
            {
                crcValue=(crcValue>>1)^0xA001;
            }
            else
            {
                crcValue=crcValue>>1;
            }
        }
    }
    return(crcValue);
}
```

8）Hexadecimal representation of signed numbers

When writing signed function codes (including 16 bit and 32 bit), it is necessary to convert the pre written data into hexadecimal complements.

a) 16 bit function code

- Data is positive or 0: complement=source code
- Data is negative: complement=0xFFFF - complement of absolute value of data+0x0001

Example：

The 16-bit signed positive number+100 has a source code of 0x0064, so the complement code is also 0x0064;

The 16-bit signed negative number - 100 has a hexadecimal complement of 0xFFFF － 0x0064 ＋ 0x0001=FF9C

b) 32-bit function code

- Data greater than or equal to 0: complement=source code
- Data is negative: complement=0xFFFFFFFF - complement of absolute value of data+0x00000001

Example：

The 32-bit 100 has a source code of 0x00000064, so the complement code is also 0x00000064;

32-bit - 100, with a hexadecimal complement of 0xFFFFFF – 0x000000064+0x00000001=FFFFFF9C

1.42.6 Common problems and solutions on 485 communication site

1）Problem 1: Correct terminal resistor access method

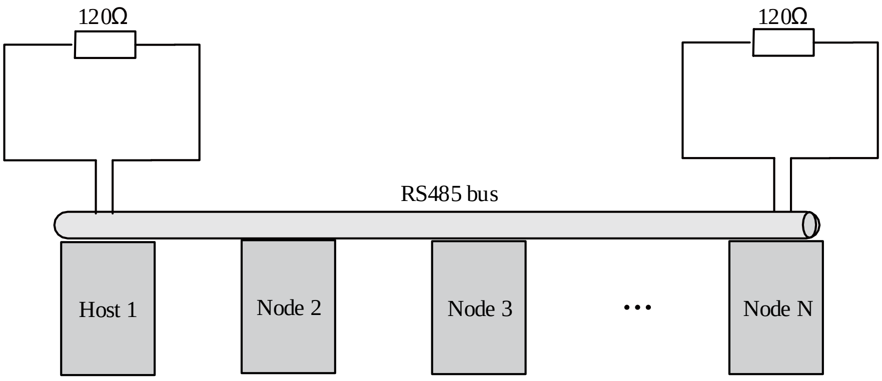


Figure 10-10 Schematic diagram of terminal resistor access method

NOTE

- Can only be terminated and matched at both ends;
- The master station is recommended to be arranged at one end of the bus;
- Measure the resistance between the 485 bus using the ohmic gear of a multimeter (during measurement, the equipment needs to be powered off). If the measured value is about 60 Ω, it is normal. If the Display is less than 50 Ω, please check whether there are other nodes besides both ends of the bus that have added matching resistors and disconnect them. If Display0 Ω, please check for short circuits or node damage.

2）Problem 2: Correct wiring method (for some nodes without GND connection points)

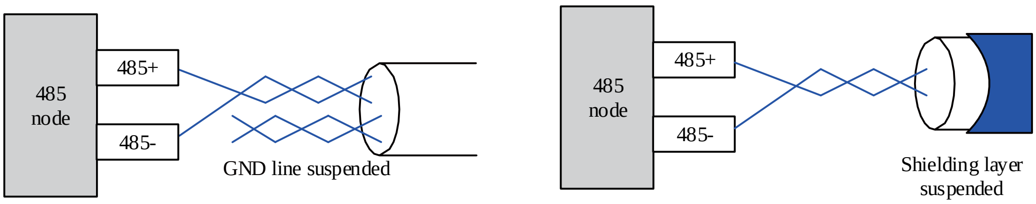


Figure 10-11 Wiring Diagram without GND

- Processing method 1: Look for a reference ground shared with the 485 circuit on other ports of this node. If so, the GND is connected to this reference ground. Pay special attention that the shield layer cannot be connected to the reference ground, otherwise the 485 port may be damaged.
- Processing method 2: Look for a reference ground shared with the 485 circuit on this node board. If so, connect the GND to this reference ground. Pay special attention that the shield layer cannot be connected to the reference ground, otherwise the 485 port may be damaged.
- Processing method 3: If you cannot find the reference ground for the 485 circuit, please

suspend the GND line as shown in the above figure, while ensuring that the ground wire PE is reliably connected.

- Processing method 4: When the number of nodes is small, increase the filter capacitance between 485+and 485 -. Refer to question 6.

3）Problem 3: Correct multi node connection method

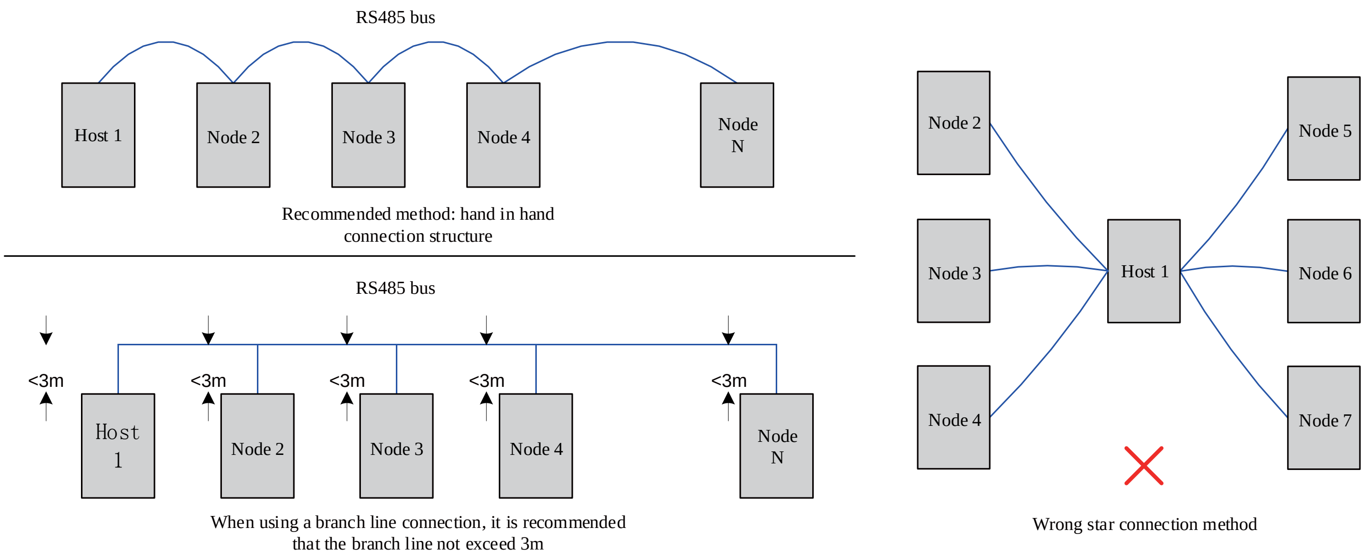


Figure 10-12 Schematic Diagram of Three Multiple Node Connection Modes

4）Problem 4: Measures to suppress external interference in the system

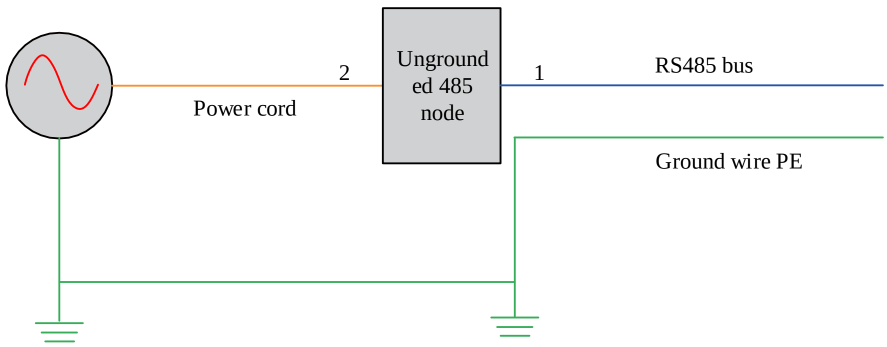


Figure 10-13 Schematic diagram of suppressing external interference

- Treatment method 1: Wrapping a magnetic ring at position 1 can effectively suppress external interference in the system. This method is recommended.
- Processing method 2: Wrapping a magnetic ring at position 2 can also suppress external interference in the system.

5）Problem 5: Drive interference suppression measures

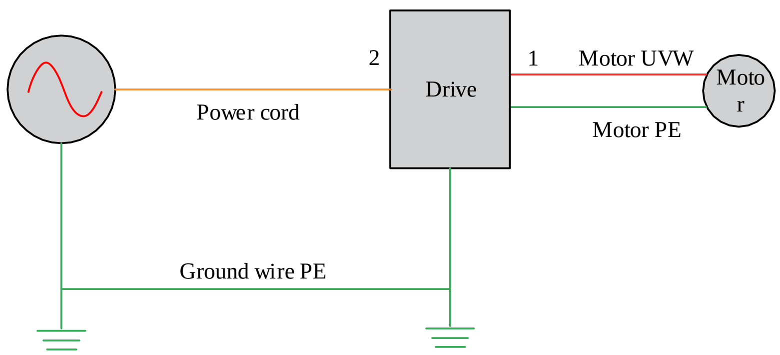


Figure 10-14 Schematic Diagram of Drive Interference Suppression

- Processing method 1: Add a filter magnetic ring at position 1, and simultaneously pass the three UVW wires (excluding the ground wire PE) through the magnetic ring. It is recommended to wrap them for three turns. The first measure is the preferred option with the best effect.

- Processing method 2: Add a filter magnetic ring at position 2, and simultaneously pass the three UVW wires (excluding the ground wire PE) through the magnetic ring. It is recommended to wrap them for three turns.

Flow Chart for Site Problem Location：

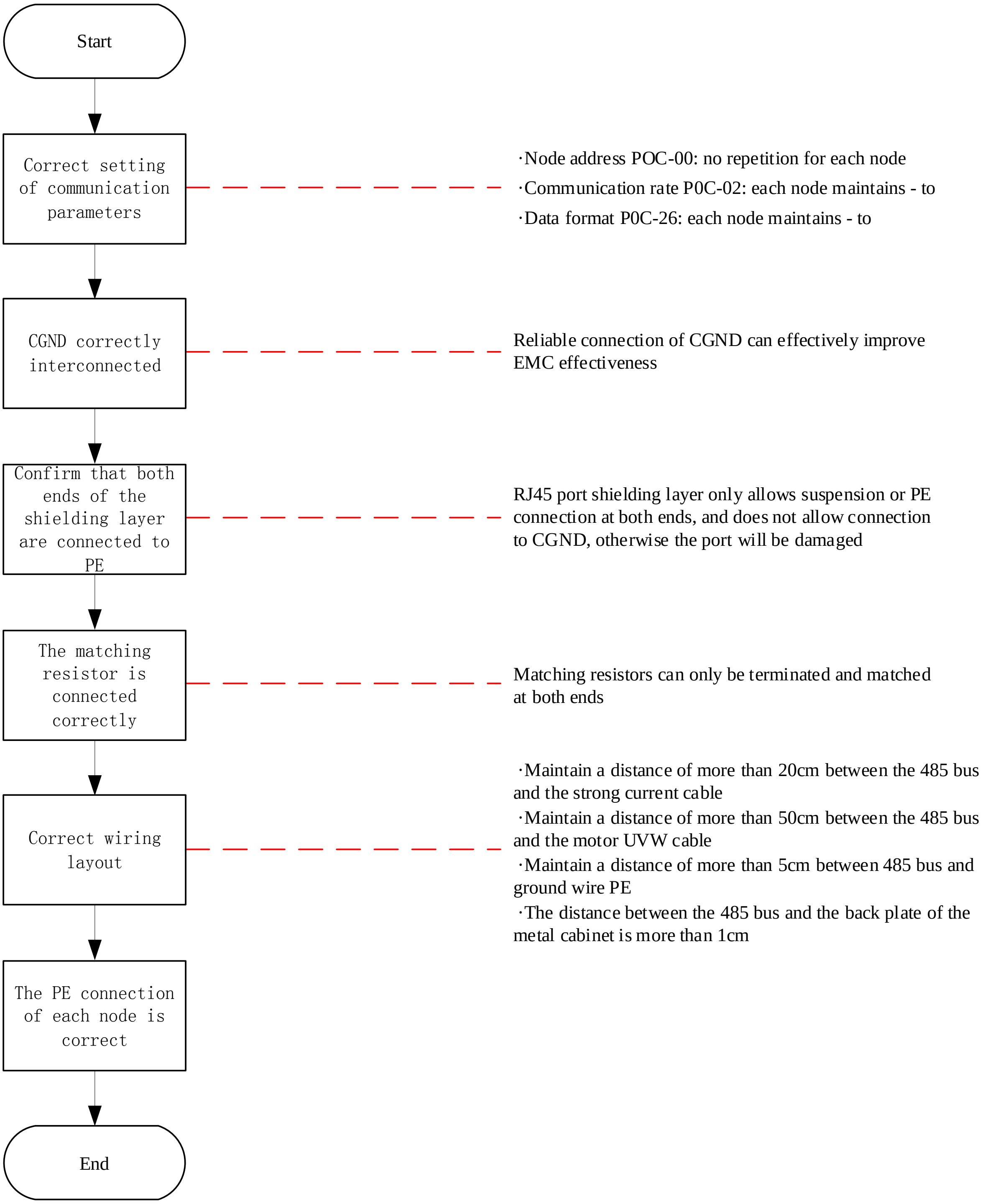


Figure 10-15 485 Communication Field Problem Location Flow Chart

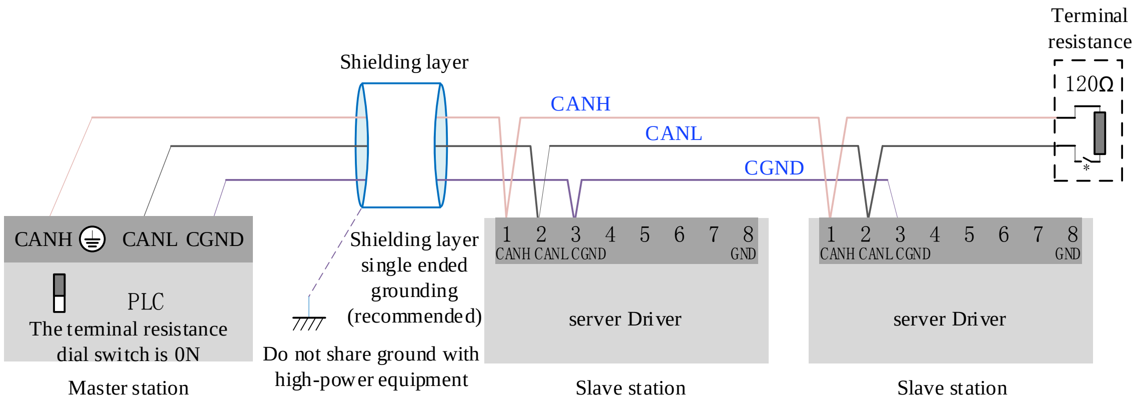
1.43 CANopen communication

CANopen communication protocol is a device sub protocol specification for automated embedded systems.

The CANopen standard includes an addressing scheme, multiple small protocols, and an application layer defined by device protocols. The communication protocol supports network management, device monitoring, and node communication, including a simple transport layer for message segmentation/merging. The underlying protocol that implements the data link layer and the physical layer is typically a controller area network (CAN).

CANopen supports the master/slave mode, with one master and multiple slaves. The address range of the master/slave station is 1 to 63 and must be unique. LCDA630P only supports slave mode.

1.43.1 Hardware connection



CANopen connection diagram

CANopen communication distance and baud rate relationship table

Baud rate(Kbps)	Maximum transmission distance(m)	Cable diameter(mm^2)	Maximum number of nodes
1000	20	≥0.3	18
500	80	≥0.3	62
250	150	≥0.3	62
125	300	≥0.5	62
100	500	≥0.5	62
50	1000	≥0.7	62

NOTE

- The above is a standard based shielded twisted pair.

1.43.2 CANopenCommunication parameter settings

Function code	Name	Setting range	Function	Factory setting	Effective method	Setting method
P02-00	Control mode selection	0～9	Set the control mode of the servo drive. 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 mixing mode 9: CANopen control mode	9	Effective immediately	Shutdown setting

<table>
<tr><th>Function code</th><th>Name</th><th>Setting range</th><th>Function</th><th>Factory setting</th><th>Effective method</th><th>Setting method</th></tr>
<tr><td>P0C-00</td><td>Servo axis address</td><td>1～247</td><td>Set the drive shaft address.
0: Broadcast address. The upper computer can write to all drives through the broadcast address. The drive receives the frame of the broadcast address and performs corresponding operations, but does not respond.
1-247: When multiple servo drives are networked, each drive can only have a unique address, otherwise communication may be abnormal or unavailable.</td><td>1</td><td>Effective immediately</td><td>Running settings</td></tr>
<tr><td>P0C-08</td><td>CAN communication rate setting</td><td>0～7</td><td>Set the communication rate between the drive and the host computer when using CAN communication (CANopen).
<table><tr><th>Set value</th><th>Communication rate</th></tr><tr><td>0</td><td>20K</td></tr><tr><td>1</td><td>50K</td></tr><tr><td>2</td><td>100K</td></tr><tr><td>3</td><td>125K</td></tr><tr><td>4</td><td>250K</td></tr><tr><td>5</td><td>500K</td></tr><tr><td>6</td><td>1M</td></tr><tr><td>7</td><td>1M</td></tr></table>The communication speed of the servo drive must be consistent with the host computer, otherwise communication cannot proceed.</td><td>5</td><td>Effective immediately</td><td>Running settings</td></tr>
<tr><td>P0C-16</td><td>CAN communication write function Whether the energy code is updated to EEPROM</td><td>0～1</td><td>Set whether the function written through communication is saved to the EEPROM.
<table><tr><th>Set value</th><th>Whether the communication write function code is updated to EEPROM</th></tr><tr><td>0</td><td>Do not update EEPROM</td></tr><tr><td>1</td><td>Update EEPROM except for P0B and P0D groups</td></tr></table>Caution:
The changed value of P0C-16 is always saved in the EEPROM.
If the changed parameters do not need to be saved after powering down, please set P0C-16 to 0. Otherwise, changing the function code values in large batches for a long time and storing them in the EEPROM will cause damage to the EEPROM and cause the drive to experience FU.108 (parameter storage failure).</td><td>0</td><td>Effective immediately</td><td>Running settings</td></tr>
</table>

1.43.3 CANopen communication related faults

Trouble display	Name	Reason	Treatment measures
FU.d04	Node protection or heartbeat timeout	The configuration time from the slave station to the consumer, or the guard time from the arrival node	Check whether the CAN nodes are online, or check the CANopen configuration, reset the nodes, or communicate.
FU.d05	NMT steering initialization when motor is enabled	NMT steering initialization received when the motor is enabled	Reset the NMT node and disable the output stage when changing the NMT.
FU.d06	NMT steering stops when the motor is enabled	When the motor is enabled, NMT stop is received	Reset the NMT node and disable the output stage when changing the NMT.
FU.d07	CANopen network disconnection	Too many errors	Check the CANopen network and reconnect.
FU.d08	PDO transmission length error	The content length transmitted by PDO is inconsistent with the mapping length during configuration	Reconfigure the PDO and reset the node or communication.
FU.d09	Software position upper and lower limit setting error	Software location limit, lower limit greater than upper limit	Set 0x607D correctly to ensure:
FU.d10	Home offset setting error	The home offset is outside the upper and lower limits of the software position	607D-1h＜607D-2h
FU.d11	Excessive synchronization cycle error	Synchronization cycle error exceeds 1/4 of Set value	Correctly set 607D and 607C to ensure: 607C>(607D-1h)

1.44 Virtual VDI/VDO

1）Virtual Digital Input (VDI)

VDI is similar to hardware DI terminals and can assign DI functions. When VDI is enabled, it is equivalent to the number of extended DIs, and the number of VDIs is 16.

Caution:

- If the VDI and P03 group DI terminals are assigned the same non zero DI function, the drive will experience FU.130!

Taking the VDI distribution servo enable signal (FunIN. 1: S-ON) as an example, explain the steps for using VDI:

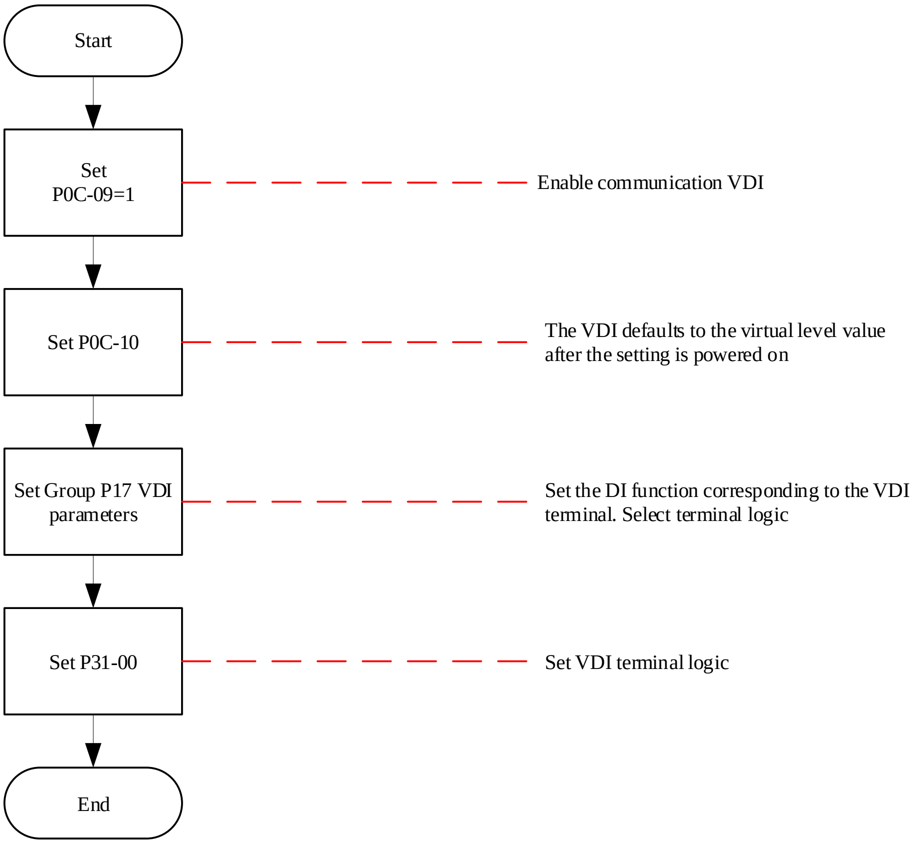


Figure 10-16 VDI Usage Flow Chart

When first powering on, the VDI terminal logic is determined by P0C-10 (the default virtual level value of VDI after powering on). After that, the VDI terminal logic is determined by P31-00 (VDI virtual level).

The display of P0C-10 on the panel is decimal, and the P31-00 panel is not visible. After converting to binary, the bit (n)=1 of P0C-10 (P31-00) indicates that the VDI (n+1) terminal logic is "1", and the bit (n)=0 indicates that the VDI (n+1) terminal logic is "0".

⚠Caution:

- VDIx terminal logic: When 0 is selected, it is equivalent to the terminal logic being "active at high level"; When selected as 1, it is equivalent to DIterminal logic selection being valid along the edge.

☆Associated function code：

Function code	Name	Setting range	Function	Factory setting	Effective method	Setting method
P0C-09	Communication VDI	0～1	Enable communication VDI	0	Effective immediately	Shutdown setting
P0C-10	VDI default value after power on	0～65535	Set the VDI default value after power on.	0	Re-energize	Shutdown setting
P31-00	Communication given VDI virtual level	Bit0-VDI1 virtual level …… Bit15-VDI16 virtual level	Set VDI terminal logic	-	Effective immediately	Running settings

2）Virtual digital output (VDO)

VDO is similar to the hardware DO terminal and can be assigned a DO FUNCTION. When VDO is enabled, it is equivalent to the number of extended DOs, and the number of VDOs is 16.

Follow these steps to use VDO：

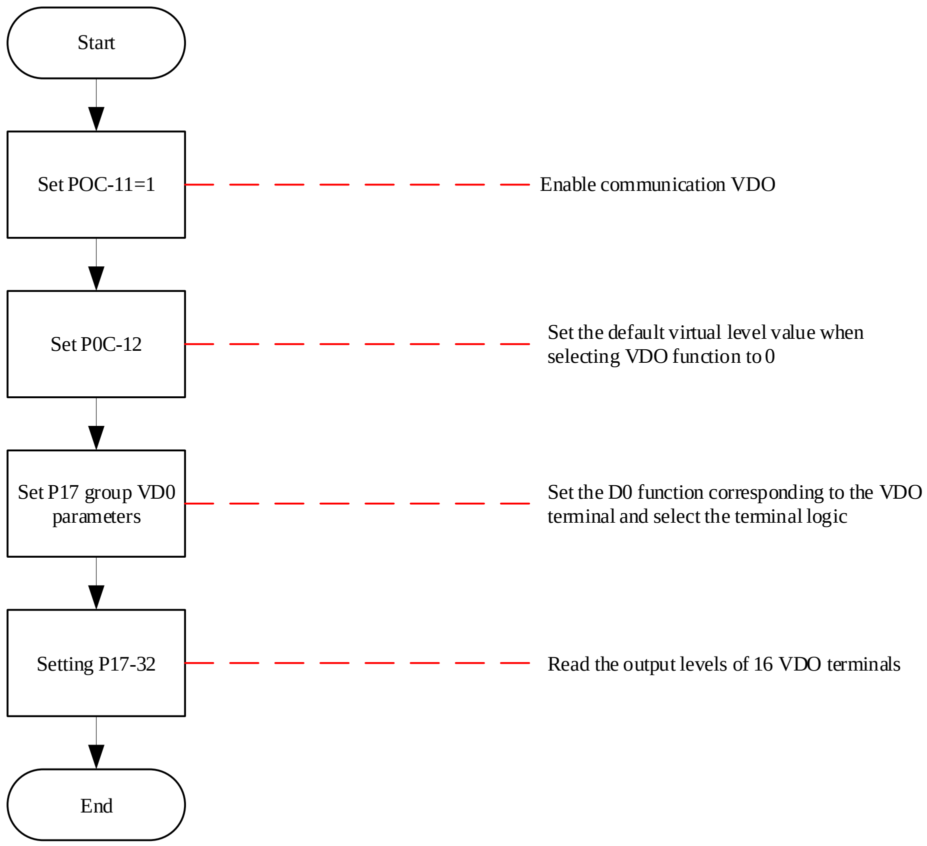


Figure 10-17 VDO Usage flow chart

P0C-12 and P17-32 are displayed in hexadecimal on the panel. After being converted to binary, bit (n)=1 of P0C-12 (P17-32) indicates that the VDO (n+1) terminal logic is "1", and bit (n)=0 indicates that the VDO (n+1) terminal logic is "0". It is recommended to set the logic level of each VDO terminal to the opposite logic as P0C-12.

⚠Caution:

- VDOx terminal logic: When 0 is selected, it is equivalent to the terminal logic being "active at high level"; When selected as 1, it is equivalent to being active at a low level.

☆Associated function code：

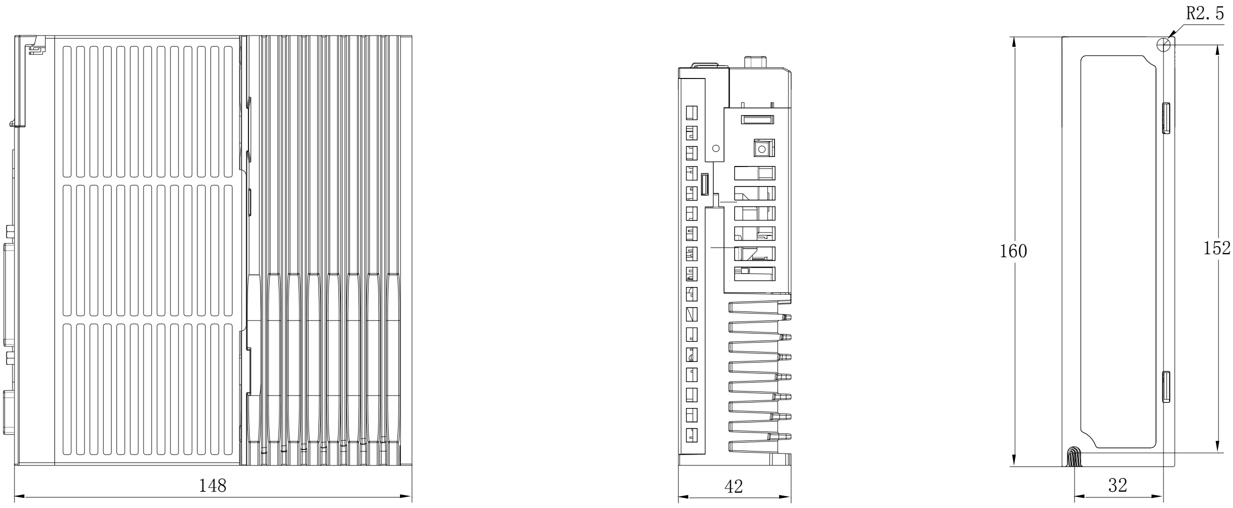
Function code	Name	Setting range	Function	Factory setting	Effective method	Setting method
P0C-11	Communication VDO	0～1	Enable communication VDO	0	Effective immediately	Shutdown setting
P0C-12	Default level when VDO function is selected as 0	0～65535	Set terminal logic when VDO does not allocate DO FUNCTION	0	Effective immediately	Shutdown setting
P17-32	VDO virtual level	Bit0-VDO1 virtual level …… Bit15-VDO16 virtual level	Set output logic for VDO	0	-	Display

Chapter XI Appendices

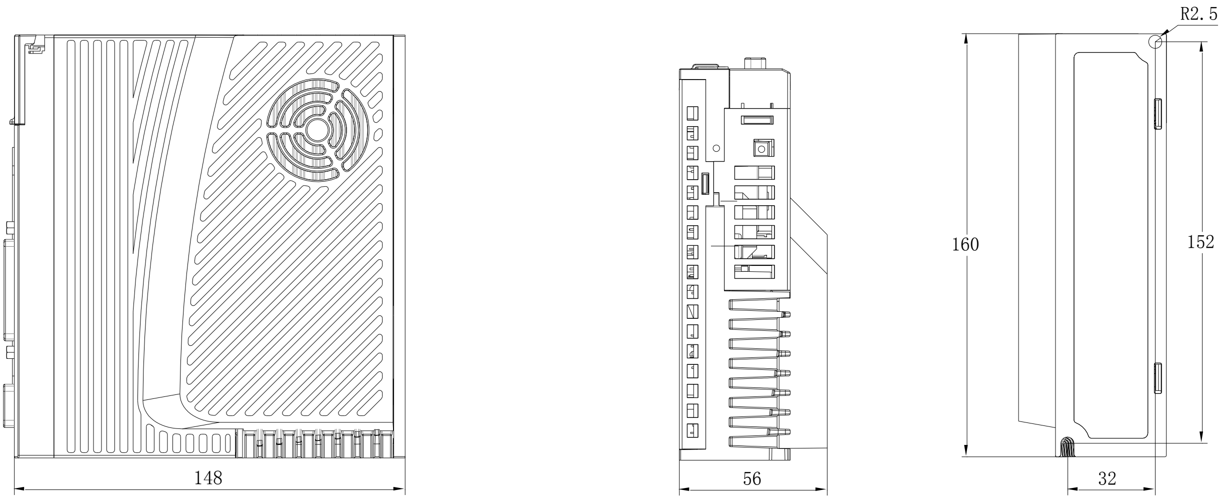
AppendicesA Outline dimension drawing of servo drive

LCDA630PS（220V）、LCDA630PT（380V）(Unit:mm)

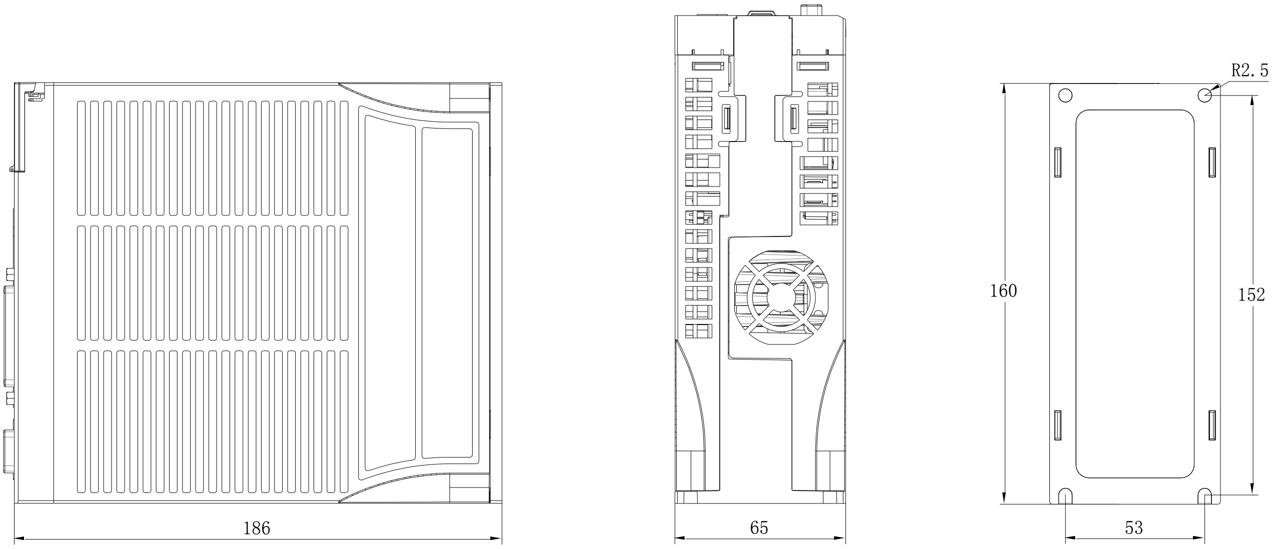
1. LCDA630PS1R6I、LCDA630PS2R8I



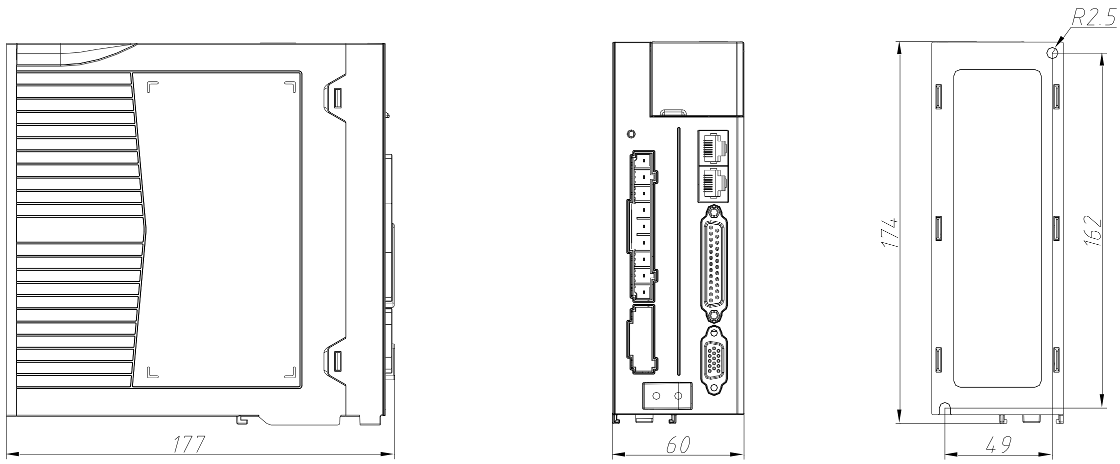
2. LCDA630PS5R5I



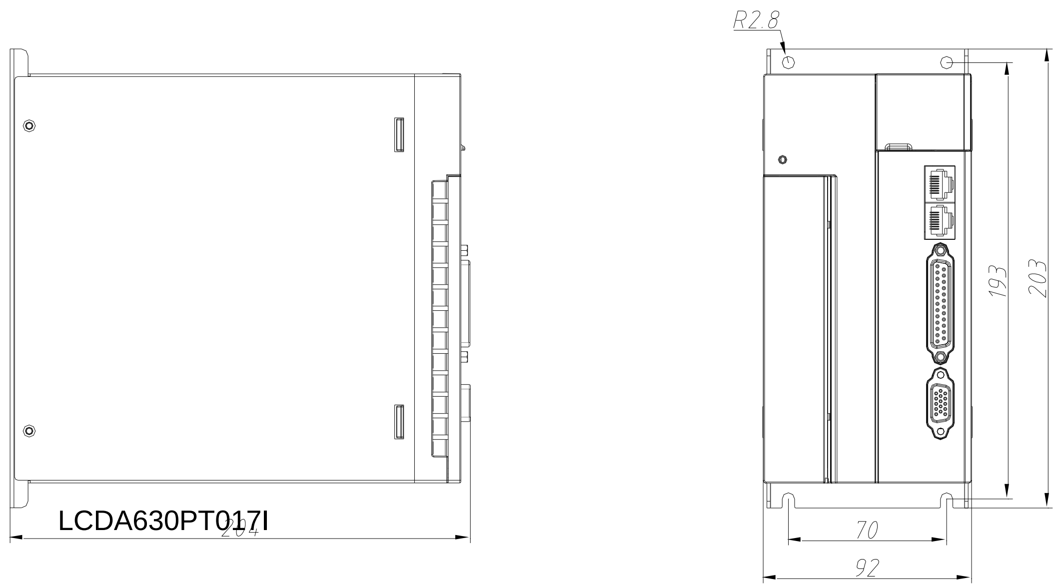
3. LCDA630PS7R6I、LCDA630PS012I、LCDA630PS015I、LCDA630PS018I



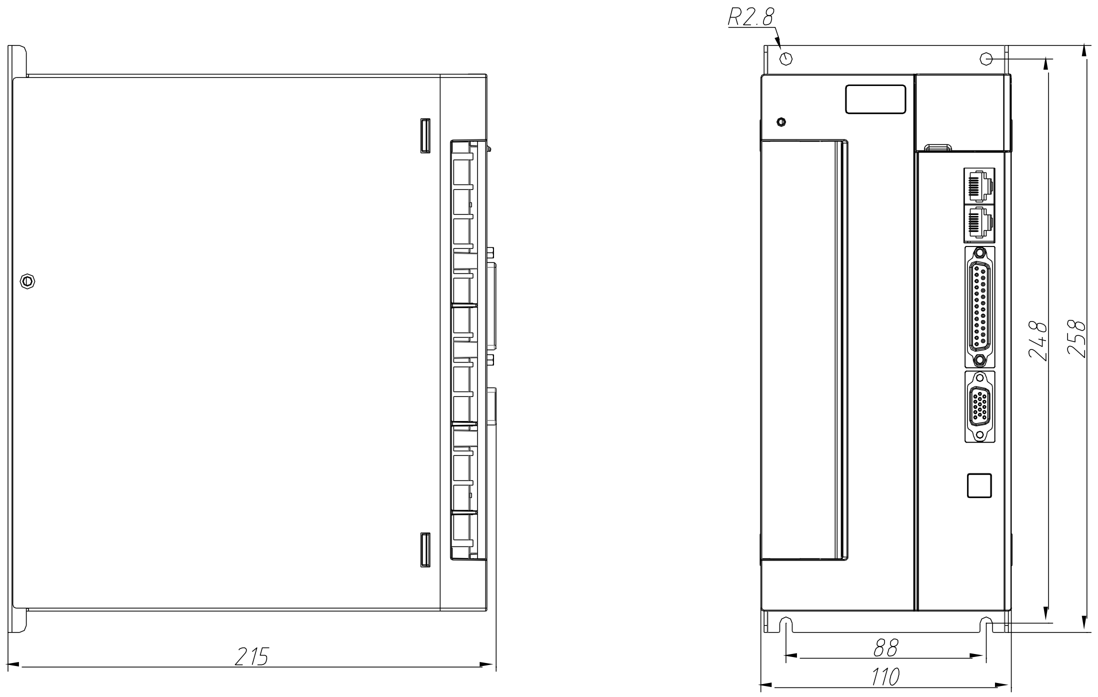
4. LCDA630PT3R5I、LCDA630PT5R4I



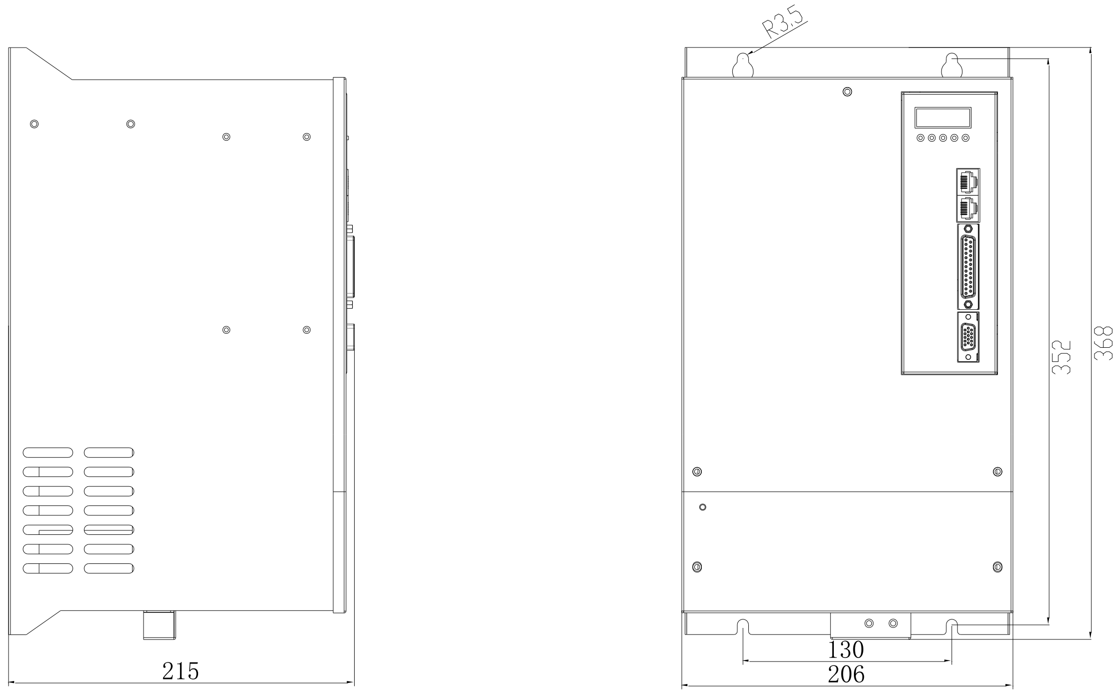
5. LCDA630PT8R4I、LCDA630PT012I、LCDA630PT017I



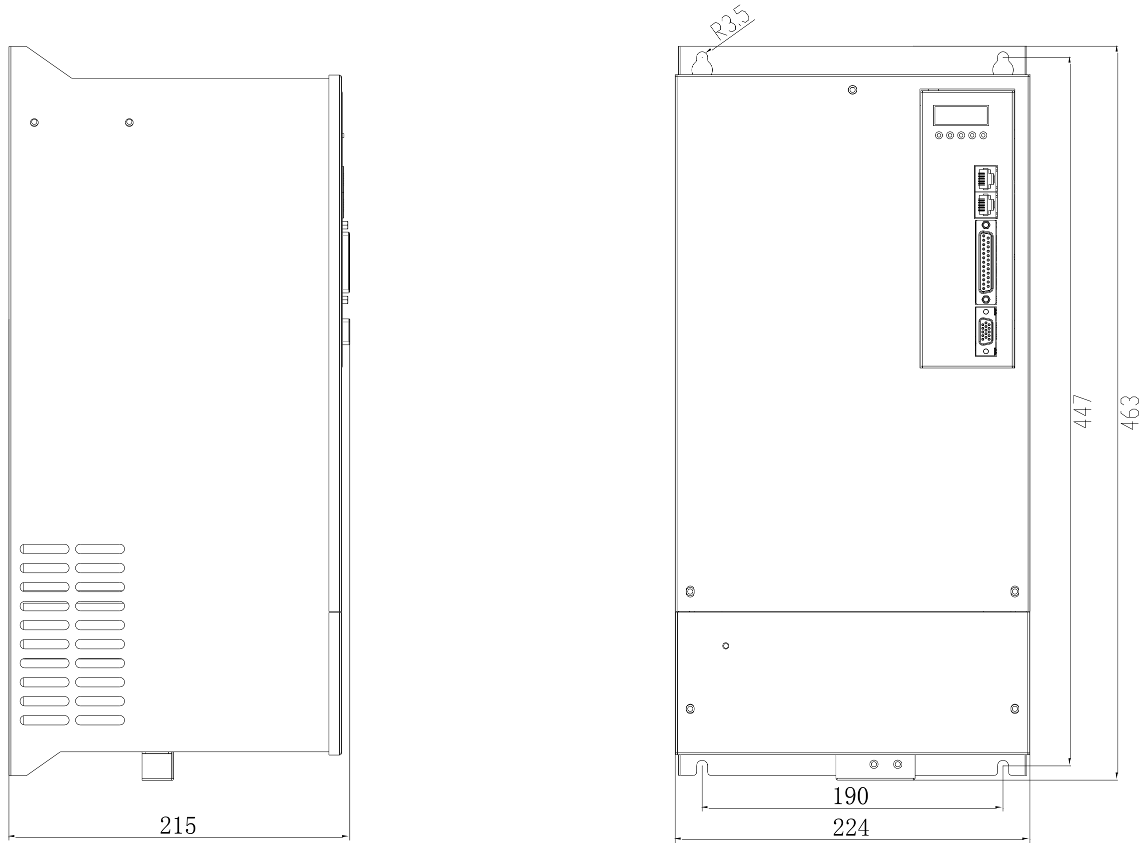
6. LCDA630PS025I、LCDA630PS032I、LCDA630PT021I、LCDA630PT026I、LCDA630PT032I



7. LCDA630PS045I、LCDA630PT037I、LCDA630PT045I



8. LCDA630PS060I、LCDA630PS075I、LCDA630PT060I、LCDA630PT075I


R3.5
447
463
190
224
215

Appendix B List of Function Code Parameters

Function code group	Parameter group summary	Function code group	Parameter group summary
Group P00	Servo motor parameters	Group P0A	Fault and protection parameters
Group P01	Drive parameters	Group P0B	Monitoring parameters
Group P02	Basic control parameters	Group P0C	Communication parameters
Group P03	Terminal input parameters	Group P0D	Auxiliary functions parameter
Group P04	Terminal output parameters	Group P0F	Full closed-loop functional parameters
Group P05	Position control parameters	Group P11	Multi-segment position function parameters
Group P06	Speed control parameters	Group P12	Multi segment speed parameters
Group P07	Torque control parameters	Group P17	Virtual DIDO Parameters
Group P08	Gain class parameters	Group P30	Communication reading servo related variables
Group P09	Self adjusting parameters	Group P31	Communication given servo related variables

P00 GROUP SERVO MOTOR PARAMETERS

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P00	00	Motor number	14130: Tamagawa absolute encoder motor 22 □□□: 220V level incremental encoder motor 38 □ □ □: 380V level incremental encoder motor	-	14130	Re-energize	Shutdown setting	ALL
P00	02	Non label	-	-	-	-	Display	-
P00	09	Rated voltage	0：220 1：380	V	-	Re-energize	Shutdown setting	-
P00	10	Rated power	0.01～655.35	kW	-	Re-energize	Shutdown setting	-
P00	11	Rated current	0.01～655.35	A	-	Re-energize	Shutdown setting	-
P00	12	Rated torque	0.01～655.35	Nm	-	Re-energize	Shutdown setting	-
P00	13	Maximum torque	0.10～655.35	Nm	-	Re-energize	Shutdown setting	-
P00	14	Rated rotational	100～6000	rpm	-	Re-en	Shutd	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		speed				ergize	own setting	
P00	15	Maximum rotational speed	100～6000	rpm	-	Re-energize	Shutdown setting	-
P00	16	Rotational inertia Jm	0.01～655.35	kgcm2	-	Re-energize	Shutdown setting	-
P00	17	Pole pairs of permanent magnet synchronous motors	2～360	Antipolar	-	Re-energize	Shutdown setting	-
P00	18	Stator resistance	0.001～65.535	Ω	-	Re-energize	Shutdown setting	-
P00	19	Stator inductance Lq	0.01～655.35	mH	-	Re-energize	Shutdown setting	-
P00	20	Stator inductance Ld	0.01～655.35	mH	-	Re-energize	Shutdown setting	-
P00	21	Line back potential coefficient	0.01～655.35	mV/rpm	-	Re-energize	Shutdown setting	-
P00	22	Torque coefficient Kt	0.01～655.35	Nm/Arms	-	Re-energize	Shutdown setting	-
P00	23	Electrical constant Te	0.01～655.35	ms	-	Re-energize	Shutdown setting	-
P00	24	Mechanical constant Tm	0.01～655.35	ms	-	Re-energize	Shutdown setting	-
P00	28	Absolute code disk position offset	0～1073741824	P/r	-	Re-energize	Shutdown setting	-
P00	30	Encoder selection (HEX)	0x000 Common Incremental Encoder (UVW-ABZ) 0x010 - 17bit Tamagawa bus encoder	1	0x010	Re-energize	Shutdown setting	-
P00	31	Number of encoder lines	0～1073741824	P/r	1048576	Re-energize	Shutdown setting	-
P00	33	Corresponding angle of Z signal	0.0～360	°	180	Re-energize	Shutdown setting	-
P00	34	Corresponding	0.0～360	°	180	Re-en	Shutd	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		angle of U-phase rising edge				ergize	own setting	

GROUP P01 Drive PARAMETERS

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P01	00	MCU software version number	0～65535	-	-	-	Display	-
P01	01	FPGA software version number	0～65535	-	-	-	Display	-
P01	02	Servo drive number	0～65535	-	-	Re-energize	Shutdown setting	-

Group P02 Basic control parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
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 mixing mode	-	1	Effective immediately	Shutdown setting	-
P02	01	Absolute value system selection	0: Incremental position mode 1: Absolute position linear mode 2: Absolute position rotation mode	-	0	Re-energize	Shutdown setting	ALL
P02	02	Rotation direction selection	0: Take CCW direction as forward rotation direction (A leads B) 1: Take the CW direction as the forward rotation direction (Reverse mode, A lagging B)	-	0	Re-energize	Shutdown setting	PST
P02	03	Output pulse phase	0: Take CCW direction as forward rotation direction (A leads B) 1: Take the CW direction as the forward rotation direction	-	0	Re-energize	Shutdown setting	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			(Reverse mode, A lagging B)					
P02	05	Servo enable OFFShutdown mode selection	0:Free stop and maintain free running status 1: Zero speed shutdown, maintain free running state	-	0	Effective immediately	Shutdown setting	PST
P02	06	Fault No. 2 Shutdown mode selection	0:Free stop and maintain free running status 1: Zero speed shutdown, maintain free running state	-	0	Effective immediately	Shutdown setting	PST
P02	07	Overtravel Shutdown mode selection	0:Free stop and maintain free running status 1: Zero speed shutdown, position remains locked 2: Zero speed shutdown, maintain free running state	-	1	Effective immediately	Shutdown setting	PST
P02	08	Fault No. 1Shutdown mode selection	0- Free stop and maintain free running status	-	0	Effective immediately	Shutdown setting	PST
P02	09	Band brake output ON to command reception delay	0～500	ms	250	Effective immediately	Running settings	PS
P02	10	Static state, band brake output OFF to motor power off delay	1～1000	ms	150	Effective immediately	Running settings	PS
P02	11	Rotation speed threshold when the band brake output is OFF in rotating state	0～3000	rpm	30	Effective immediately	Running settings	PS
P02	12	Rotation status, motor is not powered on, delay until band brake output is OFF	1～1000	ms	500	Effective immediately	Running settings	PS
P02	15	LED Warning Display Selection	0: Immediately output a warning message 1: Do not output warning information	-	0	Effective immediately	Shutdown setting	PST
P02	18	Servo enable (S-ON) filter time constant	0～64	ms	0	Effective immediately	Shutdown setting	PST
P02	21	Minimum	-	Ω	-	-	Display	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		allowable braking resistance of the drive						
P02	22	Power of built-in braking resistor	-	W	-	-	Display	PST
P02	23	Internal braking resistance value	-	Ω	-	-	Display	PST
P02	24	Resistance heat dissipation coefficient	10～100	%	30	Effective immediately	Shutdown setting	PST
P02	25	Braking resistor setting	0: Use built-in braking resistor 1: Use external braking resistor for natural cooling 2: Use external braking resistor and forced air cooling 3: Without braking resistor, it relies entirely on capacitance absorption	-	0	Effective immediately	Shutdown setting	PST
P02	26	External braking resistor power	1～65535	W	-	Effective immediately	Shutdown setting	PST
P02	27	External braking resistance value	1～1000	Ω	-	Effective immediately	Shutdown setting	PST
P02	30	User Password	0～65535	-	0	Re-energize	Shutdown setting	PST
P02	31	System parameter initialization	0: No action 1: Restore the factory setting value (except for P00/P01 group parameters) 2: Clear fault records	-	0	Effective immediately	Shutdown setting	PST
P02	32	Panel Default Display Features	0～99	-	50	Effective immediately	Running settings	-
P02	38	Fault short circuit braking time	0～30000	ms	5000	Effective immediately	Running settings	PST
P02	39	Fault short circuit braking threshold	0-3000	0.1%	1000	Effective immediately	Running settings	PST

Group P03 Terminal input parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P03	00	Power-on effective DI function allocation 1	0～0xFFFF Bit0: corresponds to FunIN. 1 Bit1； corresponds to FunIN. 2 ……	-	0	Re-energize	Running setting	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			Bit 15: corresponds to FunIN.16					
P03	01	Power-on effective DI function allocation 2	0～0xFFFF Bit0: corresponds to FunIN.17 Bit1: corresponds to FunIN.18 …… Bit15: corresponds to FunIN.32	-	0	Re-energize	Running setting	-
P03	02	DI1 terminal function selection	0～37	-	14	Shutdown takes effect	Running setting	-
P03	03	DI1 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	04	DI2 terminal function selection	0～37	-	15	Shutdown takes effect	Running setting	-
P03	05	DI2 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	06	DI3 terminal function selection	0～37	-	13	Shutdown takes effect	Running setting	-
P03	07	DI3 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling	-	0	Shutdown takes effect	Running setting	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			edges are valid					
P03	08	DI4 terminal function selection	0～37	-	2	Shutdown takes effect	Running setting	-
P03	09	DI4 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	10	DI5 terminal function selection	0～37	-	1	Shutdown takes effect	Running setting	-
P03	11	DI5 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	12	DI6 terminal function selection	0～37	-	12	Shutdown takes effect	Running setting	-
P03	13	DI6 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	14	DI7 terminal function selection	0～37	-	3	Shutdown takes effect	Running setting	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P03	15	DI7 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	16	DI8 terminal function selection	0～37	-	31	Shutdown takes effect	Running setting	-
P03	17	DI8 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	18	DI9 terminal function selection	0～37	-	0	Shutdown takes effect	Running setting	-
P03	19	DI9 terminal logic selection	Input polarity: 0-4 0: indicates that the low level is valid 1: Indicates that the high level is valid 2: Indicates that the rising edge is valid 3: Indicates that the falling edge is valid 4: Indicates that both rising and falling edges are valid	-	0	Shutdown takes effect	Running setting	-
P03	34	Power-on effective DI function allocation 3	0～0xFFFF Bit0: corresponds to FunIN.33 Bit1: corresponds to FunIN.34 …… Bit 15: corresponds to FunIN.48	-	0	Re-energize	Running setting	-
P03	35	Power-on effective DI function allocation 4	0～0xFFFF Bit0: corresponds to FunIN.49 Bit1: corresponds to FunIN.50 …… Bit 15: corresponds to FunIN.64	-	0	Re-energize	Running setting	-
P03	50	AI1 Offset	-5000～5000	mV	0	Effecti	Runni	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
						ve immediately	ng setting	
P03	51	AI1 input filtering time constant	0～655.35	ms	2.00	Effective immediately	Running setting	-
P03	53	AI1 Deadband	0～1000.0	mV	10.0	Effective immediately	Running setting	-
P03	54	AI1 zero drift	-500.0～500.0	mV	0.0	Effective immediately	Running setting	-
P03	55	AI2 Bias	-5000～5000	mV	0	Effective immediately	Running setting	-
P03	56	AI2 input filtering time constant	0～655.35	ms	2.00	Effective immediately	Running setting	-
P03	58	AI2 Deadband	0～1000.0	mV	10.0	Effective immediately	Running setting	-
P03	59	AI2 zero drift	-500.0～500.0	mV	0.0	Effective immediately	Running setting	-
P03	80	Speed value corresponding to analog quantity 10V	0rpm～9000rpm	1rpm	3000rpm	Effective immediately	Shutdown setting	-
P03	81	Torque value corresponding to analog quantity 10V	1.00 to 8.00 times rated torque	1.00 times Rated torque	1.00 times Rated torque	Effective immediately	Shutdown setting	-

Group P04 Terminal output parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P04	00	DO1 terminal function selection	0～22	-	1	Shutdown takes effect	Running settings	-
P04	01	DO1 terminal logic selection	Output polarity inversion setting: 0-1 0: Indicates the output L low level when it is valid (Optocoupler conduction) 1: Indicates the output H high level when it is valid (Optocoupler OFF)	-	0	Shutdown takes effect	Running settings	-
P04	02	DO2 terminal function selection	0～22	-	5	Shutdown takes effect	Running settings	-
P04	03	DO2 terminal logic selection	Output polarity inversion setting: 0-1 0: Indicates the output L low level when it is valid (Optocoupler conduction) 1: Indicates the output H high level when it is valid (Optocoupler OFF)	-	0	Shutdown takes effect	Running settings	-
P04	04	DO3 terminal function selection	0～22	-	3	Shutdown takes effect	Running settings	-
P04	05	DO3 terminal logic selection	Output polarity inversion setting: 0-1 0: Indicates the output L low level when it is valid (Optocoupler conduction) 1: Indicates the output H high level when it is valid (Optocoupler OFF)	-	0	Shutdown takes effect	Running settings	-
P04	06	DO4 terminal function selection	0～22	-	11	Shutdown takes effect	Running settings	-
P04	07	DO4 terminal logic selection	Output polarity inversion setting: 0-1 0: Indicates the output L low level when it is valid (Optocoupler conduction) 1: Indicates the output H high level when it is valid (Optocoupler OFF)	-	0	Shutdown takes effect	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P04	08	DO5 terminal function selection	0～22	-	16	Shutdown takes effect	Running settings	-
P04	09	DO5 terminal logic selection	Output polarity inversion setting: 0-1 0: Indicates the output L low level when it is valid (Optocoupler conduction) 1: Indicates the output H high level when it is valid (Optocoupler OFF)	-	0	Shutdown takes effect	Running settings	-
P04	22	DO Source Selection	0～31	-	0	Effective immediately	Shutdown setting	-
P04	50	AO1 signal selection	00: Motor speed (1V/1000rpm 01: Speed command (1V/1000rpm) 02: Torque command (1V/100%) 03: Position deviation (0.05V/Command Unit) 04: Position deviation (0.05V/Encoder unit) 05: Position command speed (1V/1000 rpm) 06: Positioning completion command (Positioning completed: 5V Positioning incomplete: 0V) 07：Speed feedforward (1V/1000rpm) 08: AI1 voltage 09: AI2 voltage	-	0	Effective immediately	Running settings	-
P04	51	AO1 bias voltage	-10000～10000	mV	5000	Effective immediately	Running settings	-
P04	52	AO1 magnification	-99.99 ～99.99	Times	1.00	Effective immediately	Running settings	-
P04	53	AO2 signal selection	00: Motor speed (1V/1000rpm) 01: Speed command (1V/1000rpm) 02: Torque command (1V/100%) 03: Position deviation (0.05V/Command Unit) 04: Position deviation	-	0	Effective immediately	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			(0.05V/Encoder unit) 05: Position command speed (1V/1000rpm) 06: Positioning completion command (Positioning completed: 5V Positioning incomplete: 0V) 07：Speed feedforward (1V/1000rpm) 08: AI1 voltage 09: AI2 voltage					
P04	54	AO2 bias voltage	-10000～10000	mV	5000	Effective immediately	Running settings	-
P04	55	AO2 magnification	-99.99 ～99.99	Times	1.00	Effective immediately	Running settings	-

Group P05 Position control parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P05	00	Location command source	0: Pulse command 1: Step amount given 2: Multi segment position command given	-	0	Effective immediately	Shutdown setting	P
P05	01	Pulse command input terminal selection	0: Low speed 1: High speed	-	0	Effective immediately	Shutdown setting	P
P05	02	Number of position commands per 1 revolution of the motor	0 ～1048576	P/r	0	Re-energize	Shutdown setting	P
P05	04	First order low-pass filtering time constant	0～6553.5	ms	0.0	Effective immediately	Shutdown setting	P
P05	05	Step amount	-9999 ～9999	Command Unit	50	Effective immediately	Shutdown setting	P
P05	06	Average filtering time constant	0.0～128.0	ms	0.0	Effective immediately	Shutdown setting	P
P05	07	Electronic gear ratio 1 (numerator)	1～1073741824	-	131072	Effective imme	Running setting	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
						diately		
P05	09	Electronic tooth ratio 1 (minute)	1～1073741824	-	10000	Effective immediately	Running setting	P
P05	11	Electronic tooth ratio 2	1～1073741824	-	131072	Effective immediately	Running setting	P
P05	13	(numerator)	1～1073741824	-	10000	Effective immediately	Running setting	P
P05	15	Electronic tooth ratio 2	0: Pulse+direction, positive logic 1: Pulse+direction, negative logic 2: A-phase+B-phase quadrature pulse, 4 times frequency 3：CW+CCW	-	0	Re-energize	Shutdown setting	P
P05	16	(denominator)	0: Servo enable OFF and clear position deviation in case of fault 1: Clear position deviation pulse in case of enabling OFF and fault 2: Enable OFF and clear position deviation through DI input ClrPosErr signal	-	0	Effective immediately	Shutdown setting	P
P05	17	Pulse command form	35 ～32767	P/r	2500	Re-energize	Shutdown setting	-
P05	19	Clear Action Selection	0: No speed feedforward 1: Internal speed feedforward	-	1	Effective immediately	Shutdown setting	P
P05	20	Encoder frequency division pulse number	0: Output when the absolute value of position deviation is less than P05-21 1: Output when the absolute value of position deviation is less than P05-21 and the filtered position command is 0 2: Output when the absolute value of position deviation is less than P05-21 and the position command before filtering is 0 3: When the absolute value of position deviation is less than the positioning completion/approaching threshold and the Position command filtering is 0, the output is valid for at least the	-	0	Effective immediately	Running setting	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			time set in P05-60					
P05	21	Speed feedforward control selection	1 ～65535	Encoder /Command Unit	734	Effective immediately	Running settings	P
P05	22	Positioning completion output conditions	1 ～65535	Encoder /Command Unit	65535	Effective immediately	Running settings	P
P05	23	Positioning completion threshold	0: Disable interrupt fixed length function 1: Enable interrupt fixed length function	-	0	Re-energize	Shutdown setting	P
P05	24	Positioning proximity threshold	0 ～1073741824	Command Unit	10000	Effective immediately	Running settings	P
P05	26	Interrupt fixed length enable	0～6000	rpm	200	Effective immediately	Running settings	P
P05	27	Interrupt fixed length displacement	0～1000	ms	10	Effective immediately	Running settings	P
P05	29	Interrupt fixed length constant speed running speed	0: Disabled 1: Enabled	-	1	Effective immediately	Running settings	P
P05	30	Interrupt fixed length acceleration and deceleration time	0: Close the home reset 1: Input the HomeingStart signal through DI to enable the Home reset function 2: Input the HomingStart signal through DI to enable the electrical return to zero function	-	0	Effective immediately	Running settings	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			3: Start the home reset immediately after powering on 4: Immediately perform home reset 5: Start the electrical zero return command 6: Take the current position as the home					
P05	31	Fixed length lock release signal enable	0: Forward return to zero, deceleration point and home are home switches 1: Reverse return to zero, deceleration point and home are home switches 2: Forward return to zero, deceleration point and home are motor Z signals 3: Reverse return to zero, deceleration point and home are motor Z signals 4: Forward return to zero, deceleration point as the home switch, and home as the motor Z signal 5: Reverse return to zero, the deceleration point is the home switch, and the home is the motor Z signal 6: Forward return to zero, deceleration point, and home are forward overtravel switches 7: Reverse return to zero, deceleration point and home are reverse overtravel switches 8: Forward return to zero, the deceleration point is the forward overtravel switch, and the home is the motor Z signal 9: Reverse return to zero, the deceleration point is the reverse overtravel switch, and the home is the motor Z signal 10: Forward return to zero, deceleration point and home are mechanical limit positions 11: Reverse return to zero, deceleration point and home are mechanical limit positions 12: Forward return to zero, the deceleration point is the mechanical	-	0	Effective immediately	Shutdown setting	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			limit position, and the home is the motor Z signal 13: Reverse return to zero, the deceleration point is the mechanical limit position, and the home is the motor Z signal					
P05	32	Home reset enable control	0～3000	rpm	100	Effective immediately	Running setting	P
P05	33	Home reset mode	0～1000	rpm	10	Effective immediately	Running setting	P
P05	34	The speed of the high-speed search home switch signal	0～1000	ms	1000	Effective immediately	Shutdown setting	P
P05	35	The speed of the low speed search home switch signal	0～65535	ms	10000	Effective immediately	Shutdown setting	P
P05	36	Acceleration and deceleration time when searching for the home	-1073741824 ～1073741824	Command Unit	0	Effective immediately	Shutdown setting	P
P05	38	Limit the time to find the home	0: Encoder frequency division output 1: Pulse command synchronization output 2: Frequency division or synchronous output prohibition	-	0	Re-energize	Shutdown setting	P
P05	39	Mechanical home offset	0: The position command (referring to Unit only) is 0 and lasts for 2.5 ms before switching 1: Real time switching	-	0	Effective immediately	Shutdown setting	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P05	40	Servo pulse output source selection	0: P05-36 is the coordinate after the home reset. When encountering a limit, it triggers the home reset enable again, and then reversely finds the home. 1: P05-36 is the relative offset after the home reset. When encountering a limit, it triggers the home reset enable again, and then reversely finds the home 2: P05-36 is the coordinate after the home is reset, and it automatically reverses the zero finding when encountering a limit position 3: P05-36 is the relative offset after the home is reset, and when encountering a limit, it will automatically reverse the zero finding	-	0	Effective immediately	Shutdown setting	P
P05	41	Electronic gear ratio switching conditions	0: Positive polarity output (Z pulse is high level) 1: Negative polarity output (Z pulse is low level)	-	1	Re-energize	Shutdown setting	P
P05	43	Mechanical home offset and limit handling method	0: The falling edge is valid 1: The rising edge is valid	-	0	Re-energize	Running settings	PST
P05	46	Z pulse output polarity selection	-2147483648～2147483647	Encoder Unit	0	Effective immediately	Shutdown setting	ALL
P05	48	Position pulse edge selection	-2147483648～2147483647	Encoder Unit	0	Effective immediately	Shutdown setting	ALL
P05	50	Absolute position linear mode position offset (lower 32 bits)	1-65535	-	65535	Effective immediately	Shutdown setting	ALL
P05	51	Absolute Position Linear Mode Position Offset (High 32 bits)	1-65535	-	1	Effective immediately	Shutdown setting	ALL
P05	52	Absolute position rotation mode mechanical gear ratio (numerator)	0～ 4294967295	Encoder Unit	0	Effective immediately	Shutdown setting	ALL

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P05	54	Absolute position rotation mode mechanical gear ratio (denominator)	0～ 127	Encoder Unit	0	Effective immediately	Shutdown setting	ALL
P05	56	Absolute position rotation mode Number of pulses for one revolution of the load (lower 32 bits)	0～1000	rpm	2	Effective immediately	Running setting	P
P05	58	Absolute position rotation mode Number of pulses for one revolution of the load (high 32 bits)	0～300.0	%	100.0 %	Effective immediately	Running setting	P
P05	59	Touch stop return to zero speed judgment threshold	0～30000	ms	0	Effective immediately	Running setting	P
P05	60	Touch to zero torque limit	0～30000	ms	0	Effective immediately	Running setting	P
P05	61	Positioning completion window time	0～262143	P/r	0	Re-energize	Shutdown setting	-

Group P06 Speed Control Parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P06	00	Main speed command A source	0:Number given (P06-03) 1:AI1 2:AI2	-	0	Effective immediately	Shutdown setting	S
P06	01	Auxiliary speed command B source	0:Number given (P06-03) 1:AI1 2:AI2 3:0 (no effect) 4:0 (no effect) 5: Multi segment speed command	-	1	Effective immediately	Shutdown setting	S
P06	02	Speed command selection	0: Main speed command A source 1: Auxiliary speed command B source	-	0	Effective immediately	Shutdown setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			2:A+B 3: A/B switching 4: Communication given					
P06	03	Speed command keyboard Set value	-6000～6000	rpm	200	Effective immediately	Running settings	S
P06	04	Jog speed Set value	0～6000	rpm	100	Effective immediately	Running settings	S
P06	05	Speed command acceleration ramp time constant	0～65535	ms	0	Effective immediately	Running settings	S
P06	06	Speed command deceleration ramp time constant	0～65535	ms	0	Effective immediately	Running settings	S
P06	07	Maximum rotational speed threshold	0～6000	rpm	6000	Effective immediately	Running settings	S
P06	08	Forward speed threshold	0～6000	rpm	6000	Effective immediately	Running settings	S
P06	09	Reverse speed threshold	0～6000	rpm	6000	Effective immediately	Running settings	S
P06	11	Torque feedforward control selection	0: No torque feedforward 1: Internal torque feedforward	-	1	Effective immediately	Running settings	PS
P06	15	Zero fixed speed threshold	0～6000	rpm	10	Effective immediately	Running settings	S
P06	16	Motor rotation speed threshold	0～1000	rpm	20	Effective immediately	Running settings	S
P06	17	Speed consensus signal threshold	0～100	rpm	10	Effective immediately	Running settings	S
P06	18	Speed reached signal threshold	10～6000	rpm	1000	Effective immediately	Running settings	S
P06	19	Zero speed output signal threshold	1～6000	rpm	10	Effective immediately	Running settings	S

Group P07 Torque control parameters

The torque command 100% corresponds to the rated torque of the motor.

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

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P07	01	Auxiliary torque command B source	0:Number given (P07-03) 1:AI1 2:AI2	-	1	Effective immediately	Shutdown setting	T
P07	02	Torque command selection	0: Main torque command A source 1: Auxiliary torque command B source 2: Main instruction A source+auxiliary instruction B source 3: Main command A source/auxiliary command B source switching 4: Communication given	-	0	Effective immediately	Shutdown setting	T
P07	03	Torque command keyboard Set value	-300.0～300.0	%	0	Effective immediately	Running settings	T
P07	05	Torque command filtering time constant	0～30.00	ms	0.79	Effective immediately	Running settings	PST
P07	06	Second Torque command filtering time constant	0～30.00	ms	0.79	Effective immediately	Running settings	PST
P07	07	Source of torque limit	0: Positive and negative internal torque limit 1: Positive and negative external torque limit (Select using P-CL, N-CL) 2: T-LMT used as external torque limit input 3: Take the minimum value of positive and negative external torque and external T-LMT as the torque limit (select using P-CL and N-CL) 4: Switching between positive and negative internal torque limits and T-LMT torque limits (using P-CL, N-CL selection)	-	0	Effective immediately	Shutdown setting	PST
P07	08	T-LMT selection	1：AI1 2：AI2	-	2	Effective immediately	Shutdown setting	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P07	09	Positive internal torque limit	0.0～300.0	%	300.0	Effective immediately	Running settings	PST
P07	10	Negative internal torque limit	0.0～300.0	%	300.0	Effective immediately	Running settings	PST
P07	11	Positive external torque limit	0.0～300.0	%	300.0	Effective immediately	Running settings	PST
P07	12	Negative external torque limit	0.0～300.0	%	300.0	Effective immediately	Running settings	PST
P07	17	Speed limit source selection	0: Internal speed limit (Speed limit during torque control) 1: Use V-LMT as external speed limit input 2: Select P07-19/P07-20 as the internal speed limit through FunIN.36 (V-SEL)	-	0	Effective immediately	Running settings	T
P07	18	V-LMT selection	1：AI1 2：AI2	-	1	Effective immediately	Running settings	T
P07	19	Torque control forward speed limit value/Torque control speed limit value 1	0～6000	rpm	3000	Effective immediately	Running settings	T
P07	20	Negative speed limit value during torque control/speed limit value during torque control 2	0～6000	rpm	3000	Effective immediately	Running settings	T
P07	21	Torque reaches reference value	0.0～300.0	%	0.0	Effective immediately	Running settings	PST
P07	22	Torque reaches effective value	0.0～300.0	%	20.0	Effective immediately	Running settings	PST
P07	23	Torque reaches invalid value	0.0～300.0	%	10.0	Effective immediately	Running settings	PST
P07	40	Speed limited window in torque mode	0.5～30.0	ms	1.0	Effective immediately	Running settings	T

Group P08 Gain class parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P08	00	Speed loop gain	0.1～2000.0	Hz	25.0	Effective immediately	Running settings	PS

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P08	01	Speed loop integral time constant	0.15～512.00	ms	31.83	Effective immediately	Running settings	PS
P08	02	Position loop gain	0.0～2000.0	Hz	40.0	Effective immediately	Running settings	P
P08	03	Second speed loop gain	0.1～2000.0	Hz	40.0	Effective immediately	Running settings	PS
P08	04	Integral time constant of the second speed loop	0.15～512.00	ms	40.00	Effective immediately	Running settings	PS
P08	05	2nd position loop gain	0.0～2000.0	Hz	64.0	Effective immediately	Running settings	P
P08	08	Second gain mode setting	0: The first gain is fixed, and external DI is used for P/PI switching; 1: Use Gain switching according to the condition settings in P08-09	-	1	Effective immediately	Running settings	PST
P08	09	Gain switching condition selection	0: First gain fixed (PS) 1: Use external DI switching (PS) 2: High torque command (PS) 3: High speed command (PS) 4: Large speed command change rate (PS) 5: Speed command high and low speed threshold (PS) 6: Large position deviation (P) 7: With position command (P) 8: Positioning completed 9: Large actual speed (P) 10: With position command+actual speed (P)	-	0	Effective immediately	Running settings	PST
P08	10	Gain switching delay time	0.0～1000.0	ms	5.0	Effective immediately	Running settings	PST
P08	11	Gain switching level	0～20000	According to switching conditions	50	Effective immediately	Running settings	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P08	12	Gain switching delay	0～20000	According to switching conditions	30	Effective immediately	Running settings	PST
P08	13	Position Gain switching time	0.0～1000.0	ms	3.0	Effective immediately	Running settings	P
P08	15	Rotational inertia ratio of load	0.00～120.00	Times	1.00	Effective immediately	Running settings	PST
P08	18	Speed feedforward filtering time constant	0.00～64.00	ms	0.50	Effective immediately	Running settings	P
P08	19	Speed Feedforward gain	0.0～100.0	%	0.0	Effective immediately	Running settings	P
P08	20	Torque feedforward filtering time constant	0.00～64.00	ms	0.50	Effective immediately	Shutdown setting	PS
P08	21	Torque Feedforward gain	0.0～200.0	%	0.0	Effective immediately	Running settings	PS
P08	22	Speed feedback filtering options	0: Disable speed feedback averaging filtering 1: Speed feedback twice 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	Shutdown setting	PS
P08	23	Speed feedback low-pass filter cutoff frequency	100～4000	Hz	4000	Effective immediately	Running settings	PS
P08	24	Pseudo differential feedforward control coefficient	0.0～100.0	-	100.0	Effective immediately	Running settings	PS

Group P09 Self adjusting parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P09	00	Self adjusting mode selection	0: Parameter self adjustment is invalid, manually adjust the parameter 1: Parameter self-adjusting mode, using a rigidity meter to automatically adjust the gain parameters 2: Positioning mode, using a rigid meter to automatically adjust the gain parameters	-	0	Effective immediately	Running settings	PST
P09	01	Rigidity level selection	0～31	-	12	Effective immediately	Running settings	PST
P09	02	Adaptive notch filter mode selection	0: Adaptive notch filter is no longer updated 1: Adaptive notch filter is valid (Group 3 notch filter) 2: Adaptive notch filters are valid (Group 3 and Group 4 notch filters) 3: Only test the resonance point on P09-24Display 4: Restore the values of the third and fourth groups of notch filters to the factory state	-	0	Effective immediately	Running settings	PST
P09	03	Online Inertia identification mode	0: Turn off online identification 1: Enable online identification and slow change 2: Enable online identification, general changes 3: Enable online identification to quickly change	-	0	Effective immediately	Running settings	RST
P09	04	Low frequency response suppression mode selection	0: Manually set the vibration frequency 1: Automatic identification of vibration frequency	-	0	Effective immediately	Running settings	P
P09	05	Offline Inertia	0: Positive and negative	-	0	Effective	Shutdown	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		identification mode selection	triangular wave mode 1: JOG jog mode			immediately	setting	
P09	06	Inertia identification maximum speed	100～1000	rpm	500	Effective immediately	Shutdown setting	PST
P09	07	Acceleration to maximum speed time constant during Inertia identification	20～800	ms	125	Effective immediately	Shutdown setting	PST
P09	08	Waiting time after completion of a single Inertia identification	50～10000	ms	800	Effective immediately	Shutdown setting	PST
P09	09	Complete a single Inertia identification of the number of motor rotations	0.00～2.00	r	-	-	Display	PST
P09	12	Group 1 notch filter frequency	50～4000	Hz	4000	Effective immediately	Running settings	PS
P09	13	Group 1 notch filter width level	0～20	-	2	Effective immediately	Running settings	PS
P09	14	Group 1 notch filter depth level	0～99	-	0	Effective immediately	Running settings	PS
P09	15	Group 2 notch filter frequency	50～4000	Hz	4000	Effective immediately	Running settings	PS
P09	16	Group 2 notch filter width level	0～20	-	2	Effective immediately	Running settings	PS
P09	17	Group 2 notch filter depth level	0～99	-	0	Effective immediately	Running settings	PS
P09	18	Group 3 notch filter frequency	50～4000	Hz	4000	Effective immediately	Running settings	PS
P09	19	Group 3 notch filter width level	0～20	-	2	Effective immediately	Running settings	PS
P09	20	Group 3 notch filter depth level	0～99	-	0	Effective immediately	Running settings	PS
P09	21	Group 4 notch filter frequency	50～4000	Hz	4000	Effective immediately	Running settings	PS
P09	22	Group 4 notch filter width level	0～20	-	2	Effective immediately	Running settings	PS
P09	23	Group 4 notch filter depth level	0～99	-	0	Effective immediately	Running settings	PS
P09	24	Resonance frequency identification	0～2	Hz	0	-	Display	PS

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		results						
P09	30	Torque disturbance compensation gain	0.0～100.0	%	0.0	Effective immediately	Running settings	PS
P09	31	Torque disturbance observer filter time constant	0.00～25.00	ms	0.50	Effective immediately	Running settings	PS
P09	38	Low frequency resonance frequency	1.0～100.0	Hz	100.0	Effective immediately	Running settings	P
P09	39	Low frequency resonance frequency filter setting	0～10	-	2	Effective immediately	Running settings	P

Group P0A Fault and protection parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0A	00	Power input phase loss protection selection	0: Enable Fault Inhibit Warning 1: Enable faults and warnings 2: Prohibit faults and warnings	-	0	Effective immediately	Running setting	-
P0A	03	Enable selection of power down saving function	0: Do not perform power down saving 1: Execute power down saving	-	0	Effective immediately	Running setting	-
P0A	04	Motor overload protection gain	50～300	%	100	Effective immediately	Shutdown setting	-
P0A	08	Overspeed fault threshold	0～10000	rpm	0	Effective immediately	Running setting	PST
P0A	09	Maximum position pulse frequency	100～4000	kHz	4000	Effective immediately	Shutdown setting	P
P0A	10	Excessive position deviation fault threshold	1 ～60000	°	1440	Effective immediately	Running setting	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0A	12	Speed protection function enabled	0: No protection for speeding 1: Turn on the overspeed protection	-	1	Effective immediately	Running setting	PST
P0A	16	Low frequency resonance position deviation judgment threshold	1-1000	Encoder Unit	5	Effective immediately	Running setting	P
P0A	17	Position setting Unit selection	0：Encoder unit 1：Command Unit	-	0	Effective immediately	Shutdown setting	P
P0A	19	DI8 filter time constant	0～255	11ns	80	Re-energize	Shutdown setting	-
P0A	20	DI9 filter time constant	0～255	11ns	80	Re-energize	Shutdown setting	-
P0A	24	Low speed Pulse input pin filtering time constant	0～255	11ns	30	Re-energize	Shutdown setting	P
P0A	25	Speed feedback Display value filtering time constant	0～5000	ms	50	Effective immediately	Shutdown setting	-
P0A	26	Motor overload shield enable	0: Open motor overload detection 1: Shielded motor overload warning and fault detection	-	0	Effective immediately	Shutdown setting	-
P0A	27	Velocity DO filter time constant	0～5000	ms	10	Effective immediately	Shutdown setting	-
P0A	28	Filtering time constant of orthogonal encoder	0～255	11ns	30	Re-energize	Shutdown setting	-
P0A	30	High speed Pulse input pin filtering time constant	0～255	11ns	3	Re-energize	Shutdown setting	P
P0A	32	Locked rotor over temperature protection time window	10～65535	ms	200	Effective immediately	Running setting	-
P0A	33	Locked rotor overtemperature protection enable	0: Shield Motor locked rotor over temperature protection detection 1: Enable Motor locked rotor over	-	1	Effective imme	Running setting	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			temperature protection detection			diately		
P0A	36	Encoder multi turn overflow fault selection	0: Do not shield 1: Shield	-	0	Effective immediately	Shutdown setting	ALL
P0A	40	Soft limit setting	0: Soft limit not enabled 1: Enable soft limit immediately after powering on 2: Enable soft limit after zero return	1	0	Effective immediately	Shutdown setting	PST
P0A	41	Maximum value of soft limit	-2147483648～2147483647	Command Unit	2147483647	Effective immediately	Shutdown setting	PST
P0A	43	Minimum value of soft limit	-2147483648～2147483647	Command Unit	-2147483648	Effective immediately	Shutdown setting	PST
P0A	47	Band brake protection detection enable	0: Disabled 1: Enabled	-	1	Effective immediately	Running setting	ALL

Group P0B Monitoring parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0B	00	Actual motor speed	-	rpm	-	-	Display	PST
P0B	01	Speed command	-	rpm	-	-	Display	PS
P0B	02	Internal torque command	-	%	-	-	Display	PST
P0B	03	(Relative to Rated torque)	-	-	-	-	Display	PST
P0B	05	Input signal (DI signal) monitoring	-	-	-	-	Display	PST
P0B	07	Output signal (DO signal) monitoring	-	Command Unit	-	-	Display	PST
P0B	09	Absolute position counter (32-bit decimal display)	-	Encoder unit	-	-	Display	PST
P0B	10	Mechanical angle (number of pulses from origin)	-	°	-	-	Display	PST
P0B	11	Electrical angle	-	rpm	-	-	Display	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0B	12	Input speed information corresponding to position command	-	%	-		Display	PST
P0B	13	Average load rate	-	Command Unit	-	-	Display	P
P0B	15	Input command pulse counter (32-bit decimal display)	-	Encoder unit	-	-	Display	P
P0B	17	Encoder position deviation counter (32-bit decimal display)	-	Encoder unit	-	-	Display	PST
P0B	19	Feedback pulse counter (32-bit decimal display)	-	s	-	-	Display	PST
P0B	21	Total power on time (32-bit decimal display)	-	V	-	-	Display	PST
P0B	22	AI1 sampling voltage value	-	V	-	-	Display	PST
P0B	24	AI2 sampling voltage value	-	A	-	-	Display	PST
P0B	26	Effective value of phase current	-	V	-	-	Display	PST
P0B	27	Bus voltage value	-	℃	-	-	Display	PST
P0B	33	Module temperature value	0: Current fault 1: Last fault 2: Last 2 failures …… 9: Last 9 failures	-	0	Effective immediately	Running settings	PST
P0B	34	Fault record	-	-	-	-	Display	PST
P0B	35	Fault code for selected times	-	s		-	Display	PST
P0B	37	Selected fault timestamp	-	rpm	-	-	Display	PST
P0B	38	Motor speed at selected fault	-	A	-	-	Display	PST
P0B	39	Motor U-phase current at selected fault	-	A	-	-	Display	PST
P0B	40	Motor V phase current at selected fault	-	V	-	-	Display	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0B	41	Bus voltage at selected fault	-	-	-	-	Display	PST
P0B	42	Input terminal status at selected fault	-	-	-	-	Display	PST
P0B	53	Output terminal status at selected fault	-	Command Unit	-	-	Display	P
P0B	55	Position deviation counter	-	rpm	-	-	Display	PST
P0B	58	Actual motor speed (0.1 rpm)	-	Encoder unit	0	-	Display	ALL
P0B	60	Mechanical absolute position (low 32 bits)	-	Encoder unit	0	-	Display	ALL
P0B	64	Mechanical absolute position (high 32 bits)	-	Command Unit	-	-	Display	PST
P0B	70	Real time input position command counter	-	r	0	-	Display	ALL
P0B	71	Absolute encoder rotation number data	-	Encoder unit	0	-	Display	ALL
P0B	77	Absolute encoder position within 1 turn	-	Encoder unit	0	-	Display	ALL
P0B	79	Absolute encoder absolute position (low 32 bits)	-	Encoder unit	0	-	Display	ALL
P0B	81	Absolute encoder absolute position (high 32 bits)	-	Encoder unit	0	-	Display	ALL
P0B	83	Rotation load single turn position	-	Encoder unit	0	-	Display	ALL
P0B	85	(Low 32 bits)	-	Command Unit	0	-	Display	ALL

Group P0C Communication parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0C	00	Servo axis address	1 ~ 247, 0 is the broadcast address	-	1	Effective imme	Running setting	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
						diately		
P0C	02	Serial Baud rate setting	0：2400Kbp/s 1：4800Kbp/s 2：9600Kbp/s 3：19200Kbp/s 4：38400Kbp/s 5：57600Kbp/s	-	2	Effective immediately	Running setting	PST
P0C	03	MODBUS data format	0: No check, 2 end bit 1: Even check, 1 end bit 2: Odd check, 1 end bit 3: No check, 1 end bit	-	3	Effective immediately	Running setting	PST
P0C	08	CAN communication rate setting	0：20K 4：250K 1：50K 5：500K 2：100K 6：1M 3：125K 7：1M	-	5	Effective immediately	Running setting	PST
P0C	09	Communication VDI	0: Inhibited 1: Enabled	-	0	Effective immediately	Shutdown setting	PST
P0C	10	VDI default value after power on	Bit0-VDI1 Default …… Bit15-VDI16 Default	-	0	Re-energize	Running setting	PST
P0C	11	Communication VDO	0: Inhibited 1: Enabled	-	0	Effective immediately	Shutdown setting	PST
P0C	12	Default level when VDO function is selected as 0	Bit0-VDO1 Default Bit15-VDO16 default value	-	0	Effective immediately	Shutdown setting	PST
P0C	13	Whether the MODBUS communication write function code is updated to EEPROM	0: Do not update EEPROM 1: Update EEPROM except for P0B and P0D groups	-	1	Effective immediately	Running setting	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0C	14	MODBUS error code	New agreement: 0x0001: Illegal function (command code) 0x0002: Illegal data address 0x0003: Illegal data 0x0004: Slave station equipment fault Old agreement: 0x0002: Command code is not 0x03/0x06/0x10 0x0004: The CRC check code of the data frame received by the servo calculation is not equal to the data intra check code 0x0008: The accessed Function code does not exist 0x0010: The value written to Function code exceeds the upper and lower limit of Function code 0x0080: The function code being written can only be modified in the servo shutdown state, while the servo is currently in the running state	1	-	-	Display	-
P0C	16	CAN communication write function code updated to EEPROM	0: Do not update EEPROM 1: Update EEPROM except for P0B and P0D groups	-	0	Effective immediately	Running setting	PST
P0C	25	MODBUS command response delay	0～5000	ms	1	Effective immediately	Running setting	PST
P0C	26	MODBUS communication data high and low order	0: High 16 bits first, low 16 bits last 1: The low 16 bits come first, and the high 16 bits come last	1	1	Effective immediately	Running setting	PST
P0C	30	MODBUS error frame format selection	0: Old Agreement 1: New protocol (standard protocol)	1	1	Effective immediately	Running setting	PST

Group P0D Auxiliary functions parameter

Function code	Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0D	00	Software reset	0: No action 1: Enabled	-	0	Effective immediately	Shutdown setting	-
P0D	01	Fault reset	0: No action 1: Enabled	-	0	Effective immediately	Shutdown setting	-
P0D	02	Offline Inertia identification function	-	-	-	Effective immediately	Running setting	-
P0D	03	Reserved parameters	-	-	-	-	-	-
P0D	05	Emergency stop	0: No action 1: Enable emergency shutdown	-	0	Effective immediately	Running setting	-
P0D	10	Automatic adjustment of analog channels	0: No action 1: AI1 adjustment 2: AI2 adjustment	-	0	Effective immediately	Shutdown setting	-
P0D	11	JOG commissioning function	(Self filtering)	-	-	-	-	-
P0D	17	DIDO forced input/output enable	0: No action 1: Forced DI enable, forced DO not enable 2: Forced DO enable, forced DI not enable 3: Force DIDO to be enabled	-	0	Effective immediately	Running setting	-
P0D	18	DI forced input given	0～0x01FF	-	0x01FF	Effective immediately	Running setting	-
P0D	19	DO forced output given	0～0x001F	-	0	Effective immediately	Running setting	-
P0D	20	Absolute encoder reset enable	0: No action 1: Reset fault 2: Reset fault and multi turn data	-	0	Effective immediately	Shutdown setting	ALL
P0D	24	Gravity load identification	0: Do not recognize 1: Enable recognition	-	0	Effective immediately	Running setting	-

Group P0F Full closed-loop functional parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P0F	00	Encoder feedback mode	0～2	-	0	Effective immediately	Shutdown setting	P
P0F	01	External encoder usage	0: Use in standard running direction 1: Used in reverse running direction	-	0	Effective immediately	Shutdown setting	P
P0F	04	Number of external encoder pulses per revolution of the motor	0 ～1073741824	External encoder Unit	10000	Re-energize	Shutdown setting	P
P0F	08	Full closed-loop position deviation excessive threshold	0 ～1073741824	External encoder Unit	10000	Effective immediately	Running settings	P
P0F	10	Full closed-loop position deviation clearing setting	0～100	r	0	Effective immediately	Running settings	P
P0F	13	Hybrid Vibration Compression Filtering Time Constant	0～6553.5	ms	0	Effective immediately	Running settings	P
P0F	16	Full closed-loop position deviation counter	-1073741824 ～ 1073741824	External encoder Unit	0	-	Display	P
P0F	18	Internal encoder feedback pulse counter	-1073741824 ～ 1073741824	Internal encoder Unit	0	-	Display	P
P0F	20	External encoder feedback pulse counter	-1073741824 ～ 1073741824	External encoder Unit	0	-	Display	P

Group P11 Multi segment position function parameters

Function code	Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P11	00	Multi segment position running mode	0: Shutdown at the end of a single operation (P11-01 selects the number of segments) 1: Cyclic operation (P11-01 performs segment number selection) 2: DI switching operation (selected through DI) 3: Sequential operation (P11-01 performs segment number selection)	-	1	Effective immediately	Shutdown setting	P
P11	01	Number of end segments of displacement command	1～16	-	1	Effective immediately	Shutdown setting	P
P11	02	Margin treatment method	Valid in three modes except DI mode 0: Continue running unfinished segments 1: Restart operation from the first segment	-	0	Effective immediately	Shutdown setting	P
P11	03	Time Unit	0：ms 1：s	-	0	Effective immediately	Shutdown setting	P
P11	04	Displacement command type selection	0: Relative displacement command 1: Absolute displacement command	-	0	Effective immediately	Shutdown setting	P
P11	05	Selection of starting section for sequential running	0～16	-	0	Effective immediately	Shutdown setting	P
P11	12	Movement displacement of the 1st segment	-1073741824 ～1073741824	指令 Unit	10000	Effective immediately	Running settings	P
P11	14	Maximum operating speed of the 1st segment displacement	1～6000	rpm	200	Effective immediately	Running settings	P
P11	15	Displacement acceleration and deceleration time of the 1st segment	0～65535	ms(s)	10	Effective immediately	Running setting	P
P11	16	Waiting time after completion of the	0～10000	ms(s)	10	Effective	Running	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		1st segment displacement				imme diately	setting	
P11	17	Movement displacement of the 2nd segment	-1073741824 ～1073741824	指令 Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	19	Maximum operating speed of the 2nd segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	20	Displacement acceleration and deceleration time of the 2nd segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	21	Waiting time after completion of the 2nd segment displacement	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	22	Movement displacement of the 3rd segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	24	Maximum operating speed of the3rd segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	25	Displacement acceleration and deceleration time of the 3rd segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	26	Waiting time after completion of the 3rd segment displacement	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	27	Movement displacement of the fourth segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	29	Maximum operating speed of the 4th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	30	Displacement acceleration and	0～65535	ms(s)	10	Effecti ve	Runni ng	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		deceleration time of the 4th segment				imme diately	setting	
P11	31	Waiting time after completion of the 4th segment displacement	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	32	Movement displacement of the 5th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	34	Maximum operating speed of the 5th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	35	Displacement acceleration and deceleration time of the 5th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	36	Waiting time after completion of the 5th segment displacement	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	37	Movement displacement of the 6th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	39	Maximum operating speed of the 6th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	40	Displacement acceleration and deceleration time of the 6th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	41	Waiting time after the completion of the 6th segment displacement	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	42	Movement displacement of the 7th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	44	Maximum operating speed of the 7th	1～6000	rpm	200	Effecti ve	Runni ng	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		segment displacement				imme diately	setting	
P11	45	Displacement acceleration and deceleration time of the 7th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	46	Waiting time after completion of displacement of the 7th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	47	Movement displacement of the 8th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	49	Maximum operating speed of the 8th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	50	Displacement acceleration and deceleration time of the 8th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	51	Waiting time after completing the displacement of the 8th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	52	Movement displacement of the 9th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	54	Maximum operating speed of the9th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	55	Displacement acceleration and deceleration time of the 9th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	56	Waiting time after completion of displacement of the 9th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	57	Movement displacement of the	-1073741824 ～1073741824	Com mand	1000 0	Effecti ve	Runni ng	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		10th segment		Unit		immediately	setting	
P11	59	Maximum operating speed of the 10th segment displacement	1～6000	rpm	200	Effective immediately	Running setting	P
P11	60	Displacement acceleration and deceleration time of the 10th segment	0～65535	ms(s)	10	Effective immediately	Running setting	P
P11	61	Waiting time after the 10th segment displacement is completed	0～10000	ms(s)	10	Effective immediately	Running setting	P
P11	62	Movement displacement of the 11th segment	-1073741824 ～1073741824	Command Unit	10000	Effective immediately	Running setting	P
P11	64	Maximum operating speed of the 11th segment displacement	1～6000	rpm	200	Effective immediately	Running setting	P
P11	65	Displacement acceleration and deceleration time of the 11th segment	0～65535	ms(s)	10	Effective immediately	Running setting	P
P11	66	Waiting time after displacement completion of the 11th segment	0～10000	ms(s)	10	Effective immediately	Running setting	P
P11	67	Movement displacement of the 12th segment	-1073741824 ～1073741824	Command Unit	10000	Effective immediately	Running setting	P
P11	69	Maximum operating speed of the 12th segment displacement	1～6000	rpm	200	Effective immediately	Running setting	P
P11	70	Displacement acceleration and deceleration time of the 12th segment	0～65535	ms(s)	10	Effective immediately	Running setting	P
P11	71	Waiting time after displacement	0～10000	ms(s)	10	Effective	Running	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		completion of the 12th segment				imme diately	setting	
P11	72	Movement displacement of the 13th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	74	Maximum operating speed of the 13th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	75	Displacement acceleration and deceleration time of the 13th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	76	Waiting time after completion of displacement of the 13th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	77	Movement displacement of the 14th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	79	Maximum operating speed of the 14th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	80	Displacement acceleration and deceleration time of the 14th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	81	Waiting time after displacement completion of the 14th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	82	Movement displacement of the 15th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	84	Maximum operating speed of the 15th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	85	Displacement acceleration and	0～65535	ms(s)	10	Effecti ve	Runni ng	P

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		deceleration time of the 15th segment				imme diately	setting	
P11	86	Waiting time after displacement completion of the 15th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	87	Movement displacement of the 16th segment	-1073741824 ～1073741824	Com mand Unit	1000 0	Effecti ve imme diately	Runni ng setting	P
P11	89	Maximum operating speed of the 16th segment displacement	1～6000	rpm	200	Effecti ve imme diately	Runni ng setting	P
P11	90	Displacement acceleration and deceleration time of the 16th segment	0～65535	ms(s)	10	Effecti ve imme diately	Runni ng setting	P
P11	91	Waiting time after displacement completion of the 16th segment	0～10000	ms(s)	10	Effecti ve imme diately	Runni ng setting	P

Group P12 Multi segment speed parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P12	00	Multi-segment speed command running mode	0: Shutdown at the end of a single operation (P12-01 selects the number of segments) 1: Cyclic operation (P12-01 performs segment number selection) 2: Switching through external DI	-	1	Effecti ve imme diately	Shutd own setting	S
P12	01	Speed command end point segment number selection	1～16	-	16	Effecti ve imme diately	Shutd own setting	S
P12	02	Runtime Unit Selection	0-sec 1-min	-	0	Effecti ve imme diately	Shutd own setting	S
P12	03	Acceleration time 1	0～65535	ms	10	Effecti ve imme diately	Shutd own setting	S
P12	04	Deceleration time 1	0～65535	ms	10	Effecti	Shutd	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
						ve imme diately	own setting	
P12	05	Acceleration time 2	0～65535	ms	50	Effective immediately	Shutdown setting	S
P12	06	Deceleration time 2	0～65535	ms	50	Effective immediately	Shutdown setting	S
P12	07	Acceleration time 3	0～65535	ms	100	Effective immediately	Shutdown setting	S
P12	08	Deceleration time 3	0～65535	ms	100	Effective immediately	Shutdown setting	S
P12	09	Acceleration time 4	0～65535	ms	150	Effective immediately	Shutdown setting	S
P12	10	Deceleration time 4	0～65535	ms	150	Effective immediately	Shutdown setting	S
P12	20	Speed command of the 1st segment	-6000～6000	rpm	0	Effective immediately	Shutdown setting	S
P12	21	Running time of the 1st segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	22	Acceleration and deceleration time of the 1st segment	0: Zero acceleration/deceleration time 1: Acceleration/deceleration time 1 2: Acceleration/deceleration time 2 3: Acceleration/deceleration time 3 4: Acceleration and deceleration time 4	-	0	Effective immediately	Shutdown setting	S
P12	23	Second segment speed command	-6000～6000	rpm	100	Effective immediately	Shutdown setting	S
P12	24	Command run time	0～6553.5	S	5.0	Effecti	Shutd	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		of the 2nd segment		(min)		ve imme diately	own setting	
P12	25	Acceleration and deceleration time of the 2nd segment	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	Effecti ve imme diately	Shutd own setting	S
P12	26	Speed command of the 3rd segment	-6000～6000	rpm	300	Effecti ve imme diately	Shutd own setting	S
P12	27	Running time of the 3rd segment command	0～6553.5	S (min)	5.0	Effecti ve imme diately	Shutd own setting	S
P12	28	Acceleration and deceleration time of the 3rd segment	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	Effecti ve imme diately	Shutd own setting	S
P12	29	Speed command of the 4th segment	-6000～6000	rpm	500	Effecti ve imme diately	Shutd own setting	S
P12	30	Running time of the 4th segment command	0～6553.5	S (min)	5.0	Effecti ve imme diately	Shutd own setting	S
P12	31	Acceleration and deceleration time of the 4th segment	0: Zero acceleration and deceleration time 1: Acceleration and deceleration time 1 2: Acceleration and deceleration time 2 3:Acceleration and deceleration time	-	0	Effecti ve imme diately	Shutd own setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			3 4: Acceleration and deceleration time 4					
P12	32	Speed command of the 5th segment	-6000～6000	rpm	700	Effective immediately	Shutdown setting	S
P12	33	Command run time of the 5th segment	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	34	Acceleration and deceleration time of the 5th segment	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	Shutdown setting	S
P12	35	Speed command of the 6th segment	-6000～6000	rpm	900	Effective immediately	Shutdown setting	S
P12	36	Running time of the 6th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	37	Acceleration and deceleration time of the sixth segment	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	Shutdown setting	S
P12	38	Speed command of the 7th segment	-6000～6000	rpm	600	Effective immediately	Shutdown setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P12	39	Segment 7 command run time	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	40	Acceleration and deceleration time of the seventh segment	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	Shutdown setting	S
P12	41	Speed command of the 8th segment	-6000～6000	rpm	300	Effective immediately	Shutdown setting	S
P12	42	Running time of the 8th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	43	Acceleration and deceleration time of the eighth segment	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	Shutdown setting	S
P12	44	Speed command of the 9th segment	-6000～6000	rpm	100	Effective immediately	Shutdown setting	S
P12	45	Running time of the 9th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	46	Acceleration and deceleration time of the ninth segment	0: Zero acceleration and deceleration time 1: Acceleration and deceleration time 1 2: Acceleration and deceleration time 2	-	0	Effective immediately	Shutdown setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			3: Acceleration and deceleration time 3 4: Acceleration and deceleration time 4					
P12	47	Speed command of the 10th segment	-6000～6000	rpm	-100	Effective immediately	Shutdown setting	S
P12	48	Running time of the 10th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	49	Acceleration and deceleration time of the 10th segment	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	Shutdown setting	S
P12	50	Speed command of the 11th segment	-6000～6000	rpm	-300	Effective immediately	Shutdown setting	S
P12	51	Running time of the 11th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	52	Acceleration and deceleration time of the 11th segment	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	Shutdown setting	S
P12	53	Speed command of the 12th segment	-6000～6000	rpm	-500	Effective immediately	Shutdown setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P12	54	Running time of the 12th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	55	Acceleration and deceleration time of the 12th segment	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	Shutdown setting	S
P12	56	Speed command of the 13th segment	-6000～6000	rpm	-700	Effective immediately	Shutdown setting	S
P12	57	Running time of the 13th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	58	Acceleration and deceleration time of the 13th segment	0: Zero acceleration and deceleration time 1: Acceleration/deceleration time 1 2: Acceleration/deceleration time 2 3: Acceleration/deceleration time 3 4: Acceleration/deceleration time 4	-	0	Effective immediately	Shutdown setting	S
P12	59	Speed command of the 14th segment	-6000～6000	rpm	-900	Effective immediately	Shutdown setting	S
P12	60	Running time of the 14th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	61	Acceleration and deceleration time of the 14th segment	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	Shutdown setting	S

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P12	62	Speed command of the 15th segment	-6000～6000	rpm	-600	Effective immediately	Shutdown setting	S
P12	63	Running time of the 15th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	64	Acceleration and deceleration time of the 15th segment	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	Shutdown setting	S
P12	65	Speed command of the 16th segment	-6000～6000	rpm	-300	Effective immediately	Shutdown setting	S
P12	66	Running time of the 16th segment command	0～6553.5	S (min)	5.0	Effective immediately	Shutdown setting	S
P12	67	Acceleration and deceleration time of the 16th segment	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	Shutdown setting	S

Group P17 Virtual DIDO parameters

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P17	00	VDI1 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	01	VDI1 terminal logic selection	0: Indicates that VDI1 write 1 is valid 1: Indicates that the VDI1 write	-	0	Shutdown takes effect	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
			value is valid when it changes from 0 to 1					
P17	02	VDI2 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	03	VDI2 terminal logic selection	0: Indicates that VDI2 write 1 is valid 1: Indicates that the VDI2 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	04	VDI3 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	05	VDI3 terminal logic selection	0: Indicates that VDI3 write 1 is valid 1: Indicates that the VDI3 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	06	VDI4 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	07	VDI4 terminal logic selection	0: Indicates that VDI4 write 1 is valid 1: Indicates that the VDI4 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	08	VDI5 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	09	VDI5 terminal logic selection	0: Indicates that VDI5 write 1 is valid 1: Indicates that the VDI5 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	10	VDI6 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	11	VDI6 terminal logic selection	0: Indicates that VDI6 write 1 is valid 1: Indicates that the VDI6 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	12	VDI7 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	13	VDI7 terminal	0: Indicates that VDI7 write 1 is	-	0	Shutdown	Running	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
		logic selection	valid 1: Indicates that the VDI7 write value is valid when it changes from 0 to 1			takes effect	settings	
P17	14	VDI8 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	15	VDI8 terminal logic selection	0: Indicates that VDI8 write 1 is valid 1: Indicates that the VDI8 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	16	VDI9 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	17	VDI9 terminal logic selection	0: Indicates that VDI9 write 1 is valid 1: Indicates that the VDI9 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	18	VDI10 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	19	VDI10 terminal logic selection	0: Indicates that VDI9 write 1 is valid 1: Indicates that the VDI9 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	20	VDI11 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	21	VDI11 terminal logic selection	0: Indicates that VDI11 write 1 is valid 1: Indicates that the VDI11 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	22	VDI12 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	23	VDI12 terminal logic selection	0: Indicates that VDI12 write 1 is valid 1: Indicates that the VDI12 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	24	VDI13 terminal function selection	0～37	-	0	Shutdown takes	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
						effect		
P17	25	VDI13 terminal logic selection	0: Indicates that VDI13 write 1 is valid 1: Indicates that the VDI13 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	26	VDI14 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	27	VDI14 terminal logic selection	0: Indicates that VDI14 write 1 is valid 1: Indicates that the VDI14 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	28	VDI15 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	-
P17	29	VDI15 terminal logic selection	0: Indicates that VDI15 write 1 is valid 1: Indicates that the VDI15 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	30	VDI16 terminal function selection	0～37	-	0	Shutdown takes effect	Running settings	
P17	31	VDI16 terminal logic selection	0: Indicates that VDI16 write 1 is valid 1: Indicates that the VDI16 write value is valid when it changes from 0 to 1	-	0	Shutdown takes effect	Running settings	-
P17	32	VDO virtual level	-	-	-	-	Display	-
P17	33	VDO1 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	34	VDO1 terminal logic selection	0: Output 1 when valid 1: Output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	35	VDO2 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	36	VDO2 terminal logic selection	0: Output 1 when valid 1: Output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	37	VDO3 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P17	38	VDO3 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	39	VDO4 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	40	VDO4 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	41	VDO5 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	42	VDO5 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	43	VDO6 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	44	VDO6 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	45	VDO7 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	46	VDO7 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	47	VDO8 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	48	VDO8 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	49	VDO9 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	50	VDO9 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	51	VDO10 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	52	VDO10 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P17	53	VDO11 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	54	VDO11 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	55	VDO12 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	56	VDO12 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	57	VDO13 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	58	VDO13 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	59	VDO14 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	60	VDO14 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	61	VDO15 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	62	VDO15 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-
P17	63	VDO16 terminal function selection	0～22	-	0	Shutdown takes effect	Running settings	-
P17	64	VDO16 terminal logic selection	0：Indicates output 1 when valid 1: Indicates output 0 when valid	-	0	Shutdown takes effect	Running settings	-

Group P30 Communication read servo related variable

The panel is not visible.

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P30	00	Communication read servo status	-	-	-	-	Communication Read Only	PST
P30	01	Communication read DO function status 1	-	-	-	-	Communication Read Only	PST

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P30	02	Communication Read DO Function Status 2	-	-	-	-	Communication Read Only	PST
P30	03	Communication Read Input Pulse Command Sample Value	-	-	-	-	Display	PST

Group P31 Communication given servo related variable

The panel is not visible.

Function code		Name	Setting range	Unit	Factory setting	Effective method	Setting method	Related modes
P31	00	Communication given VDI virtual level	0～65535	-	0	Effective immediately	Running settings	PST
P31	04	Communication given DO output status	0～31	-	0	Effective immediately	Running settings	PST
P31	09	Communication given speed command	-6000.000～6000.000	rpm	0	Effective immediately	Running settings	S
P31	11	Communication given torque command	-100.000～100.000	%	0	Effective immediately	Running settings	T

DIDO function definition

Code	Name	Function Name	Description	Notes
Input signal function description				
FunIN.1	S-ON	Servo enable	Invalid - servo motor enable disabled; Valid - The servo motor is powered on and enabled.	The logical selection of the corresponding terminal must be set to "Valid level.". When the DI or VDI terminal corresponding to this function is changed, or the corresponding terminal logic selection is changed, it needs to be re energized before the change takes effect.
FunIN.2	ALM-RST	Fault and warning reset (along active function)	Invalid - Inhibited; Active - Enabled.	The logical selection of the corresponding terminal must be set to Edge Valid. If the selected level is valid, the drive internal force is set to edge valid. Depending on the type of alarm, the servo can continue to operate after some alarms are reset.

Code	Name	Function Name	Description	Notes
FunIN.3	GAIN-SEL	Gain switching	When P08-08=0: Invalid - speed control loop is PI controlled; Valid - The speed control loop is P-controlled. When P08-08=1, follow the settings in P08-09.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.4	CMD-SEL	Switching of main and auxiliary operation instructions	Invalid - the current running command is A; Valid - The current running command is B.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.5	DIR-SEL	Multi-segment speed DI switching operation direction setting	Invalid - default command direction; Valid - Command the reverse direction.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.6	CMD1	Multi segment running command switching 1	Command selection for the 16th segment .	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.7	CMD2	Multi segment running command switching 2	Command selection for the 16th segment .	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.8	CMD3	Multi segment running command switching 3	Command selection for the 16th segment .	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.9	CMD4	Multi segment running command switching 4	Command selection for the 16th segment .	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.10	M1-SEL	Mode switching 1	Switch between speed, position, and torque based on the selected control mode (3, 4, and 5).	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.11	M2-SEL	Mode switching 2	Switch between speed, position, and torque according to the selected control mode (6).	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.12	ZCLAMP	Zero fixed enable	Valid -Zero position fixing function; Invalid - Zero position fixing function is prohibited.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.

Code	Name	Function Name	Description	Notes
FunIN.13	INHIBIT	Position command prohibition	Valid - Command pulse input is inhibited; Invalid - Command pulse input is allowed.	Originally, it was a pulse suppression function. It is now upgraded to position command prohibition, including internal and external position commands. The logical selection of the corresponding terminal must be set to "Valid level.".
FunIN.14	P-OT	Forward overtravel switch	Valid - Forward drive is inhibited; Invalid - Forward drive is allowed.	When the mechanical movement exceeds the movable range, the overtravel prevention function is entered: the logical selection of the corresponding terminal, and it is recommended to set it to: the level is valid.
FunIN.15	N-OT	Reverse overtravel switch	When the mechanical movement exceeds the movable range, the overtravel prevention function is entered: Valid - Reverse drive is inhibited; Invalid - Reverse drive is allowed.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.16	P-CL	Positive external torque limit	Switch the torque limiting source according to the selection in P07-07. When P07-07=1: Valid - Forward external torque limit is valid; Invalid - Forward internal torque limit is valid. When P07-07=3 and the AI limit value is greater than the forward rotation external limit value: Valid - Forward external torque limit is valid; Invalid - AI torque limit is valid. When P07-07=4: Valid - AI torque limit valid; Invalid - Forward internal torque limit is valid.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.

Code	Name	Function Name	Description	Notes
FunIN.17	N-CL	Negative external torque limit	Switch the torque limiting source according to the selection in P07-07. When P07-07=1: Active - The reverse external torque limit is active; Invalid - The reverse internal torque limit is valid. When P07-07=3 and the AI limit value is less than the reverse external limit value: Active - The reverse external torque limit is active. Invalid - AI torque limit is valid. When P07-07=4: Valid - AI torque limit valid; Invalid - The reverse internal torque limit is valid.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.18	JOGCMD+	Forward jog	Valid - Input according to the given command; Invalid - Run command stops input.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.19	JOGCMD-	Negative jog	Valid - Reverse input according to a given command; Invalid - Run command stops input.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.20	POSSTEP	Step Enable	Valid - an instruction that executes an instruction step amount; Invalid - The instruction is zero and in the positioned state.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.21	HX1	Handwheel magnification signal 1	HX1 valid, HX2 invalid: X10 HX1 invalid, HX2 valid: X100 Other: X1	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.22	HX2	Handwheel magnification signal 2		For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.23	HX_EN	Handwheel enable signal	Invalid - perform position control according to P05-00 Function code selection; Valid - Receives a handwheel pulse signal for position control in position mode.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.24	GEAR_SEL	Electronic gear selection	Invalid - Electronic gear ratio 1; Valid - Electronic gear ratio 2.	For the logical selection of the corresponding terminals, it is

Code	Name	Function Name	Description	Notes
				recommended to set the level to be valid.
FunIN.25	TOQDirSel	Torque command direction setting	Invalid - Forward direction; Valid - Reverse direction.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.26	SPDDirSel	Speed command direction setting	Invalid - Forward direction; Valid - Reverse direction.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.27	POSDirSel	Position command direction setting	Invalid - Forward direction; Valid - Reverse direction.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.28	PosInSen	Multi segment position command enable	Edge is effective Invalid - Ignore internal multi segment instructions; Valid - Starts internal multisegmentation.	It is recommended to set the logical selection of the corresponding terminal as: Edge is valid.
FunIN.29	XintFree	Interrupt fixed length state release	Invalid - Inhibited; Valid - Enabled.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.31	HomeSwitch	Origin switch	Invalid - Not triggered; Valid - Triggered.	The logical selection of the corresponding terminal must be set to "Valid level.". It is recommended to assign it to the fast DI terminal. If it is set to 2 (the rising edge is valid), the internal drive will be forced to change to 1 (the high level is valid); If set to 3 (falling edge valid), the internal drive will be forced to change to 0 (low level valid); If set to 4 (both rising and falling edges are valid), the drive will be forced to change to 0 (low level is valid) internally
FunIN.32	Homing Start	Origin reset enable	Invalid - Inhibited; Valid - Enabled.	It is recommended to set the logical selection of the corresponding terminal as: edge is valid.
FunIN.33	XintInhibit	Interrupt fixed length prohibition	Valid - Interruption of fixed length is inhibited; Invalid - Interruption of fixed length is allowed.	The logical selection of the corresponding terminal must be set to "Valid level.". If it is set to 2 (the rising edge is valid), the internal drive will be forced to change to 1 (the high level is valid); If set to 3 (falling edge valid), the

Code	Name	Function Name	Description	Notes
				internal drive will be forced to change to 0 (low level valid); If set to 4 (both rising and falling edges are valid), the drive will be forced to change to 0 (low level is valid) internally
FunIN.34	Emergency shutdown	Emergency stop	Valid - Position locked after zero speed shutdown; Invalid - No effect on the current operating state.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.35	ClrPosErr	Clear position deviation	Valid - Position deviation is cleared to zero; Invalid - Position deviation is not cleared.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.36	V_LmtSel	Internal Speed Limit Source	Valid - P07-19 as the internal positive and negative speed limit value (P07-17=2); Invalid - P07-20 as internal positive and negative speed limit value (P07-17=2).	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
FunIN.37	PulseInhibit	Pulse command prohibition	When the Location command source is a pulse command (P05-00=0) in the Position control mode: Invalid - Responsive pulse command; Valid - Do not respond to pulse commands.	For the logical selection of the corresponding terminals, it is recommended to set the level to be valid.
Output signal function description				
FunOUT.1	S-RDY	Servo ready	The servo state is ready to receive an S-ON valid signal: Valid - servo ready; Invalid - servo not ready.	-
FunOUT.2	TGON	Motor rotation output	When the rotational speed of the servo motor is higher than the speed threshold P06-16: Valid - The motor rotation signal is valid; Invalid - The motor rotation signal is invalid.	-
FunOUT.3	ZERO	Zero speed	Signal output when the servo motor stops rotating: The effective motor speed is zero; Invalid motor speed is not zero.	-
FunOUT.4	V-CMP	Consistent speed	During speed control, it is valid when the absolute value of the	-

Code	Name	Function Name	Description	Notes
			difference between the servo motor speed and the speed command is less than P06-17 Speed Deviation Set value.	
FunOUT.5	COIN	Positioning complete	During position control, the position deviation pulse is effective when it reaches the positioning completion amplitude P05-21.	-
FunOUT.6	NEAR	Positioning approach	During position control, the position deviation pulse is effective when it reaches the position proximity signal amplitude P05-22 set value.	-
FunOUT.7	C-LT	Torque limit	Confirmation signal of torque limit: Effective - limited motor torque; Invalid - Motor torque is not limited.	-
FunOUT.8	V-LT	Speed limit	Confirmation signal of speed restriction during torque control: Valid - The motor speed is limited; Invalid - The motor speed is not limited.	-
FunOUT.9	BK	Band brake output	Band brake signal output: Valid - Close and release the band brake; Invalid - Start band brake.	-
FunOUT.10	WARN	Warning output	The warning output signal is valid. (conduction)	-
FunOUT.11	ALM	Fault output	The status is valid when a fault is detected.	-
FunOUT.12	ALMO1	Output 3-digit alarm code	Output a 3-digit alarm code.	-
FunOUT.13	ALMO2	Output 3-digit alarm code	Output a 3-digit alarm code.	-
FunOUT.14	ALMO3	Output 3-digit alarm code	Output a 3-digit alarm code.	-
FunOUT.15	Xintcoin	Interrupt fixed length completion	Valid - interrupt fixed length positioning completion; Invalid - Interrupt fixed length positioning not completed.	-
FunOUT.16	HomeAttain	Zero return output	Zero return status: Valid - Zero return; Invalid - The home does not return to zero.	-

Code	Name	Function Name	Description	Notes
FunOUT.17	ElecHome Attain	Electrical return to zero output	Electrical return to zero status: Valid - Electrical zero return; Invalid - The electrical origin does not return to zero.	-
FunOUT.18	ToqReach	Torque reaching output	Valid - The absolute torque value reaches Set value; Invalid - The absolute torque value is less than Set value.	-
FunOUT.19	V-Arr	Speed reach output	Valid - Speed feedback reaches set value; Invalid - Speed feedback does not reach set value.	-
FunOUT.20	AngIntRdy	Angle identification output	Effective - Angle identification completed ; Invalid - Angle identification not completed.	-
FunOUT.21	DB	DB brake output	Valid - Dynamic brake relay disconnected; Invalid - Dynamic brake relay engaged.	
FunOUT.22	CmdOk	Internal command output	Valid - Internal instructions completed; Invalid - Internal command not completed.	