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Chapter 1 Security Reminder

This chapter describes important items that users must follow for product identification, storage, handling, installation, wiring, operation, and inspection.

1.1 Safety Precautions

● Dismount the driver after the power is turned off for more than 5 minutes, otherwise it may cause electric shock due to residual voltage.

● Do not disassemble or install the driver while the servo unit is powered on. Otherwise, it may cause electric shock, product stop operation or burnout.

● Never touch the inside of the servo driver, otherwise it may cause electric shock.

● During the period of power-on and after the power is turned off, the heat sink of the servo driver, external braking resistor, servo motor, etc. may be hot. Do not touch it, otherwise it may cause burns. To prevent inadvertent contact with hands or components (such as cables), take safety measures such as installing the casing.

● Use the power supply specifications that match the product of the servo driver power supply. Otherwise, the product may be burnt out, electric shock or fire.

● Make sure to connect the electromagnetic contactor and the no-fuse breaker between the power supply and the main circuit power supply of the servo drive. Otherwise, when the servo driver fails, it is impossible to cut off a large current and cause a fire.

● The grounding terminal of the servo driver must be grounded, otherwise it may cause electric shock.

● Do not set, disassemble, or repair the product unless it is a designated person. Otherwise it may cause electric shock or injury.

● Please do not modify this product, otherwise it may cause injury or mechanical damage.

● Do not damage or pull the cable hard, and do not subject the cable to excessive force. Do not place it under heavy objects or clamp it. Otherwise it may cause malfunction, damage, or electric shock.

● When the servo motor is running, please never touch the rotating part, otherwise it may be injured.

● Do not use this product in a place where it may splash water, corrosive environment, flammable gas or combustible materials, as this may result in electric shock or fire.

● Install the servo driver, servo motor, and external braking resistor on incombustible materials, otherwise it may cause a fire.

●In the servo driver and servo motor, do not mix flammable foreign matter such as oil or grease, or conductive foreign matter such as screws or metal sheets. This may

cause a fire.

●When starting to operate on the machine, please put the servo motor in an emergency stop state at any time, otherwise it may cause injury.

●In the state where the servo motor and the mechanical connection are connected, if an operation error occurs, not only mechanical damage but also personal accident may occur.

● Set the emergency stop device externally to ensure that the power is turned off and the operation stops immediately when an abnormality occurs.

● Use a noise filter to reduce the effects of electromagnetic interference, otherwise electromagnetic interference may be caused to electronic devices used near the servo unit.

● Use the servo unit and servo motor in the specified combination.

1.2 Storage Precautions

● Do not stack too many products together, as this may result in injury or malfunction.

● Please keep it in the following environment:

- places without direct sunlight;
- Locations with an ambient temperature in the range of -20 °C to +65 °C;
- Relative humidity in the range of 0% to 95%, and no condensation;
- Locations free of water droplets, vapors, dust and oily dust;
- Locations where there is no high heat device;
- Non-corrosive, flammable gas and liquid sites;
- It is not easy to splash water, oil and medicine;
- places that are not exposed to radioactive radiation;
- Strong and vibration-free places;
- Locations where there is no electromagnetic noise interference.

Storage in an environment other than the above may result in malfunction or damage to the product.

1.3 Transportation Precautions

● When moving the servo unit and servo motor, pay attention to the sharp parts such as the corners of the device, otherwise it may cause injury.

● Do not stack too many products together, as this may result in injury or malfunction.

●This is a precision device. Do not drop it or apply a strong impact to it. Failure to do so may result in malfunction or damage.

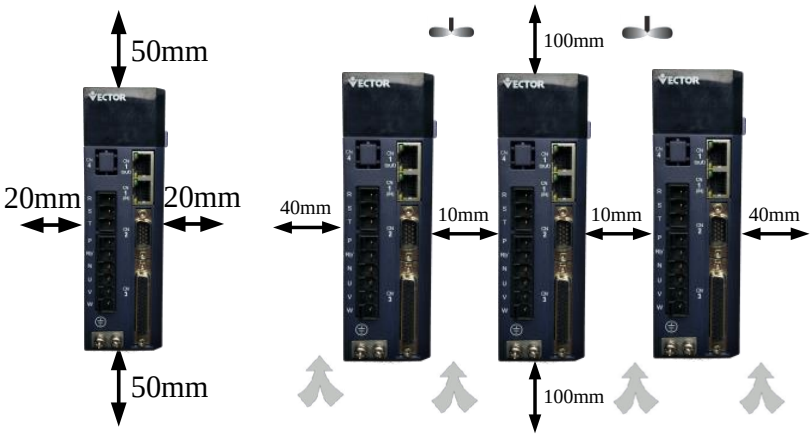
● Do not apply impact to the connector part, as this may result in poor connection or malfunction.

1.4 Installation Precautions

● Install the driver on a dry and sturdy platform. Maintain good ventilation and heat dissipation during installation and maintain good grounding.

● Please install in the specified direction to avoid malfunction.

● When installing, please ensure that the servo driver is kept at a specified distance from the inner surface of the cabinet and other machines, otherwise it may cause fire or malfunction.



● When installing, do not block the suction and exhaust ports, and do not allow foreign objects inside the product to enter, otherwise it may cause malfunction or fire due to aging of internal components.

● Do not place heavy objects on or under this product as this may result in injury.

● Please install in the following environment:

- ➢ places without direct sunlight;
- ➢ Locations where the ambient temperature is in the range of 0 °C to 55 °C;
- ➢ Relative humidity in the range of 0% to 95%, and no condensation;
- ➢ Locations free of water droplets, vapors, dust and oily dust;
- ➢ Locations where there is no high heat device;
- ➢ Non-corrosive, flammable gas and liquid sites;
- ➢ It is not easy to splash water, oil and medicine;
- ➢ places that are not exposed to radioactive radiation;

- Strong and vibration-free places;
- Locations where there is no electromagnetic noise interference.

Installation in an environment other than the above may result in product failure or damage.

1.5 Wiring precautions

● It is recommended not to use single-phase 220V for main power supply, which may cause damage to electrolytic capacitor due to lack of phase.

● Do not change the wiring during power-on, otherwise it may cause electric shock or injury.

● Please perform wiring or inspection by professional technicians, otherwise it may cause electric shock or product failure.

● Please carefully confirm the wiring and power supply. The output circuit may be short-circuited due to wiring errors or application of different voltages. The brake does not operate when the above fault occurs, which may result in mechanical damage or personal injury.

● Do not connect the input power cable to the U, V, and W terminals of the drive. Otherwise, the servo driver will be damaged.

● When wiring, do not pass the power cable and signal cable through the same pipe, and do not bundle them together. The distance between the two should be more than 30cm to avoid interference.

● The driver ground terminal must be grounded to avoid leakage and reduce the interference of the system, and the diameter of the ground wire should be the same as or above the power supply line.

● When connecting the AC power supply and DC power supply to the servo unit, connect to the specified terminal. Failure to do so may result in malfunction or fire.

● For the wiring length, the command input line is up to 3m and the encoder line is up to 20m.

● Use a twisted-pair shielded cable for the signal cable and encoder cable, and ground the shield with a single end.

●The U, V, W terminals of the driver and the U, V, and W terminals of the motor should be connected one by one according to the name. If it is wrong connected, the motor cannot operate normally.

● Common DC bus products require pressure sensitive resistors and the wiring is secure.

● Please check the power after the power is off for at least 5 minutes. Even if the power is turned off, high voltage may remain inside the servo drive. Therefore, do not touch the power terminal within 5 minutes after the power is turned off, otherwise it may cause electric shock.

● Do not turn the power ON/OFF frequently. When it is necessary to continuously turn ON/OFF the power, please control it once or less in 1 minute. Since the power supply section of the servo driver has a capacitor, a large charging current

(charge time of 0.2 seconds) flows during the ON/OFF power supply. Therefore, if the power is turned ON/OFF frequently, the performance of the main circuit components inside the servo driver will be degraded.

● Do not apply power when the terminal block screws are loose or the cable is loose. Otherwise, it may cause fire.

● Take appropriate shielding measures in the following locations, otherwise the machine may be damaged:

- Locations that cause interference due to static electricity;
- A place that produces a strong electric field or a strong magnetic field;
- Locations where there may be radiation radiation;
- A place with a power cord nearby.

1.6 Operating precautions

● in the test operation, in order to prevent accidents, please test the servo motor with no load (not connected to the driver shaft), otherwise it may cause injury.

● when starting to operate on the supporting machine, set the user parameters that match the machine in advance. If you start operation without parameter setting, it may cause mechanical loss or malfunction.

● to avoid accidents, install a limit switch or a stopper at the end of the movable part of the machine, otherwise it will cause mechanical damage or injury.

● do not make extreme changes to the parameter settings, as this may result in unstable operation, mechanical damage or injury.

●when the power is turned on or the power supply is cut off, the heat sink of the servo driver, external braking resistor, motor, etc. may be in a high temperature state. Do not touch it, otherwise it may cause burns.

● when using a servo motor on the vertical axis, set a safety device to prevent the workpiece from falling under alarm, over travel, etc. In addition, please perform the servo lock stop setting when an over travel occurs, otherwise the workpiece may fall in the over travel condition.

● do not enter the operating range of the machine during operation, otherwise it will cause injury.

● do not touch the servo motor or the movable part of the machine during operation, otherwise it will cause injury.

● please set up the safety system to ensure safety even in the event of a signal line breakage. For example, when the positive over travel switch (P-OT) and negative over travel switch (N-OT) signals are disconnected at the factory setting, they operate safely.

● be sure to set the servo OFF state when turning off the power.

● do not turn the power on/off frequently. After the actual operation starts, the power ON/OFF interval should be more than 1 hour, otherwise the components inside the servo unit will be prematurely aged.

●when an alarm occurs, reset the alarm after the cause is removed and ensure safety, and restart the operation, otherwise it may cause injury.

● do not use the brake of the brake motor for normal braking, otherwise it may cause a malfunction.

1.7 Maintenance and inspection Precautions

● do not change the wiring while the power is on, otherwise it may cause electric shock or injury.

● please perform wiring or inspection by professional technicians, otherwise it may cause electric shock or product failure.

● please check the power after the power is off for at least 5 minutes. Even if the power is turned off, high voltage may remain inside the servo drive. Therefore, do not touch the power terminal within 5 minutes after the power is turned off, otherwise it may cause electric shock.

●when replacing the servo drive, please back up the servo driver user parameters to be replaced before the replacement, and transfer the backup to the new servo drive, and then restart the operation, otherwise the machine may be damaged.

Chapter 2 Product Information

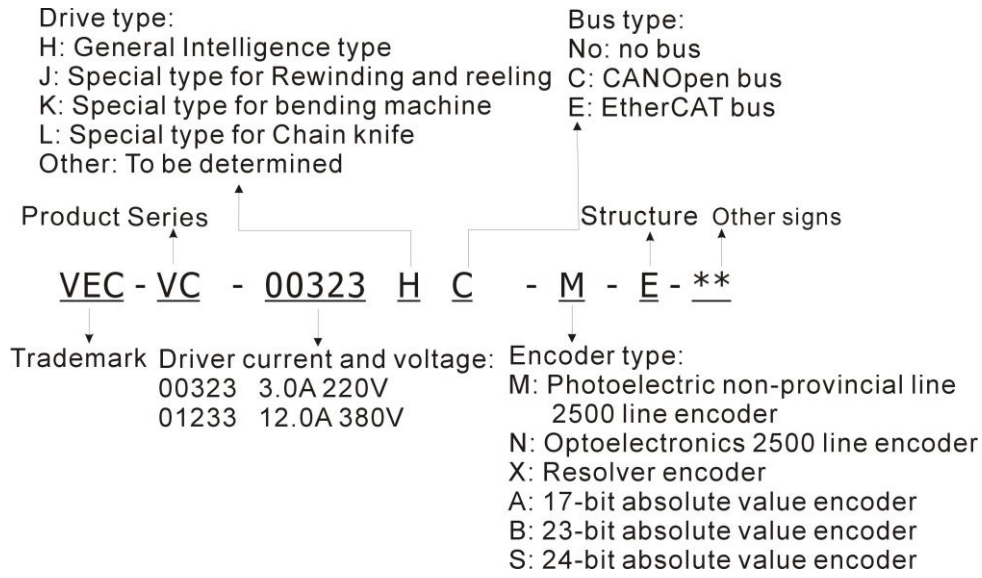
2.1 Servo driver Appearance

C structure servo driver

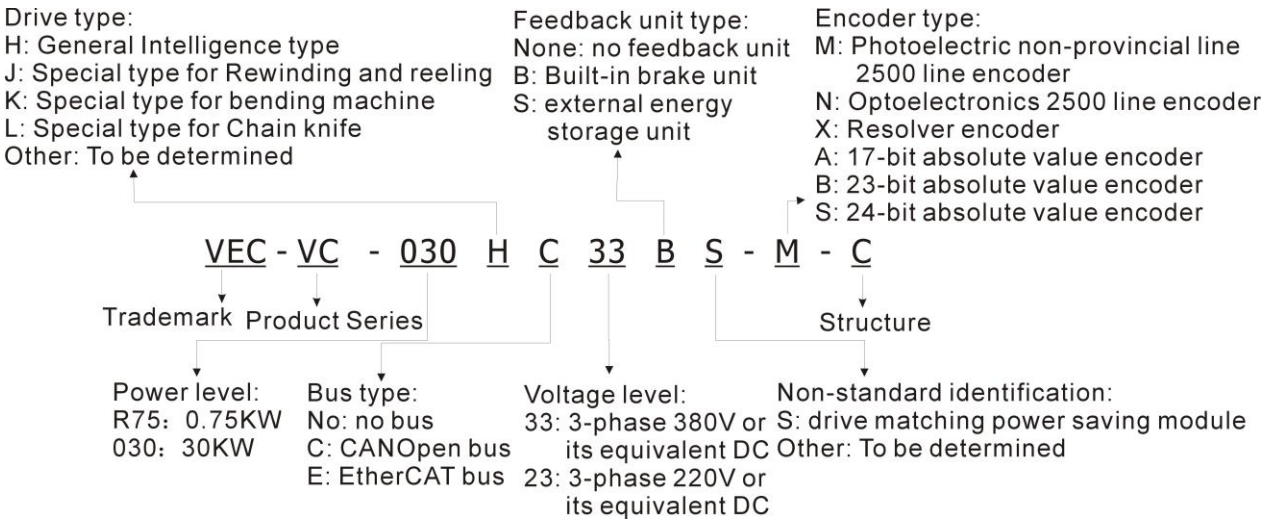
E structure servo drive

2.2 Nameplate Description

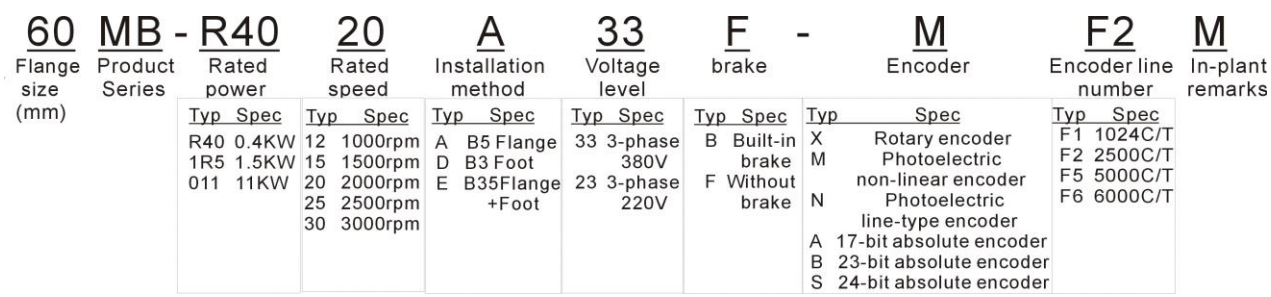
2.2.1 E structure servo driver nameplate



2.2.2 C structure servo driver nameplate



2.2.3 Motor nameplate



2.3 Servo Driver Specifications

Items		description
Voltage	control mode	Single-phase / three-phase full-controlled rectification SVPWM modulation
Encoder	encoder feedback	2500 pulse incremental + Hall encoder; 2500 pulse incremental； 17bit Tamagawa absolute encoder； 23bit Tamagawa absolute encoder； 24bit Nikon absolute encoder;
Pulse command input	pulse type	differential input、Open collector
	Frequency range	differential input：0-500kHz，pulse width greater than 1us Open collector：0-300kHz，pulse width greater than 2.5us
	Pulse mode	pulse + direction； AB pluses; CW+CCW;
Analog input	voltage range	-10V to 10V
	Input impedance	10kΩ
	Maximum frequency	1.5kHz
DI/DO interface type		NPN/PNP
Communication		Modbus/CANopen/EtherCAT
Position mode	command input method	pulse command Internal planning position ➢ Plan by target position, speed, acceleration and deceleration time ➢ Trapezoidal speed curve ➢ Cubic speed curve ➢ Absolute / relative command mode
	Instruction smoothing mode	low pass filtering / median filtering
	Electronic gear ratio	N/M;(M=1~2147483647,N=1~2147483647)
	Torque limit	internal torque limit Analog torque limit
	Feedforward compensation	speed feedforward/torque feedforward
	Torque compensation	fixed torque compensation / analog torque compensation / automatic torque compensation;
Speed	Command input type	Pulse Frequency / Analog / Internal planning speed
	Speed control range	1~max speed

control mode	bandwidth	1kHz
	Torque limit	internal torque limit / analog torque limit
	Instruction smoothing mode	low pass filtering / median filtering
	Feedforward compensation	torque feedforward
	Torque compensation	fixed torque compensation / analog torque compensation / automatic torque compensation;
torque control mode	Command input type	internal torque reference / analog control torque
	Torque compensation	fixed torque compensation / analog torque compensation / automatic torque compensation;
	Speed	limit internal speed limit / analog speed limit
Digital Input	Enable Drive, Reset Drive, Torque Command A/B Switch, Torque Command Reverse Enable, Forward Torque Limit A/B Switch, Negative Torque Limit A/B Switch, Forward Speed Limit A /B switch, negative speed limit A/B switch, forward jog, reverse jog, speed command reverse enable, main speed source A/B switch, speed stop enable, clear position count, speed mode Zero fixed, multi-speed speed selection 0, multi-speed speed selection 1, multi-speed speed selection 2, multi-speed speed selection 3, position command prohibited, position command reverse, pulse command prohibited, electronic gear ratio switch 1, position error Clear, return to zero, trigger multi-segment position, multi-segment position selection 0, multi-segment position selection 1, multi-segment position selection 2, multi-segment position selection 3, multi-segment position direction selection, zero return origin switch input, xy pulse and internal position planning switching, control Mode switch 0, control mode switch 1, enable interrupt fixed length input, cancel interrupt fixed length, trigger interrupt fixed length, first set of second set gain switch, reset fault, positive limit switch in position mode, Reverse limit switch in position mode, open and closed loop in full closed loop mode , electronic gear ratio switch 2, motor overheat input, emergency stop input, internal trigger clear, internal trigger set, internal counter count pulse, internal counter clear, speed mode UPDOWN mode UP signal, speed mode UPDOWN mode DOWN Signal, AI zero drift automatic correction	
Digital output	Driver enabled, speed arrival, speed reduction, speed increase, zero speed, speed over limit, forward rotation, reverse rotation, fault output, forward speed limit in torque mode, torque mode In the negative speed limit, in the torque mode, the positioning is completed, the positioning is close to the output, the zero return is completed, the position error is too large, the output is interrupted by the fixed length, the software limit output is output, the brake output is Input command is valid, often OFF, always ON, torque limit output, torque arrival, internal trigger status, internal counter count arrives, speed is consistent, pulse position command is zero output	
Troubles	Software overcurrent, hardware overcurrent, overvoltage, under voltage, current sensor fault, encoder fault, EEPROM check fault, phase sampling fault, FPGA and ARM	

hooting	communication fault, current change big fault, magnetic encoder fault, current Phase sequence learning failure, Z-point is not scanned during self-learning, Z-point offset is not found, Hall code value learning error, driver over-temperature, power-on, line-saving encoder has no feedback threshold value, motor encoder type Mismatch, when the origin returns to zero, the origin switch INFn.34 is not allocated, INFn.xx is repeatedly allocated, over speed, position error is too large, the interrupt fixed length trigger signal INFn.40 is not assigned, there is no zero return before the absolute point motion, the motor Overload, software limit, hardware limit, curve planning failure, full closed loop position error is too large, prohibit positive (reverse) turn, Z point signal is unstable, RPDO receive timeout, motor stall, brake resistor overload, forward stroke Switch input function bit INFn.43 is not assigned to entity DI, reverse travel switch input function bit INFn.44 is not assigned to entity DI, origin search error, CAN bus status switching error, unsupported CANopen control mode, absolute value mode The number of laps overflows, the absolute encoder battery fails, the inertia learning fails. When the full closed loop parameter is learned, the position value detected by the second encoder is too small, the bus error, the motor overheats, the DI function code is not allocated, and the AI zero drift is too large. , zero return timeout, absolute value encoder battery failure, absolute value encoder rotation direction error when self-learning, absolute value encoder battery voltage is too low	
Installation environment requirements	Atmospheric pressure	86~106kPa
	Ambient humidity	0~55℃
	Ambient temperature	0~90%RH
	IP rating	IP20
	Vibration	0~4.9m/s^2

2.4 Driver selection

2.4.1 E structure 220V Driver selection

Input voltage(V)	Output rate current(A)	Output max current A
Single / three phase 220	3	9
Single / three phase 220	6	18
Single / three phase 220	12	36

2.4.2 E structure 380v Driver selection

Input voltage(V)	Output rate current(A)	Output max current A

Three phase 380	7	21
Three phase 380	12	36
Three phase 380	16	40
Three phase 380	20	50
Three phase 380	27	67.5
Three phase 380	19.5	49.0
Three phase 380	27.0	68.0

2.4.3 C structure 220V Driver selection

Input voltage(V)	Output Rate Power(kw)
Single / three phase 220	0.4
Single / three phase 220	0.75
Single / three phase 220	1.5
Single / three phase 220	2.2

2.4.4 C structure 380V Driver selection

Input voltage(V)	Output Rate Power(kw)
Three phase 380	1.5
Three phase 380	2.2
Three phase 380	4
Three phase 380	5.5
Three phase 380	7.5
Three phase 380	11
Three phase 380	15
Three phase 380	18
Three phase 380	22
Three phase 380	30
Three phase 380	37
Three phase 380	45
Three phase 380	55
Three phase 380	75

2.5 **Standards Compliance**

The VEC Servo has been tested and according to the following standards.

1. CE (EU Safety Standard);

2. IEC/EN61800-5-1:2007 (Safety requirements for electrical, thermal and energy in Section 5-1 of the variable speed electric driver system), corresponding to the national

standard GB12668.501-2013;

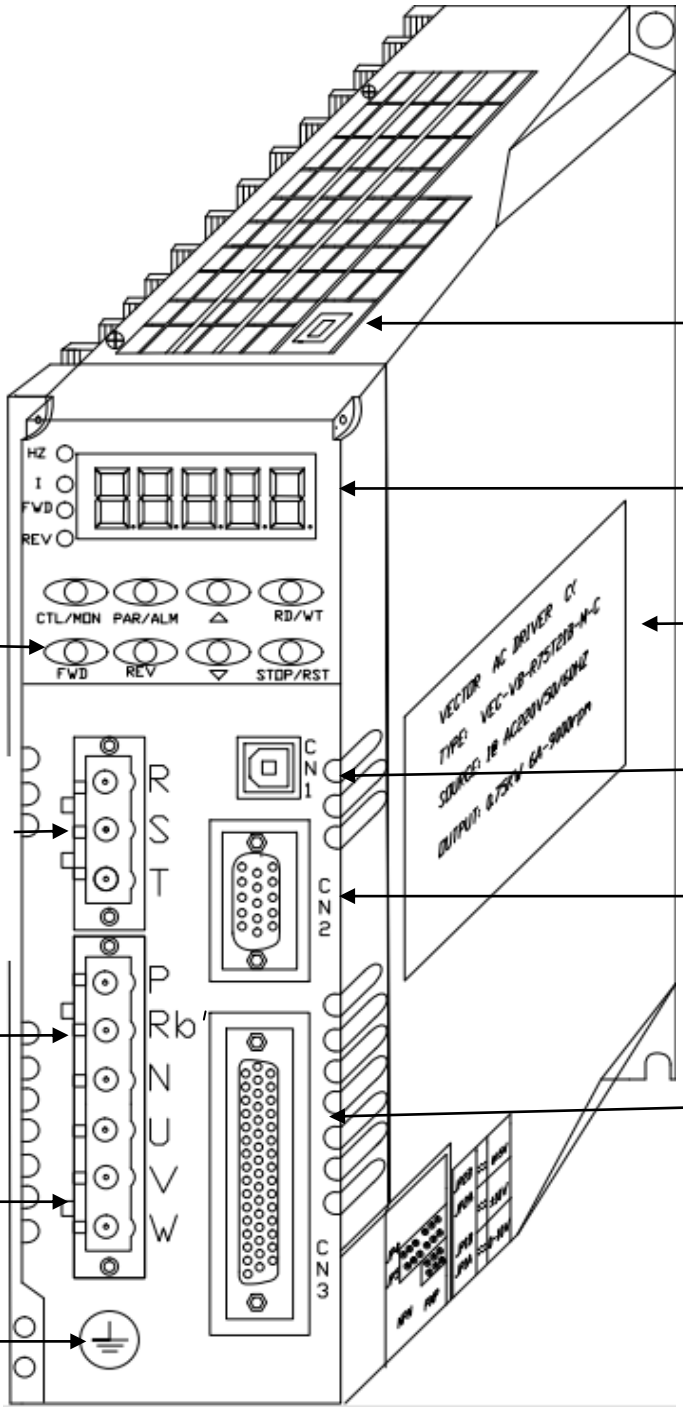
3, IEC / EN61800-3: 2004 + A1 (speed control electric driver system part 3 electromagnetic compatibility standards and its specific test methods), corresponding to the national standard GB12668.3-2012.

Chapter 3 Wiring

This chapter describes the wiring method of servo drives and the definition of various signals.

3.1 VEC Servo Driver Overview

3.1.1 C structure servo driver



RS232 interface，connect to PC , used to test/monitor/update

Five digital LED display

Nameplate

Operation panel

RS485 or CAN communication

Power supply(RST)
AC220V
AC380V

Input motor encoder signal, Connect to motor encoder output

External braking resistor (P、Rb')

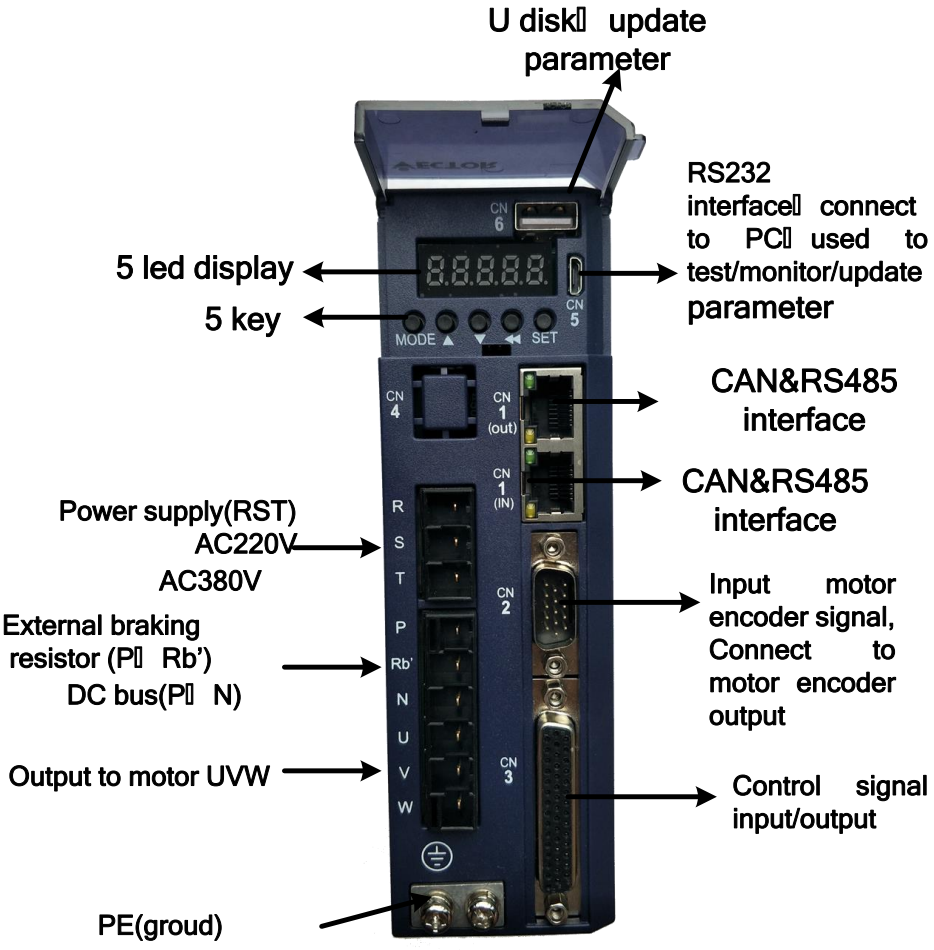
DC bus(P、N)

Control signal input/output

Output to motor UVW

Groud

3.1.2 E structure servo driver



3.2 Main circuit wiring

This section explains the functions of the main circuit terminals, the wiring examples of the main circuit, and the precautions for the main circuit wiring.

3.2.1 Main circuit terminal name and function

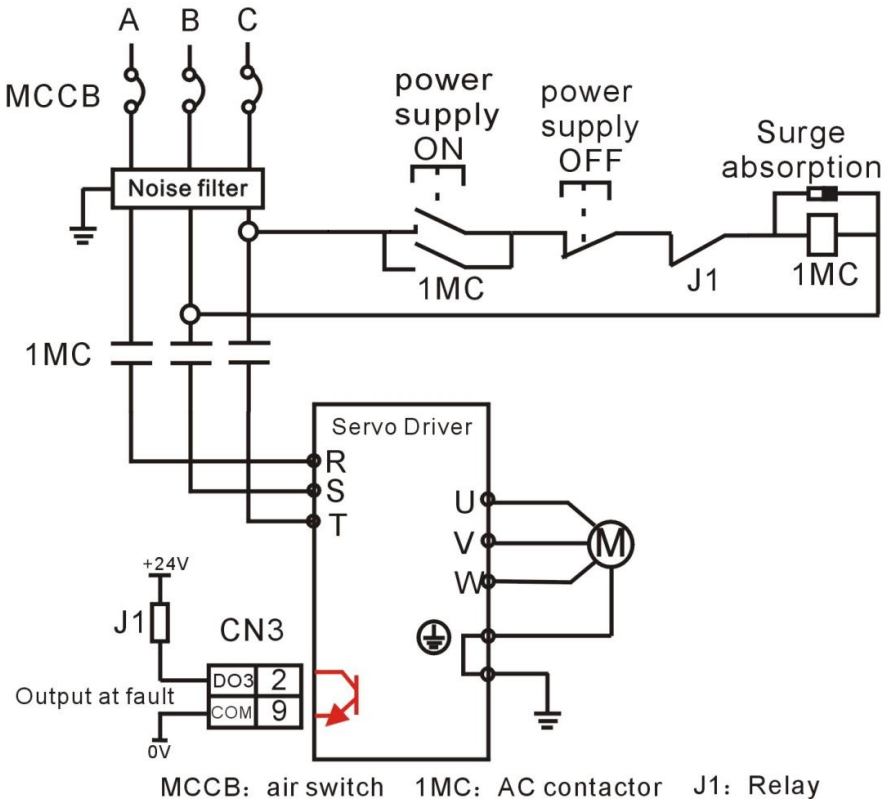
Terminal symbol	name	function
R、S、T	main circuit power input terminal	power supply
U、V、W	motor terminals	connected to the motor U, V, W
P、Rb’	braking resistor terminal	connected to external braking resistor
P、N	DC bus terminal	External power saving module or shared DC bus

⏚	The grounding terminal	Connected to the ground and directly connected to the ground wire of the motor.

Note the following when sharing the DC bus: The 380V driver can only share the DC bus with the 380V drive, and the 220V driver can only share the DC bus with the 220V drive.

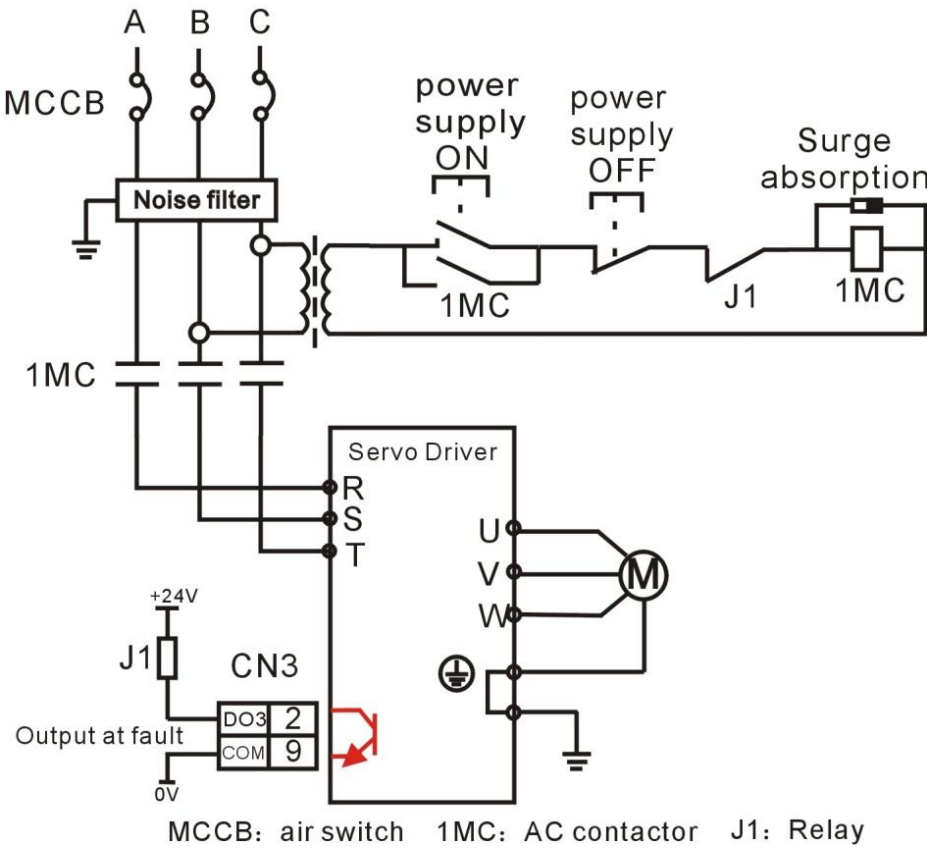
3.2.2 Typical Main Circuit Wiring Example

（1）Three phase 220V driver



●IO's power supply +24V needs to be supplied externally.

（2）Three phase 380V driver



●IO's power supply +24V needs to be supplied externally.

3.2.3 Main circuit wiring precautions

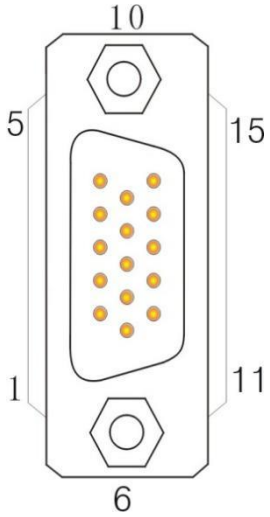
(1) Do not connect the input power cable to the P, RB', N, U, V, W terminals of the drive, otherwise the servo driver will be damaged.
(2) The U, V, W terminals of the driver and the U, V, and W terminals of the motor should be connected one by one according to the name. When the error is connected, the motor cannot operate normally.
(3) The braking resistor cannot be connected between the P and N terminals of the DC bus, otherwise it may cause a fire!
(4) The driver ground terminal must be grounded to avoid leakage and reduce the interference of the system, and the diameter of the ground wire should be the same as or above the power supply line.
(5) When wiring, do not pass the power cable and signal cable through the same pipe, and do not bundle them together. The distance between the two should be more than 30cm to avoid interference.
(6) Use a twisted pair shielded cable for the signal cable and encoder cable.
(7) For the wiring length, the command input line has a maximum length of 3 m and the encoder line has a maximum length of 20 m.
(8) Even if the power is turned off, a high voltage may remain inside the servo driver. Therefore, do not touch the power terminals within 5 minutes after turning off the power.
(9) Do not apply power when the terminal block screws are loose or the cable is loose,

otherwise it may cause fire.

(10) Do not turn the power on and off frequently. When repeated continuous ON/OFF power is required, control it once or less for 1 minute. Since the capacitor is provided in the power supply section of the servo driver, a large charging current (charge time of 0.2 seconds) flows during the ON power supply. If the power is turned ON/OFF frequently, the performance of the main circuit components inside the servo driver will be degraded and the service life will be shortened.

3.3 Encoder signal wiring

3.3.1 Pin Assignment of Encoder Connection Port (CN2)



3.3.2 Pin Definition of Encoder Connection Port (CN2)

Pin No.	Signal Name	Pin No.	Signal Name
1	A+	2	A-
3	B+	4	B-
5	Z+ or absolute encoder signal +	6	Z-or absolute encoder signal -
7	U+	8	U-
9	V+	10	V-
11	W+	12	W-
13	+5V	14	0V
15	Reserved	case	Shield

3.3.3 Encoder wiring precautions

(1) When the encoder type of the servo motor is a non-line-saving incremental photoelectric encoder, it can be directly connected to the CN2 port as defined.

(2) When the encoder type of the servo motor is a resolver, it is necessary to use the

vector angle resolver card to resolve the angle and then connect to the CN2 port.

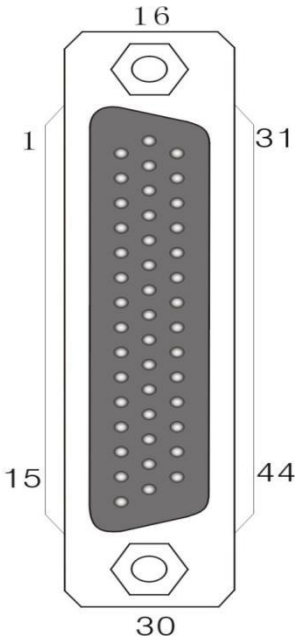
(3) The encoder cable needs to use twisted pair shielded cable, and the wiring length is within 20m. If it exceeds 20m, please increase the wire diameter of the signal wire.

● the angle resolver card is optional. Please consult your Agent for details.

3.4 Input/output signal wiring

In order to communication with the host controller, the VEC servo driver provides 10 digital inputs and 6 digital outputs that can be arbitrarily configured. In addition, XY pulse input and encoder differential output signals OA+, OA-, OB+, OB-, and analog input and output signals can be provided.

3.4.1 Pin assignment of input/output signal port (CN3)



3.4.2 Pin Definition and Function of Input/Output Signal Port (CN3)

Pin num	name	function	Pin num	name	function
10、26	+24V	+24V external DC24V power supply for DI, DO	21	RST	Reset driver
9、25	COM		12	AGND	analog ground
3	DO1	Configurable digital output	14	AI1	Configurable analog input
18	DO2		15	AI2	
2	DO3		29	AI3	
17	DO4		44	AO1	Configurable analog output
1	DO5		28	AO2	
			13	SIG+	tension sensor signal input, tension sensor can be powered by 35, 36
16	DO6		30	SIG-	
24	DI1	Configurable digital input	37	OA+	Can be selected as the encoder signal crossover output or the second encoder input by parameter P03.78.
8	DI2		38	OA-	
23	DI3		39	OB+	
7	DI4		40	OB-	
22	DI5		41	OZ+	Encoder Z index ouput
6	DI6		42	OZ-	
5	DI7		35	+5V	+5V
20	DI8		36	0V	
4	DI9		11	SW-DO	DO NPN/PNP Jumper
19	DI10		27	SW-DI	DI NPN/PNP Jumper
31	X+	position command input Input signal type selectable(differential signal or open collector)	43	XYPH	XY input pull-up resistor
32	X-				
33	Y+		case	Shield	Groud to the Earth
34	Y-				

3.4.3 Input and output signal type selection

Depending on the type of host controller, the DI and DO signals of the VEC servo driver are designed to be selected by jumpers.

1）DIx jumper selection

SW-DI (27 pin of CN3) and +24V (26 pin of CN3) are shorted to select NPN, SW-DI (27 pin of CN3) and COM (25 pin of CN3) are shorted to select PNP.In other words,if SW-DI connect to +24V,NPN signal is selected, SW-DI connect to COM ,PNP signal is selected

2）DOx jumper selection

SW-DO (11 pin of CN3) and COM (25 pin of CN3) are shorted to select NPN,

SW-DO (11 pin of CN3) and +24V (26 pin of CN3) are shorted to select PNP.In other words, if SW-DO connect to +24V, PNP signal is selected, SW-DO connect to COM, NPN signal is selected

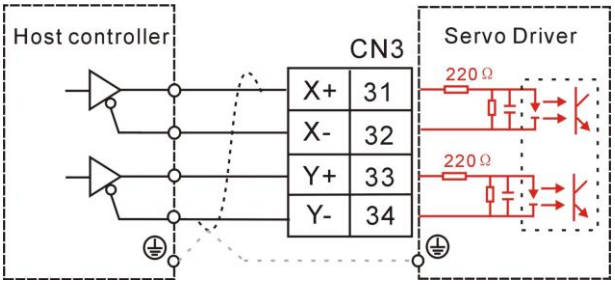
Remark: The external DC24V power supply is connected to 9 feet (COM) and 10 feet (+24V).

3.4.4 Pulse Command Input Wiring Example

The wiring method of the Pulse command input (31, 32, 33, and 34 feet) in the CN3 port will be described in detail below. There are two choices of input signal types, namely differential signal input and open collector input. The details are as follows:

（1）When differential signal is input

Maximum input frequency ≦500KHz (before multiplier)



Please ensure that:

● 3.2V≤[（High level）-（Low level）]≤5.1V

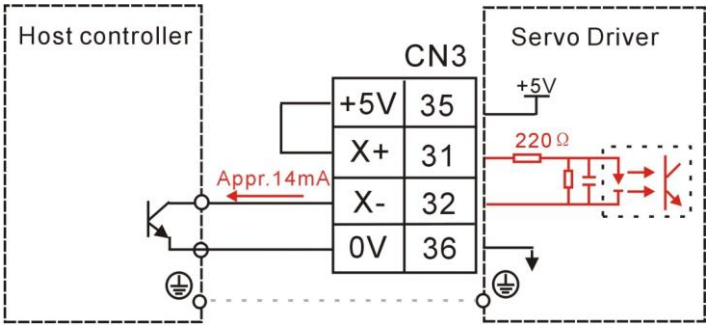
If the above formula is not satisfied, the input pulse of the servo driver is unstable, and pulse loss or instruction inversion may occur.

（2）When the open collector input

Maximum input frequency ≦300KHz

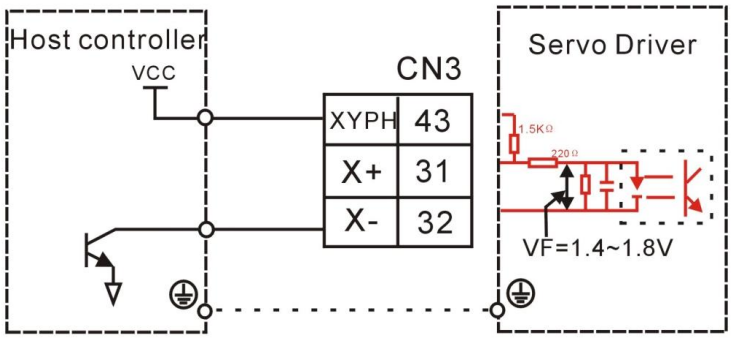
①The host controller is NPN type (Mitsubishi, Panasonic, Omron and other Japanese PLC)

a. When using the internal 5V power supply of the drive：



● the wiring of Y+ (33 feet) and Y- (34 feet) is the same as X+ and X-

b. When using an external power supply：

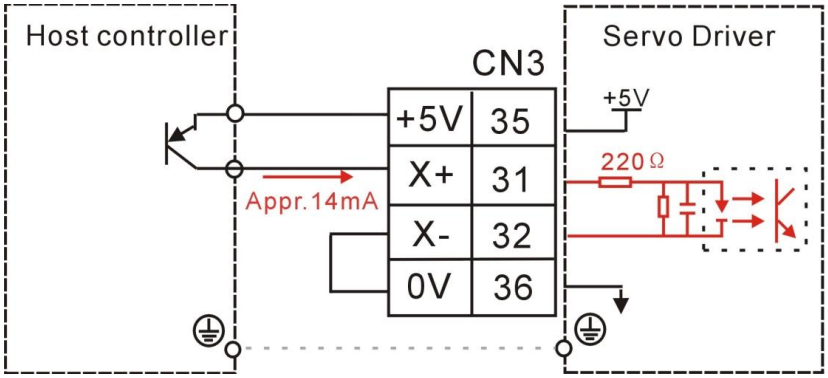


●The wiring of Y+ (33 feet) and Y- (34 feet) is the same as X+ and X-。

● VCC=24V。

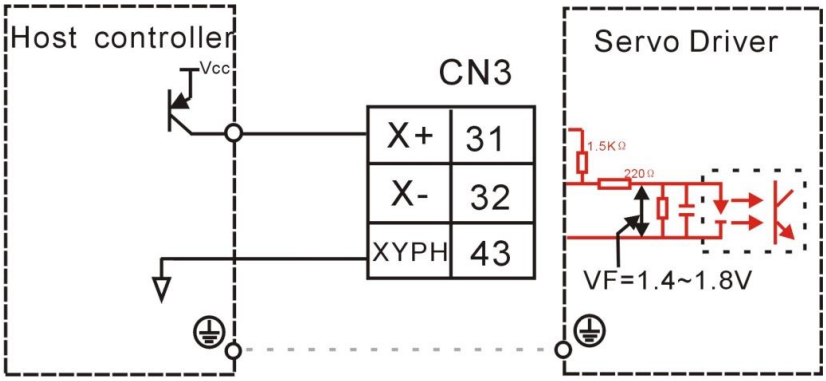
②The host controller is PNP type (European PLC such as Siemens)

a. When using the internal 5V power supply of the drive：



● The wiring of Y+ (33 feet) and Y- (34 feet) is the same as X+ and X-。

b. Use the external power supply



● The wiring of Y+ (33 feet) and Y- (34 feet) is the same as X+ and X-。

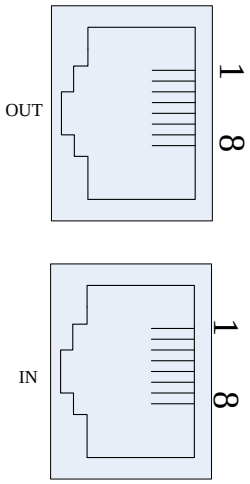
● VCC=24V。

3.5 Communication signal wiring

3.5.1 Pin assignment and definition of E structure communication port (CN1)

symbol	Terminal appearance	Description

CN1



The definition of both interfaces is the same.

Pin num	definition	Description
1	CANH	CAN bus high signal
2	CANL	CAN bus low signal
3	GND	power ground
4	SG+	RS485 signal+
5	SG-	RS485 signal-
6	NC	unconnect
7	NC	unconnect
8	GND	power ground

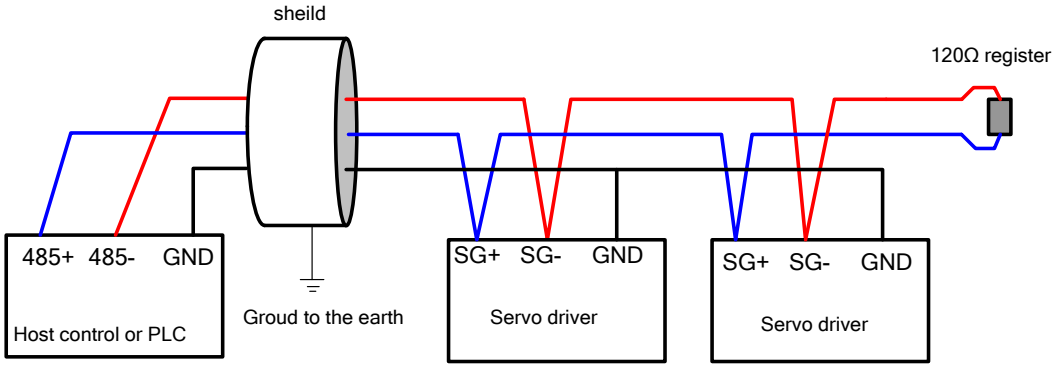
(1) Whether it is RS485 or CAN bus, it is necessary to connect the power ground of the controller (PLC) to the power ground of the servo driver.

(2) When multiple drivers are used in parallel with the RS485 bus, add a 120Ω termination resistor between the SG+ and SG- terminals to the farthest drive.

(2) When multiple drivers are used in parallel with the CAN bus, add a 120Ω termination resistor between the CANH and CANL terminals to the farthest drive.

Remark: Universal servo uses RS-485 signal communication, CANopen bus type servo uses CAN signal communication.

Note: When wiring, connect the GND of the host device to the GND terminal of the servo driver.



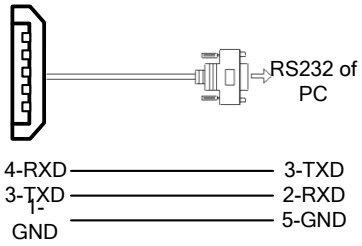
3.5.2 E structure monitoring port pin assignment and definition

Pin symbol	Terminal appearance	Description

CN5

Pin num	define	Description
1	GND	power ground
2	NC	unconnect
3	TXD	RS232 transmist
4	RXD	RS232 Receive
5	F GARST	FPGA reset

Remark: The function of the FPGARST pin is: When the FPGA firmware update fails, short the pin to GND (5 pin) to update the FPGA firmware again. After the update is completed, disconnect it from GND (5 pin). The power is turned on again for the driver to work properly. The connection to the computer is as follows:



The RS232 baud rate selection parameters are as follows：

Parameter No	Parameter Description	Setting Range	Default	
P08.26	RS232 monitoring port baud rate 0- 9600 1- 38400 2- 115200	0~2	2	RW

3.6 Wiring recommendations and anti-interference measures

3.6.1 Wiring recommendations

For the safety and stability of the product, please pay attention to the following when wiring:

1. For the command input and the cable related to the encoder wiring, please select the shortest distance wiring.

2. Use a thick wire (2mm2 or more) as much as possible for the grounding wire.

● All parts of the system (servo drive, servo motor, noise filter, host controller, switching power supply, HMI, etc.) must be grounded and must be grounded at one point.

● It is recommended that the grounding resistance be 100Ω or less.

● Use a shielded cable for the motor cable.

3. Do not bend or withstand the cable.

●The cable diameter of the signal cable is only 0.2mm or 0.3mm. Please use it with care.

4. To prevent RF interference, use a noise filter.

● when using near a residential building or when you are concerned about radio frequency interference, install a noise filter on the input side of the power cord.

5. To prevent malfunction caused by noise, the following processing methods can be used:

● Install the superior device and the noise filter as close as possible to the servo drive.

● Install a surge suppressor on the coil of the relay or AC contactor.

● when wiring, please separate the strong electric line from the weak electric line and keep the interval of 30cm or more. Do not put it in the same pipe or bundle it together.

● do not share power with welding machines, EDM equipment, etc. Even if there is no power supply, when there is a high frequency generator nearby, install a noise filter on the input side of the wire.

6. Use a circuit breaker or fuse to protect the power cord.

●In order to prevent cross-electric shock accidents in the servo system, be sure to use a circuit breaker or fuse for wiring.。

3.6.2 Anti-interference measures

1. Servo motor housing is grounded

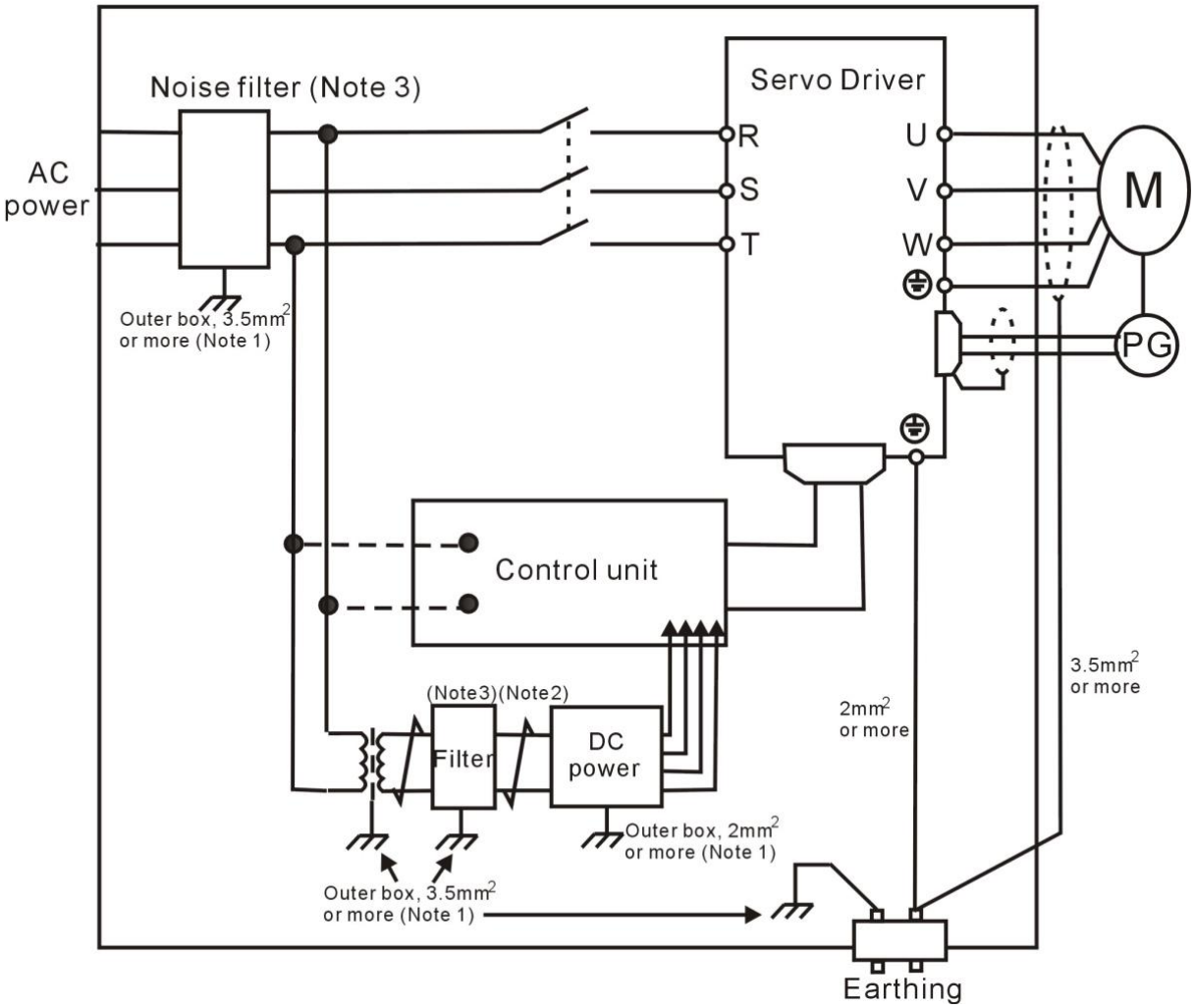
Be sure to connect the ground terminal "⏚ " of the servo motor directly to the ground terminal " ⏚" of the servo drive. In addition, connect the ground terminal of the driver to the ground. Otherwise, when the servo motor is mechanically grounded, the switching disturbance current will flow out from the main circuit of the driver through the parasitic capacitance of the servo motor.

2. When interference occurs on the command input line

When interference occurs on the command input line, connect the 0V line of the input line to the ground, the motor main circuit wiring passes through the metal conduit, and connect the conduit and the junction box to the ground.

● please ground the above grounding and ground all at one point.

3. Anti-interference wiring example



Note 1: For the outer box connecting wires used for grounding, use thick wires of 3.5mm2 or more as much as possible (weaved copper wire is recommended).

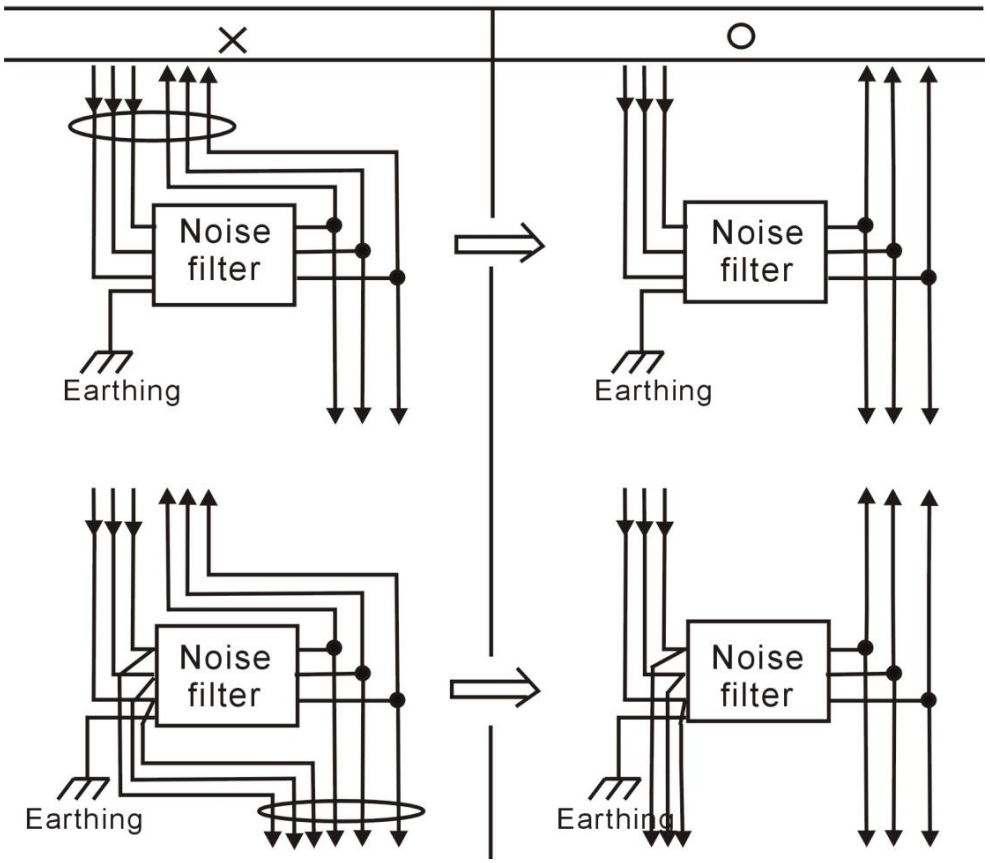
Note 2: Be sure to use twisted pair shielded wires.

Note 3: Please refer to "Using the Noise Filter" below when using a noise filter.

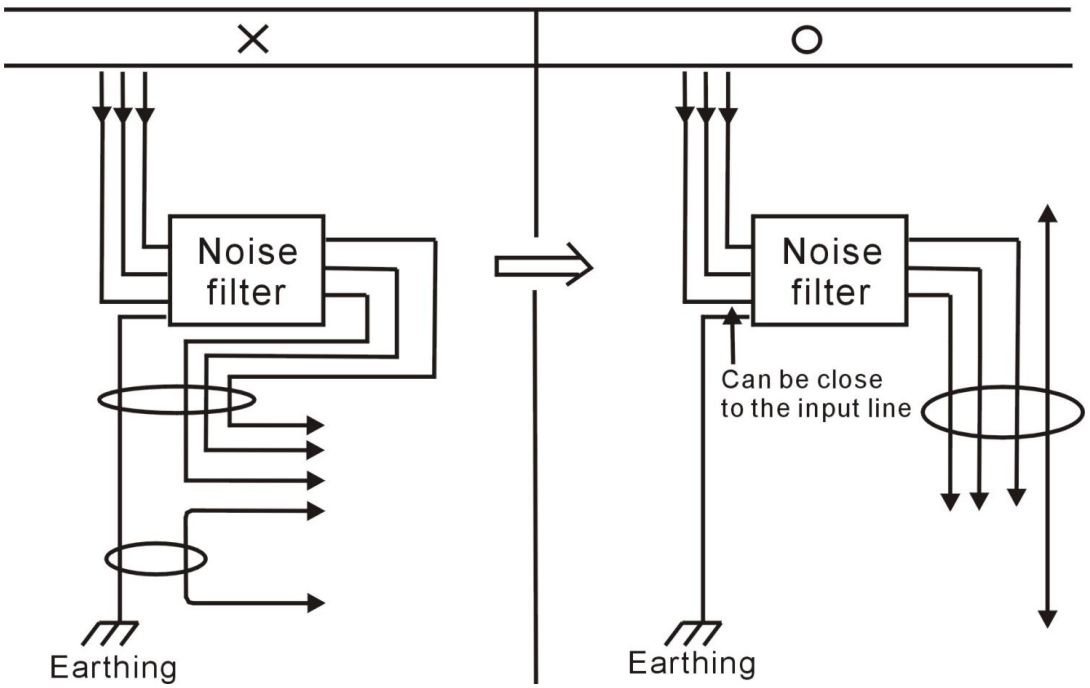
4. How to use the noise filter

In order to prevent the interference of the power line and reduce the influence of the servo driver on other devices, please select the noise filter that can make the servo system comply with the IEC/EN 61800-3 electromagnetic compatibility standard according to the power of the servo driver, and observe it in use. The following notes:

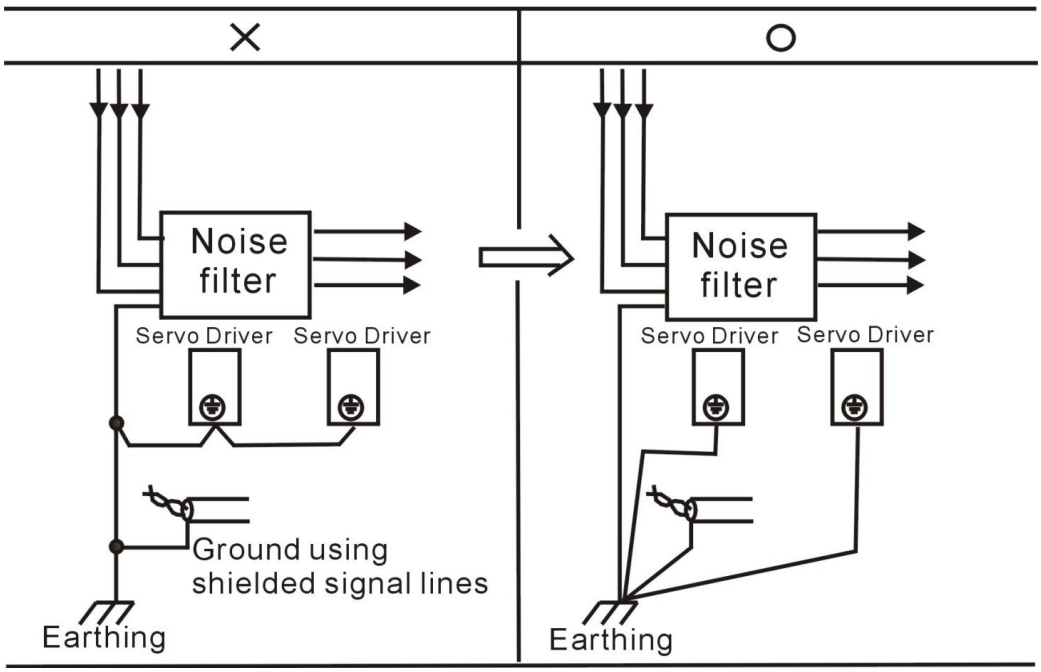
● Separate the input wiring of the noise filter from the output wiring. Do not put them in the same sleeve, and do not bundle them together.



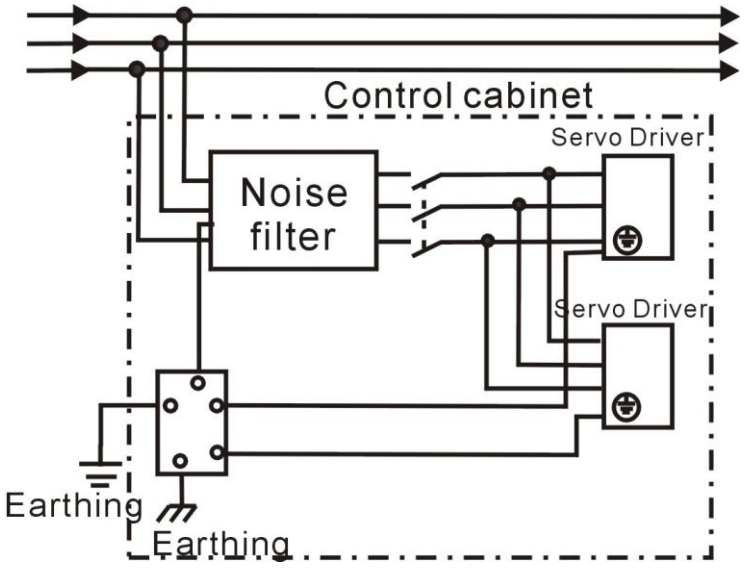
● Separate the ground wire of the noise filter from the output wiring. Do not put them in the same casing, let alone bundle them together.



● Connect the ground wire of the noise filter to the grounding plate separately. Do not connect other ground wires.



●please ground the noise filter and other components in the control cabinet when the noise filters and servo driver are installed in the same control cabinet.



Chapter 4 LED Display and Keyboard Operation

4.1 Panel composition introduction

4.1.1 C structure servo driver panel

The panel contains 8 buttons and 5 digital tubes. Only 5 of the 8 buttons can be used, and the remaining 3 buttons reserved. The general functions of the five buttons are shown in the table below.

Key name	Key function
PAR/ALM	mode switch, return to the previous menu
▲(add)	increase flashing bit value of the LED digital tube
▼(dec)	Decrease flashing digit value of the LED digital tube
STOP/RST	Moves the blinking LED tube to the left; checks the high value of data longer than 5 bits; Fault reset;execute Fn function
RD/WT	read/write parameter values;enter fn page

4.1.2 E structure servo driver panel

The panel contains 5 buttons and 5 digital tubes. The general functions of the five buttons are shown in the table below.

Key name	Key function

mode	mode switch, return to the previous menu
▲(add)	increase flashing bit value of the LED digital tube
▼(dec)	Decrease flashing digit value of the LED digital tube
◄◄(shift)	Moves the blinking LED tube to the left; checks the high value of data longer than 5 bits; Fault reset;execute Fn function
SET	read/write parameter values

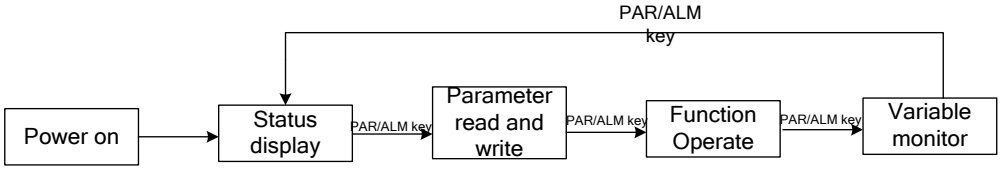
4.2 Panel operation mode

4.2.1 C structure servo driver panel

There are a total of four operating modes, namely status display, parameter reading and writing, variable monitoring, and functional operation.

Panel operation mode	mode introduction
Status display	Displays the status of the drive, such as reset (panel display rst), ready (panel display rdy), run (panel display run), fault (Er.xxx), or monitor a specific variable in the run (eg speed, busbar) Voltage, etc.)
Parameter reading and writing	reading and writing all parameters
Variable monitoring	monitors a variable or IO state of a drive
Function operation	Perform specific functions, such as jog test run, parameter reset factory value, driver reset

Each mode is switched by PAR/ALM key.

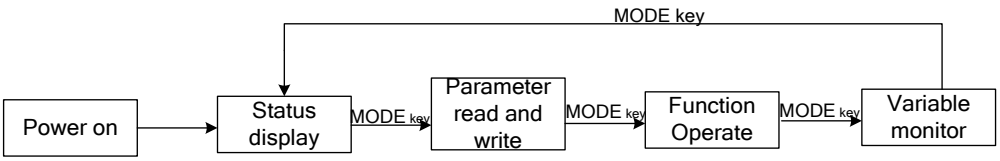


4.2.2 E structure servo driver panel

There are a total of four operating modes, namely status display, parameter reading and writing, variable monitoring, and functional operation.

Panel operation mode	mode introduction
Status display	Displays the status of the drive, such as reset (panel display rst), ready (panel display rdy), run (panel display run), fault (Er.xxx), or monitor a specific variable in the run (eg speed, busbar) Voltage, etc.)
Parameter reading and writing	reading and writing all parameters
Variable monitoring	monitors a variable or IO state of a drive
Function operation	Perform specific functions, such as jog test run, parameter reset factory value, driver reset

Each mode is switched by MODE key.



4.3 Status display

In this mode, the status of the driver is displayed. There are several states as follows.

Status Name	Status Description	Panel Display
Reset state	The driver is powered on or reset to restart.	rSt
Ready state	Servo initialization completed, ready to enter the RUN state	rdy
Running state	When the driver is enabled, the motor is powered on	run
Fault status	The driver reported a fault and the panel displays the reported fault code Er.xxx	Er.xxx

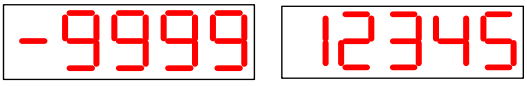
In the non-fault state of the status display, the panel can be set to display a specific variable via P02.05.

4.4 Parameter reading and writing

When you enter the parameter read/write mode for the first time, Pxx.yy is displayed. Where xx is the parameter group and yy is the parameter number in the group. The parameters of the driver are divided into 0~13groups, and each group can accommodate up to 99 16-bit parameters. The parameters are divided into four types, namely unsigned 16-bit parameters, signed 16-bit parameters, unsigned 32-bit parameters, and signed 32-bit parameters. Unsigned 16-bit parameters range from 0 to 65535. The range of signed 16-bit parameters ranges from -32767 to 32767. Unsigned 32-bit parameters range from 0 to 4294967295. The range of signed 32-bit parameters ranges from -2147483647 to 2147483647.

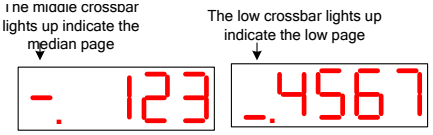
4.4.1 Display rules for numbers of different lengths

A negative number less than 4 digits and a positive number less than 5 digits can be displayed intact by 5 digital tubes. For example, -9999 and 12345 are shown below.

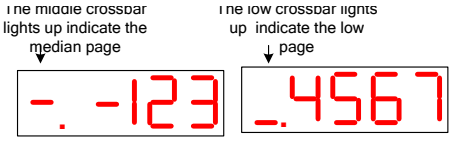


Negative numbers of more than 4 digits or positive digits of more than 5 digits are divided into 2 pages or 3 pages. Switching between pages and pages is achieved by long pressing the "◀◀" (shift) button. The leftmost digital tube of each page identifies the number of pages displayed at this time. The high crossbar lights up to represent the high position page, the middle crossbar lights up to represent the median page, and the low crossbar lights up to represent the low position page.

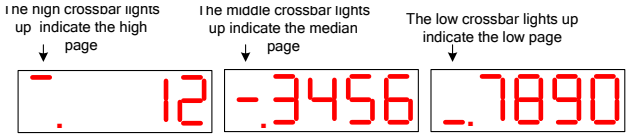
For example, 1234567 is shown below.



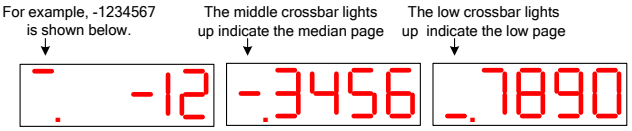
For example, -1234567 is shown below.



1234567890 is shown below.



-1234567890 is shown below.



4.4.2 Parameter setting steps

For example, the process of setting P00.02 to 4000 is as follows.

- Press the MODE button to switch the mode to the parameter read/write mode. At this time, the keyboard displays P00.00.
- use "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 keys to change the parameter number to P00.02;
- Press the SET button to read out the value of P00.02 first;
- use "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 keys to set the parameter value to 4000;
- Press the SET button to write the set parameter value to P00.02.

For multi-page display data, you can automatically shift to other pages by "◄◄" (shift), or you can directly shift to other pages by long-pressing "◄◄" (shift).

4.5 Functional operation

Currently the servo supports the following features。

Function number	Function
Fn000	reset drive
Fn001	JOG test run
Fn002	Reset all parameter to default value
Fn003	Update ARM firmware
Fn004	learning motor UVW phase sequence
Fn005	Learn motor pole pairs and encoder parameters
Fn006	Self-learning gain and feedforward coefficient and other loop parameters
Fn007	learning load inertia
Fn008	Update FPGA program
Fn009	Reset all parameter to default value except the P00 and P01 parameter

	groups
Fn010	backs up all parameters
Fn011	restores the parameters that have been backed up
Fn012	re-open RS232 communication
Fn013	Self-learning full closed loop polarity and the number of second encoder pulses of the motor one revolution

4.5.1 Fn000 RESET DRIVER

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn000;
- Press the SET button to reset the driver directly.

Note: In any state, press the "▲" (increase) and "▼" (decrease) buttons simultaneously for 2 seconds to reset the drive.

4.5.2 Fn001 JOG Test Function

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn001;
- Press the SET button, the driver is enabled and the digital tube is displayed as below. The first number indicates that the current speed is given by the value of 10, the maximum Jog speed can be set to 90, and the minimum Jog speed can be set to -90;

- Press the "▲" (increase) button to increase the Jog speed by 10 rpm, press the "▼" (decrease) button to reduce the Jog speed by 10 rpm, and press the "◄◄" (shift) button to set the Jog speed to 0;
- After the Jog test run is completed, press the MODE button to exit the Jog mode, and the servo is not enabled.

Note: When the driver is enabled, the JOG Test is invalid.

4.5.3 Fn002-Reset all parameters to default value function

All parameters are reset to their original values, which refer to all application parameters, motor parameters, and driver parameters reset to an initial value. Note that this function will also cover the motor parameters and driver parameters. After the recovery, the VECObserve

must match the motor driver parameters for the servo to run.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn002;
- Press SET to display rECY; (Recovery)
- Press and hold the "◄◄" (shift) button;
- If the recovery is successful, donE is displayed, and if it fails, Err is displayed.

note:

*** When the driver is enabled, this function is invalid.**

*** When powering up, if you press "▲", "▼", "◄◄" at the same time, all parameters can also be reset to the defaults.**

***This function is protected by the driver password.**

4.5.4 Fn003 Update ARM program

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn003;
- Click SET to display UPd; (Update)
- Press and hold the "◄◄" (shift) button to reset the drive;
- The ARM firmware can be updated via RS232

4.5.5 Fn004 Learning motor UVW winding P00.70

When using a motor other than the company, you need to learn the motor winding.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn004;
- Click SET to display SEL0; (Self-Learn0)
- Press the "◄◄" (Shift) button to start self-learning, and automatically disable or report the fault after the self-learning is completed.

Note: This feature does not work when the driver is enabled.

4.5.6 Fn005 Learning Encoder Related Parameters

When using another company's motor, you need to learn the encoder parameters.

Before self-learning, set the self-learning maximum current limit P02.36 (this value is generally set to 50% of the motor rated current / driver rated current ratio), motor maximum speed P00.03, motor rated speed P00.02, motor Rated current P00.01, driver rated current

P01.03.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn005;
- Click SET to display SEL1; (Self-Learn1)
- Press "◄◄" (Shift) to start self-learning. After self-learning is completed, it will automatically disable or report faults. The learned parameters are as follows: P00.05 Motor pole pair, P00.71 Z point offset, P00.11 motor encoder resolution, P00.72 encoder AB phase sequence.

If during the learning process, the overcurrent Er.100 is reported, the parameters P02.36 (self-learning maximum current limit), P07.01 (current loop proportional gain), and P07.02 (current loop integral gain) can be appropriately reduced.

Note: This feature does not work when the driver is enabled.

4.5.7 Fn006 Single Parameter Gain Adjustment

Single-parameter gain adjustment refers to the purpose of adjusting servo stiffness by adjusting one parameter. Before the single parameter gain adjustment, the servo load inertia ratio P07.29 must be accurately obtained. Refer to Fn007 for the method of obtaining the load inertia ratio.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn006;
- Click SET to display the value of the stiffness level P07.28;
- Press the "◄◄" (Shift) button and the motor starts to reverse.
- Gradually increase or decrease the value of the stiffness level by pressing "▲" or "▼" until the servo stiffness meets the actual application. Under normal circumstances, the rigidity level can be gradually increased until the motor has abnormal noise, and then decrease 1-2 of the rigidity level.

Note: This feature does not work when the driver is enabled.

4.5.8 Fn007 Learning Load Inertia

The load inertia is the most important parameter of the servo system. Only when the inertia is matched, the servo can achieve the best performance. Before learning the load inertia, please set the acceleration/deceleration time P07.33 (generally set to 300-2000, the larger the inertia ratio, the larger the value). The servo can automatically learn the load inertia through Fn007. During the learning of the load inertia, the motor will rotate forward for 3 rounds and then reverse for 3 rounds. The acceleration/deceleration time is P07.33. If the load

can only move in one direction, then you need to set P02.03 to prohibit forward or reverse. The learned load inertia will be placed in P07.29.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn007;
- Click SET to display SEL3; (Self-Learn 3)
- Press "◄◄" (Shift) to start self-learning and automatically disable after self-learning. If it does not learn successfully, it will report a failure.

If the overcurrent Er.100 is reported during the learning process, P07.01 (current loop proportional gain), P07.02 (current loop integral gain), P07.03 (speed loop proportional gain), P07.04 (speed loop integral gain) can be appropriately reduced.

If the load inertia is too large, low-frequency oscillation may occur during self-learning. In this case, you need to manually increase P07.03, reduce P07.04, and then learn again.

Note:

1. This function does not work when the driver is enabled.

2. When the load inertia is large, self-learning may cause low-frequency oscillation. You need to manually increase P07.03, reduce P07.04, and then learn again.

3. When the load inertia is small, reduce the inertia self-learning acceleration/deceleration time P07.33.

4. When the machine shakes, reduce the position loop gain P07.05

4.5.9 Fn008 Update FPGA Program Reset Function

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn008;
- Click SET to display FUPD; (FPGA Update)
- Press and hold the "◄◄" (shift) button to reset the drive;
- The FPGA firmware can now be updated via the VEC FPGA Firmware Update Tool.

4.5.10 Fn009 restores all parameters to default except P00 and P01 parameter groups

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn009;
- Click SET to display -rECy; (-Recovery)

- Press and hold the "◄◄" (shift) button;
- If the recovery is successful, donE is displayed, and if it fails, Err is displayed.

4.5.11 Fn010 Backup All Parameters

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn010;
- Click SET to display bcuP; (backup Parameter)
- Press and hold the "◄◄" (shift) button;
- If the backup is successful, donE is displayed, and if it fails, Err is displayed.

Note: The driver backup parameters are stored in another address area of the drive's memory.

4.5.12 Fn011 Restores Parameters That Have Been Backed Up

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Using "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn011;
- Click SET to display rESto. (restore)
- Press and hold the "◄◄" (shift) button;
- If the restore is successful, donE is displayed, and if it fails, Err is displayed.

4.5.13 Fn012 restarts RS232 communication

When the servo RS232 does not communicate for a long time, it will automatically turn off. RS232 communication can be restarted via Fn012.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Use "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn012;
- Click SET to display SEnd;
- Press the "◄◄" (Shift) button;

4.5.14 Self-learning feedback polarity and the number of second encoder pulses corresponding to one revolution of the motor in full-closed mode

In the full-closed mode, the feedback polarity P03.33 and P03.34 need to be set, and the appropriate value can be automatically calculated by this function operation. When

performing this function operation, please make sure that the second encoder measuring wheel is in close contact with the material to ensure that no slippage occurs between the measuring wheel and the material.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Combine "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn013;
- Click SET to display LFCP. (Learn Full_Close Parameter);
- Press the "◄◄" (shift) button; The electric machine made a forward rotation of 3 turns at a speed of 10 rpm.

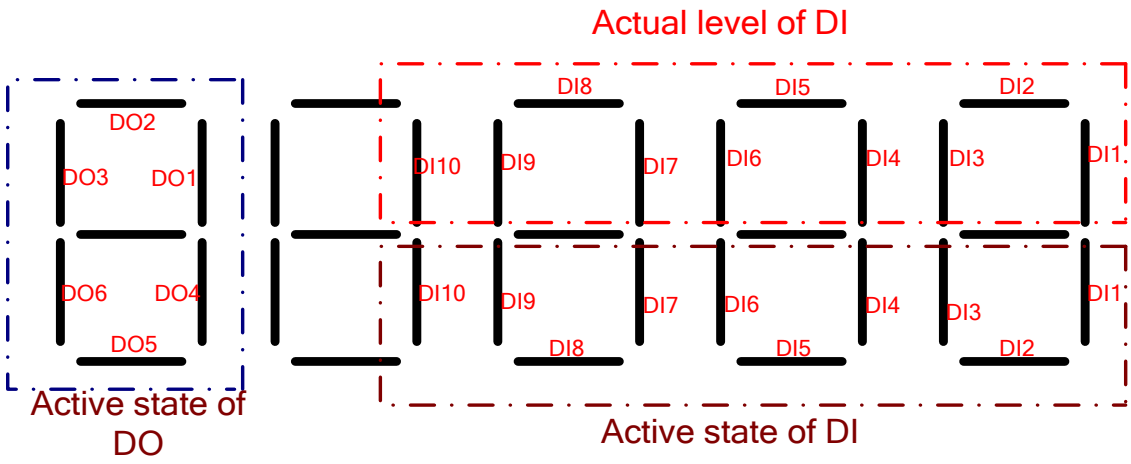
4.6 Variable Monitoring

Press the MODE button several times to switch the mode to the variable monitoring mode. In this mode, the first two digits of the digital tube display Un. Use "▲" (increase), "◄◄" (shift), "▼" (decrease) three buttons to set the display value of the digital tube to the number to be monitored (such as Un007 to monitor the DIDO status). Press SET to display the variables that need to be monitored.

Currently, the driver can monitor 14 variables, and the values corresponding to the monitor numbers are shown in the following table.

Number	corresponding value
Un000	motor speed In rpm
Un001	DC Bus Voltage V
Un002	temperature ℃
Un003	Current RMS A
Un004	Postion command pulse count value
Un005	Motor encoder pulse count value
Un006	Second encoder pulse count value
Un007	DIDO status
Un008	AI1 voltage value
Un009	AI2 voltage value
Un010	AI3 voltage value
Un011	Output motor instantaneous current percentage
Un012	Output motor instantaneous power percentage
Un013	Output rated current of the drive
Un014	motor load rate

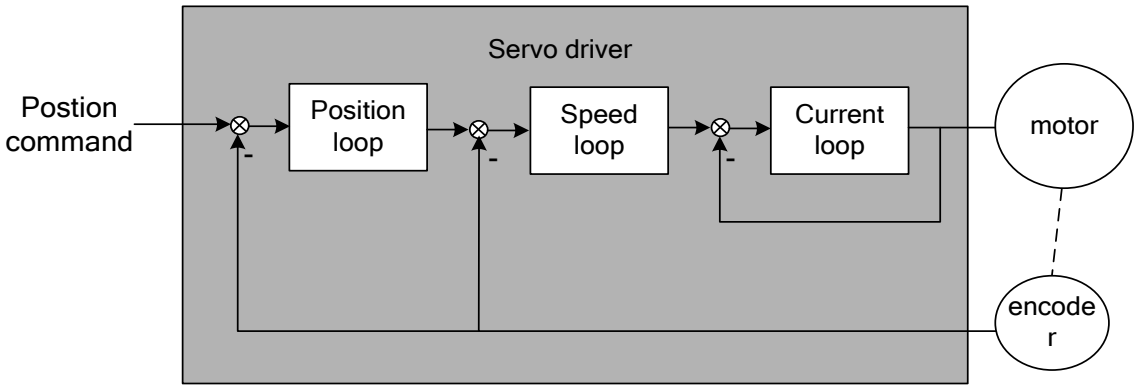
It should be noted that for DIDO status monitoring. The actual level of DI(high level-bright, low level-off),active state of DI (active-bright, inactive-off), active state of DO (active-bright, inactive-off) can be monitored simultaneously on five digital tubes,. The meaning of each segment of the digital tube is as follows.



As shown in the above figure, the first digital tube displays the active state of DO1~DO6, and the active state of each DO corresponds to the bright/off of the corresponding digital tube. The upper 3 segments of the last 4 digits correspond to the actual levels of DI1~DI10, respectively. The high level is on and the low level is off. The lower 3 segments of the last 4 digits of the digital tube correspond to the active states of DI1~DI10, respectively, active is bright, inactive is off.

Chapter 5 Control Mode

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



The servo driver is the control core of the servo system. Through the processing of the input signal and the feedback signal, the servo driver can perform precise position, speed and torque control of the servo motor, namely position, speed, torque and hybrid control mode. Among them, position control is the most important and most common control mode of the servo system.

The control modes are briefly described as follows:

Position control refers to the position of the motor controlled by the position command. The motor target position is determined by the total number of position commands, and the position command frequency determines the motor rotation speed. The position command can be given by the external pulse input, the internal position command + speed limit. With an internal encoder (servo motor with encoder) or a second encoder (full closed loop control), the servo driver enables fast and precise control of the position and speed of the machine. Therefore, the position control mode is mainly used in occasions where positioning control is required, such as robot, mounter, CNC etc.

Speed control refers to the speed of the machine controlled by the speed command. The servo driver provides fast, precise control of the mechanical speed through digital, analog voltage or communication-given speed commands. Therefore, the speed control mode is mainly used to control the speed. If you want to use host controller to realize the speed control of motor, you can output speed command input servo drive, such as analog engraving and milling machine.

Torque control refers to controlling the output torque of the motor through a torque command. The torque command is given by digital, analog voltage or communication. The torque control mode is mainly used in equipments where the stress of materials is strictly required, such as rewinding and unwinding devices. Some torque control should ensure that the material stress is not affected by the change of the winding radius.

The hybrid control mode is realized by the DI terminal, and can switch the control mode

in the running state.

5.1 Basic parameter setting

5.1.1 Control mode

The servo driver has three basic control modes: position mode, speed mode, and torque mode. A variety of hybrid control modes can be derived from three basic control modes. Which mode is used can be set by the P02.01 parameter.

<table>
<tr><th>No</th><th>Description</th><th>Range</th><th>Unit</th><th>Setting</th><th>active</th><th>default</th><th>ACCESS</th></tr>
<tr><td>P02.01</td><td>Driver control mode. Used to select the servo driver control mode.</td><td>0~6</td><td>-</td><td>Anytime</td><td>immediately</td><td>0</td><td>RW</td></tr>
<tr><td></td><td colspan="7">0- position mode
1-speed mode
2- Torque mode
3- Position/torque mode IO switching, select Torque mode when INFn.36 is active
4- Position/speed mode IO switching, select speed mode when INFn.36 is active
5- Torque/speed mode IO switching, select torque mode when INFn.36 is active
6- Position/Torque/Speed Mode IO Switching, Switching via INFn.36, INFn.37
<table>
<tr><th>INFn.37</th><th>INFn.36</th><th>Control mode</th></tr>
<tr><td>active</td><td>inactive</td><td>speed mode</td></tr>
<tr><td>inactive</td><td>active</td><td>Torque mode</td></tr>
<tr><td>active</td><td>xx</td><td>position mode</td></tr>
</table></td></tr>
</table>

The relevant input function bits are as follows.

NUM	DESCRIPTION
INFn.36	Control mode switch 0
INFn.37	Control mode switch 1

5.1.2 Servo start and stop

The servo is enabled when the internal input function bit INFn.01 of the driver is active via IO or communication. After OUTFn.25 is output, the command input command is valid, and the position/speed/torque command is accepted and the servo is running.

The servo will perform the shutdown action under the following three situations. First situation is deactive the internal input function bit INFn.01; the second situation is a fault occurs; the third situations is when the emergency stop signal INFn.58 is active. The shutdown option of the three situations can be set separately. The deactive INFn01 situation is set by P02.13, the fault stop situation refers to “7.1.1 Fault Handling”, and the emergency stop situation is set by P02.14.

The servo has 5 stop options to choose from. The first option is free rotate; the second option is rapid deceleration stop, after the motor stop, the motor is powered off; the third is slow deceleration stop, after the motor stop, the motor is powered off; the fourth is Quickly decelerate to stop, and then keep enabled after stop, users need to deactive INFn.01 to disable the driver; the fifth is slow deceleration stop, and then keep enabled after stop, users need to deactive INFn.01 to disable then driver.

Free rotate means that the driver is diable and the motor is free to stop by frictional resistance. Deceleration stop means that the servo driver drives the motor to decelerate. In this process, the motor is kept enable. The deceleration time for rapid deceleration stop is set by P02.16. The deceleration time for slow deceleration stop is set by P02.17. The deceleration time refers to the time from the rated speed to the zero speed. The actual deceleration time is determined by the speed at the time of the fault and the set deceleration time.

$$\text{实际减速时间} = \text{设定的减速时间} \times \frac{\text{故障时的速度}}{\text{额定转速}}$$

相关参数如下。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P02.13	Stop option for deactive INFn.01	0~2	-	running	Immediately	0	RW
	0- free to rotate 1- rapid deceleration stop and disable driver 2- slow deceleration stop and disable driver						
P02.14	Stop option for emergency stop INFn.58 active	0~4	-	anytime	Immediately	0	RW
	Stop option when emergency stop INFn.58 bit is active 0-free to rotate 1- rapid deceleration stop and disable driver 2- slow deceleration stop and disable driver 3- rapid deceleration stop and keep enable driver 4- slow deceleration stop and keep enable driver						
P02.16	Rapid stop deceleration time	0~65535	ms	anytime	Immediately	500	RW
P02.17	Slow stop deceleration time	0~65535	ms	anytime	Immediately	1000	RW

5.1.3 Servo braking option

When the motor decelerates, it will generate electricity and store it in the DC bus capacitor. When the DC bus capacitor voltage is too large, an overvoltage fault will be reported. Therefore, it is necessary to connect the braking resistor to the servo to consume excess energy stored in the bus capacitor. When the capacitor voltage is high, the energy brake circuit is activated. For the 220V drive, when the DC bus voltage is greater than 380VDC, the energy brake circuit is activated; for the 380V drive, when the DC bus voltage is greater than 680VDC, the energy brake circuit is activated. The user can select the servo brake option through P02.20 to release the excess energy on the DC bus.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P02.20	Servo braking option	0~3	-	anytime	Immediately	2	RW
	0- Never start the brake 1- Start the brake when deceleration and DC bus capacitor voltage is too large 2-Start the brake at anytime when DC bus capacitor voltage is too large 3- Start the brake when regenerate energy and DC bus capacitor voltage is too large						

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P02.21	Braking resistor value	0~3276.7	Ω	anytime	Immediately	0	RW
P02.22	Braking resistor power	0~3276.7	Kw	anytime	Immediately	0	RW
P02.23	Braking resistor heat dissipation coefficient	0~100	%	anytime	Immediately	50	RW
If P02.23 is set to 100%, it means that the time from the maximum heat loss to 0 is 10s.							

5.1.4 Instruction reverse

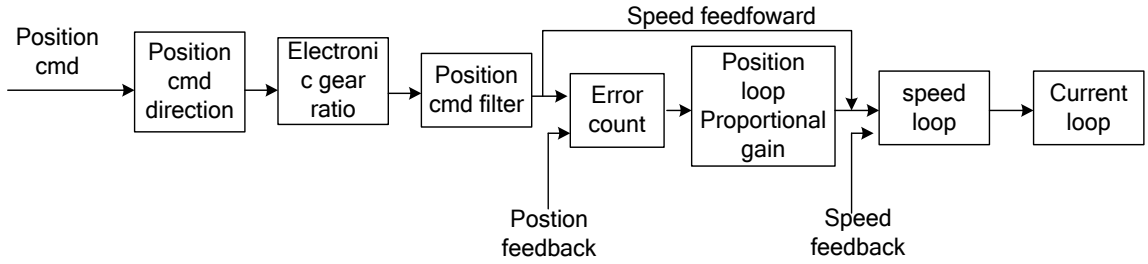
The speed, torque and position commands can be reversed by setting register P02.50. P02.50 contains 16-bit binary. When the 0th bit is valid, the position command is reversed. When the 1st bit is valid, the speed command is reversed. When 2 bits are valid, the torque command is reversed.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P02.50	Reverse Instruction	0~7	-	anyti	Imme	0	RW

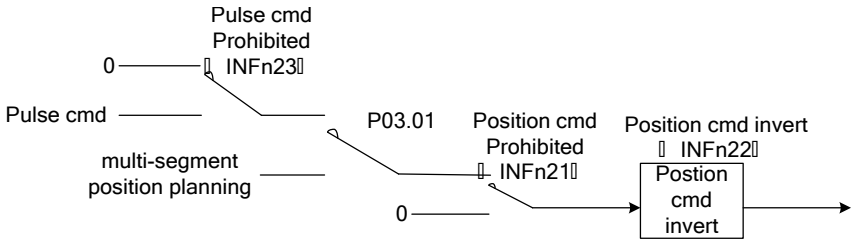
	When the 0th bit is valid, the position command is reversed. When the 1st bit is valid, the speed command is reversed. When 2 bits are valid, the torque command is reversed.			me	diatel y		

5.2 Position mode

The position mode is a control mode in which the motor position is used as a control target, and is often used to achieve high-precision positioning. The implementation of the position mode is shown in the figure below.



5.2.1 Position command source and direction selection



The position command can be derived from a pulse command, or from an internal multi-segment position plan, or through an IO switching pulse and an internal multi-segment position planning command.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.01	Source of position cmd	0~2	-	anytime	Immediately	0	RW
	0- pulse command 1- multi-segment position plan 2- through an IO switching pulse and an internal multi-segment position planning command 3- pulse command add second encoder pulse count 4- pulse command add internal multi-segment position planning command						

Related input function bits.。

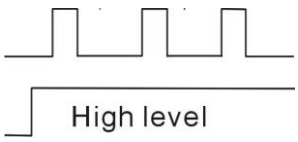
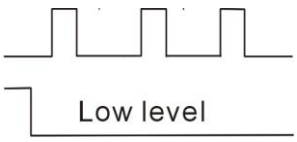
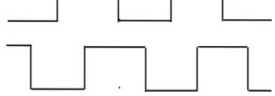
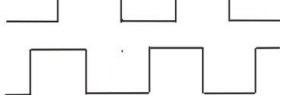
num	Bit description
INFn.21	Position command is Prohibited. When active, position command is prohibited from being input to the servo.
INFn.22	Position command is Reverse. When active, position command is Reverse from being input to the servo.
INFn.23	Pulse command is Reverse. When active, Pulse command is prohibited from being input to the servo.
INFn.35	switch position command source, when deactive, it is derived from multi-segment position command; when active, it is derived from pulse command

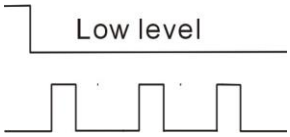
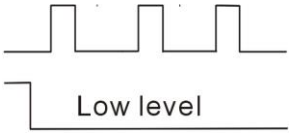
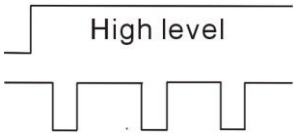
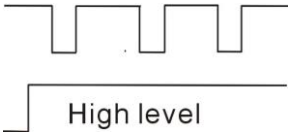
5.2.2 Position command is derived from pulse command

For the pulse command, there are five pulse patterns, and which one to use is set by P03.02.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.02	pulse pattern	0~4	-	Disable to set	Immediately	2	RW
	When Position command is derived from pulse command，select pulse patterns of pulse command 0- pulse count & pulse direction positive 1- pulse count & pulse direction negative 2- AB pulse 3- CW+CCW positive 4- CW+CCW negative						

The pulse command pattern are detailed in the following figure: ：

pulse pattern	Input port	Forward rotation command	Reverse rotation command
pulse count & pulse direction positive	X		
	Y		
pulse count & pulse direction negative	X		
	Y		
AB pulse	X		
	Y		

CW+CCW positive	X		
	Y		
CW+CCW negative	X		
	Y		

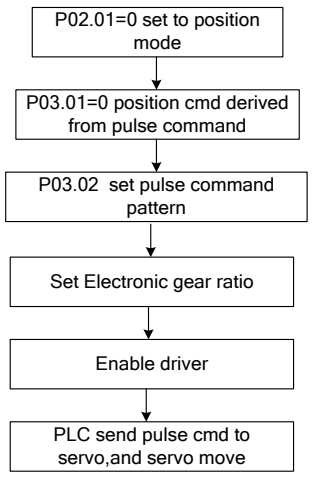
For pulse commands, the pulse can be hardware filtered to eliminate the effects of interference on the pulse command. The filter parameters can be set by P03.03.。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.03	Command pulse hardware filter, used to set the time of pulse command hardware filter.	0~32767	20ns	Disable to set	Immediately	50	RW

The count value of the pulse command can be monitored by parameter P03.04.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.04	Command pulse count value, used to display the number of pulse commands.	-	-	-	-	-	RO

When the position is derived from a pulse command, the driver parameter setting procedure is as follows.



5.2.3 Position command is derived from multi-segment position command planning

It is derived from the multi-segment position command, which means that the user presets the parameters such as the mechanical position command, speed, acceleration/deceleration time, and number of segments to be operated by parameters, and then triggers the operation of the multi-stage position, after which the motor moves according to the set procedure. Starting and stopping the multi-segment position is realized by operating INFn.27. When P13.92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-stage position; when P13.92=1, the rising edge of INFn.27 sets the operation of the multi-segment position until the multi-segment position is completed. The relevant parameters are listed below. It should be noted that the set position command refers to the mechanical position command.

Note: The position command of the multi-segment position will be multiplied by the electronic gear ratio, which is the position of the motor encoder P00.13; however, the speed setting of the multi-stage position is not affected by the electronic gear ratio.

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P13.01	Multi-segment position working mode 0- Stop after a single run 1- Cycle operation 2- DI switching operation, read the values of INFn.31, INFn.30, INFn.29, INFn.28 as the segment number.	0~2	-	When the position command is derived from the multi-segment position command, it is used to set the multi-segment position operation mode	Disable to set	Immediately	0	RW
P13.02	Total number of segments	1~16	-	Set the total number of segments for the position command.	anytime	Immediately	16	RW
P13.03	Idle waiting time unit 0- millisecond 1- second	0~1	-	The unit of waiting time when running with the multi-segment position function.	anytime	Immediately	1	RW
P13.04	remainder processing	0~1	-	When the	anyti	Imme	0	RW

	method 0- Re-jump to the first position command to run 1- From the last stop section			multi-segment position function is resumed, the segment number of the start segment is set	me	diatel y		
P13.05	Absolute or relative position command setting 0-Absolute command 1- relative command	0~1	-	sets the type of position command when running with the multi-segment position function	anyti me	Imme diatel y	1	RW
P13.10	Number of position commands in the first position segment	-2147483 647 ~ 21474836 47	Custo m unit	Number of position commands in the first position segment	anyti me	Imme diatel y	1000 0	RW
P13.12	Speed of first position segment	0~32767	rpm	Speed of first position segment	anyti me	Imme diatel y	500	RW
P13.13	acceleration time of first position segment	0~32767	ms	acceleration time of first position segment	anyti me	Imme diatel y	500	RW
P13.90	deceleration time of first position segment	0~32767	ms	deceleration time of first position segment	anyti me	Imme diatel y	500	RW
P13.14	idle time of first position segment unit of this parameter depend on P13.03	0~32767	ms(s)	idle time of first position segment	anyti me	Imme diatel y	1	RW
P13.15	Number of position commands in the second position segment	-2147483 647 ~ 21474836 47	Custo mize unit	Number of position commands in the second position segment	anyti me	Imme diatel y	1000 0	RW
P13.17	Speed of second position segment	0~32767	rpm	Speed of second position segment	anyti me	Imme diatel y	500	RW

P13.18	acceleration time of second position segment	0~32767	ms	acceleration time of second position segment	anytime	Immediately	500	RW
P13.91	deceleration time of second position segment	0~32767	ms	deceleration time of second position segment	anytime	Immediately	500	RW
P13.19	idle time of second position segment unit of this parameter depend on P13.03	0~32767	ms(s)	idle time of second position segment unit of this parameter depend on P13.03	anytime	Immediately	1	RW
P13.20	Number of position commands in the 3th position segment	-2147483647 ~ 2147483647	Customize unit	Number of position commands in the 3th position segment	anytime	Immediately	10000	RW
P13.22	Speed of 3th position segment	0~32767	rpm	Speed of 3th position segment	anytime	Immediately	500	RW
P13.23	Acceleration/ deceleration time of 3th position segment	0~32767	ms	Acceleration/ deceleration time of 3th position segment	anytime	Immediately	500	RW
P13.24	idle time of 3th position segment unit of this parameter depend on P13.03	0~32767	ms(s)	idle time of 3th position segment unit of this parameter depend on P13.03	anytime	Immediately	1	RW
P13.25	Number of position commands in the 4th position segment	-2147483647 ~ 2147483647	Customize unit	Number of position commands in the 4th position segment	anytime	Immediately	10000	RW

P13.27	Speed of 4th position segment	0~32767	rpm	Speed of 4th position segment	anytime	Immediately	500	RW
P13.28	Acceleration/ deceleration time of 4th position segment	0~32767	ms	Acceleration/ deceleration time of 4th position segment	anytime	Immediately	500	RW
P13.29	idle time of 4th position segment unit of this parameter depend on P13.03	0~32767	ms(s)	idle time of 4th position segment unit of this parameter depend on P13.03	anytime	Immediately	1	RW
P13.30	Number of position commands in the 5th position segment	-2147483647 ~ 2147483647	Customize unit	Number of position commands in the 5th position segment	anytime	Immediately	10000	RW
P13.32	Speed of 5th position segment	0~32767	rpm	Speed of 5th position segment	anytime	Immediately	500	RW
P13.33	Acceleration/ deceleration time of 5th position segment	0~32767	ms	Acceleration/ deceleration time of 5th position segment	anytime	Immediately	500	RW
P13.34	idle time of 5th position segment unit of this parameter depend on P13.03	0~32767	ms(s)	idle time of 5th position segment unit of this parameter depend on P13.03	anytime	Immediately	1	RW
.....								
P13.92	Multi-segment position command trigger signal type 0- INFn.27 rising edge triggers start multi-segment position; falling edge triggers	0~1	-	Multi-segment position command trigger signal type	anytime	Immediately	1	RW

	stop running multi-segment position 1- INFn.27 rising edge trigger start multi-segment position, falling edge does not work							

The absolute position command refers to the position that relative to the origin, and the relative position command refers to the position that relative to the current position. Therefore, the homing must be performed before the absolute position command is taken, otherwise the fault is reported.

For example, suppose that the 3-segment absolute position command is taken, the first segment position command is set to 1000, the second segment position command is set to 2000, and the third segment position command is set to 0. First, the zero return operation is performed, and then the multi-segment position is triggered. The motor first goes forward 1000, then goes forward 1000, then reverses 2000 and reach at zero.

For further example, assume that the 3-segment relative position command is set, the first-segment position command is set to 1000, the second-segment position command is set to 2000, and the third-segment position command is set to -1000. After triggering multiple positions, the motor goes forward 1000, then goes forward 2000, then go reverses 1000.

If you want to use the multi-segment position command, in addition to setting P03.01 and P13.01 first, you must also configure the DIx function control register to be set to INFn.27 (trigger multi-segment position function number). Then control the active level of DIx to implement the rising edge trigger to execute the multi-segment position command, and the falling edge to stop the execution of the multi-segment position command (P13.92=0). Select the segment number to execute similarly, configure the DIx function control register, set the corresponding level, and then trigger. The relevant input function bits are as follows.

num	Bit description
INFn.27	Trigger start multi-segment position The rising edge triggers the execution of the multi-segment position command, and the falling edge stops the execution of the multi-segment position command. Or only the rising edge triggers the execution of the multi-segment position command, and the falling edge does not operate. Specific reference P13.92
INFn.28	INFn.28 Multi-segment position command segment number selection 0
INFn.29	INFn.28 Multi-segment position command segment number selection 1
INFn.30	INFn.28 Multi-segment position command segment number selection 2
INFn.31	INFn.28 Multi-segment position command segment number selection 3
INFn.32	INFn.32 Multi-segment position direction selection. When active, set the position command of multi-segment position to reverse

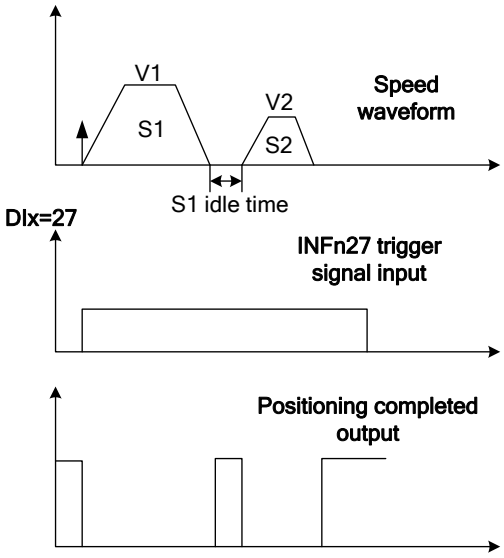
According to the state of INFn28~31, the multi-segment run segment number = INFn.31*8 + INFn.30*4 + INFn.29*2 + INFn.28*1 +1. See the table below for details.

INFn.31	INFn.30	INFn.29	INFn.28	run segment number

0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
.....				
1	1	1	1	16

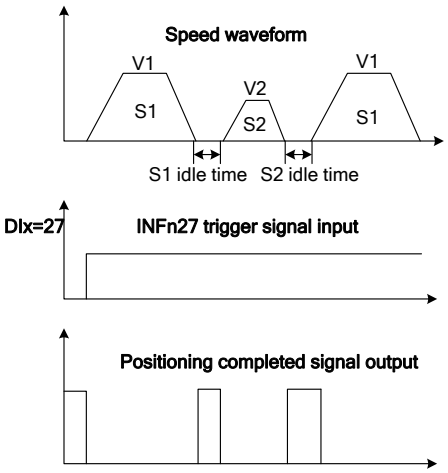
5.2.3.1 Stop after a single run

In this mode, the motor runs the n-segment position command, and the idle time of each position command can be set separately. INFn.27 starts/stops the multi-segment position mode. (Note: When P13.92=0, the INFn.27 rising edge starts multiple segments. When the position is running, the falling edge of INFn.27 stops the operation of the multi-stage position; when P13.92=1, the rising edge of INFn.27 starts the operation of the multi-stage position, and the falling edge does not move). Its operating speed curve is as follows. Assume that the total number of segments is 2.



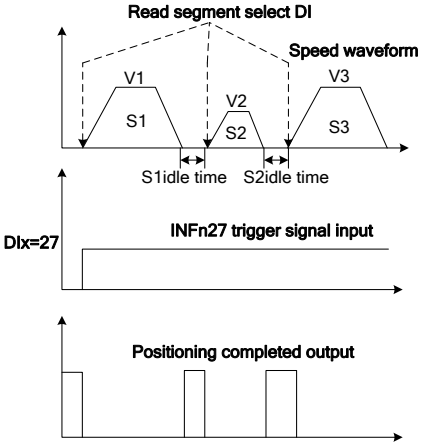
5.2.3.2 Cycle operation

In this mode, after the motor runs the n-segment position command, it automatically jumps to the first-segment position command operation. The idle time of each position command can be set separately. INFn.27 starts/stops the multi-segment position mode (Note: When P13 When .92=0, the rising edge of INFn.27 starts the operation of the multi-segment position, and the falling edge of INFn.27 stops the operation of the multi-segment position; when P13.92=1, the rising edge of INFn.27 sets the operation of the multi-segment position, the falling edge No action). Its operating speed curve is as follows. Assume that the total number of segments is 2.

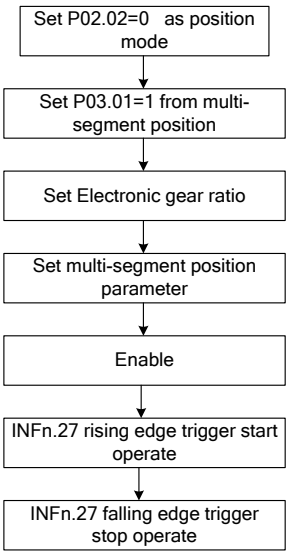


5.2.3.3 DI switching operation

In this mode, once the multi-segment position is triggered, the driver reads the valid states of INFn.31, INFn.30, INFn.29, and INFn.28 to select a certain position command. After the operation is completed, the idle time of the corresponding segment is suspended. , read the valid state of INFn.31, INFn.30, INFn.29, INFn.28 again to select another position command, and if another valid position change is found, select another position command to run. This is repeated until the operation of stopping the multi-segment position is stopped.



5.2.3.4 When the position is derived from multi-segment position, the driver parameter setting procedure is as follows.



5.2.4 Electronic gear ratio

The meaning of the electronic gear ratio is that the user position command unit is converted into the motor encoder unit. Which is

$$\text{Custom command position} \times \frac{\text{Electronic gear ratio numerator}}{\text{Electronic gear ratio denominator}} = \text{motor encoder position}$$

For example, assuming the pulse tracking mode, the user PLC sends pulse command to the servo driver, which stipulates that one pulse motor must go 1 micron, and the motor takes 1 micrometer need to turn 100 motor encoder pulses, then the electronic gear ratio is 100.

The system has two sets of electronic gear ratios to choose from, the relevant parameters are as follows.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.08	Electronic gear ratio 1 numerator	1~2147483647	-	anytime	Immediately	1000	RW
P03.10	Electronic gear ratio 1 denominator	1~2147483647	-	anytime	Immediately	1000	RW
P03.12	Electronic gear ratio 2 numerator	1~2147483647	-	anytime	Immediately	1000	RW
P03.14	Electronic gear ratio 2 denominator	1~2147483647	-	anytime	Immediately	1000	RW

					y		

Servo default using electronic gear ratio 1. Multiple electronic gear ratios can also be switched via INFn.24 and INFn.56 。

INFn.56	INFn.24	Select electronic gear ratio
deactive	deactive	$\frac{\text{Electronic gear ratio 1 numerator}}{\text{Electronic gear ratio 1 denominator}}$
deactive	active	$\frac{\text{Electronic gear ratio 2 numerator}}{\text{Electronic gear ratio 2 denominator}}$
active	deactive	$\frac{\text{Electronic gear ratio 1 numerator}}{\text{Electronic gear ratio 2 denominator}}$
active	active	$\frac{\text{Electronic gear ratio 2 numerator}}{\text{Electronic gear ratio 1 denominator}}$

5.2.5 Electronic gear ratio smooth switching function

When the electronic gear ratio is greatly changed, it is easy to cause a sudden change in the motor speed. The internal gear ratio can be smoothly switched by the P03.16(electronic gear ratio switching filter time constant).

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.16	electronic gear ratio switching filter time constant	0~32767	ms	Set the electronic gear ratio switching time to make the internal electronic gear ratio smoothly switch.	anytime	Immediately	0	RW

5.2.6 Position command filtering function

The position command filtering is to filter the position command. Consider adding positional command filtering in the following situations:

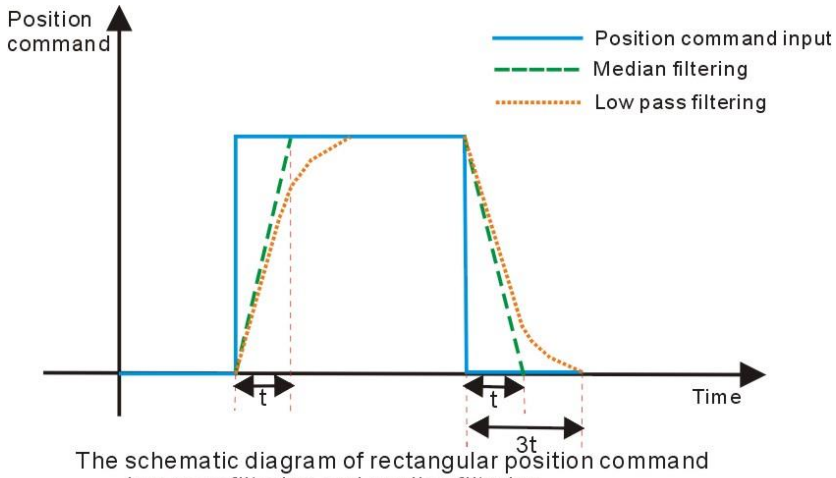
- The position command output by the host controller is not accelerated or decelerated.
- The pulse command frequency is low;
- When the electronic gear ratio is 10 times or more.

There are two filtering methods to choose from, one is a low-pass filter and the other is a

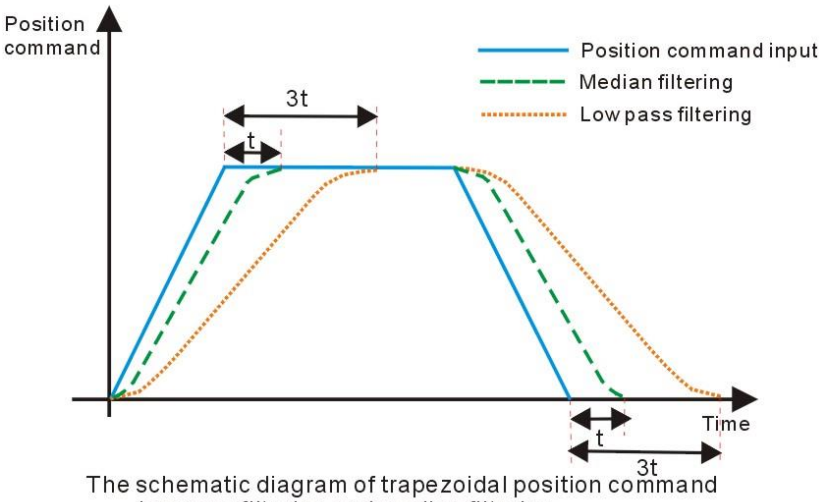
median filter.。

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.06	Position command given median filter time constant	0~128	ms	Set Position command given median filter time constant	set when stop	Immediately	0	RW
P03.07	Position command given low-pass filter time constant	0~32767	ms	Set Position command given low-pass filter time constant	set when stop	Immediately	20	RW

The larger the filter time constant is set, the more severe the position command lags and the greater the position error during operation. The waveform is as follows.



The schematic diagram of rectangular position command low pass filtering and median filtering



The schematic diagram of trapezoidal position command low pass filtering and median filtering

5.2.7 Position error clear function

Position error = (position command - position feedback) (0.0001 round)

The position error clear function clears the position error by the level change of the position error clear signal INFn.25. For the position error clear function, there are several options for setting the action of the driver after the position error is cleared.

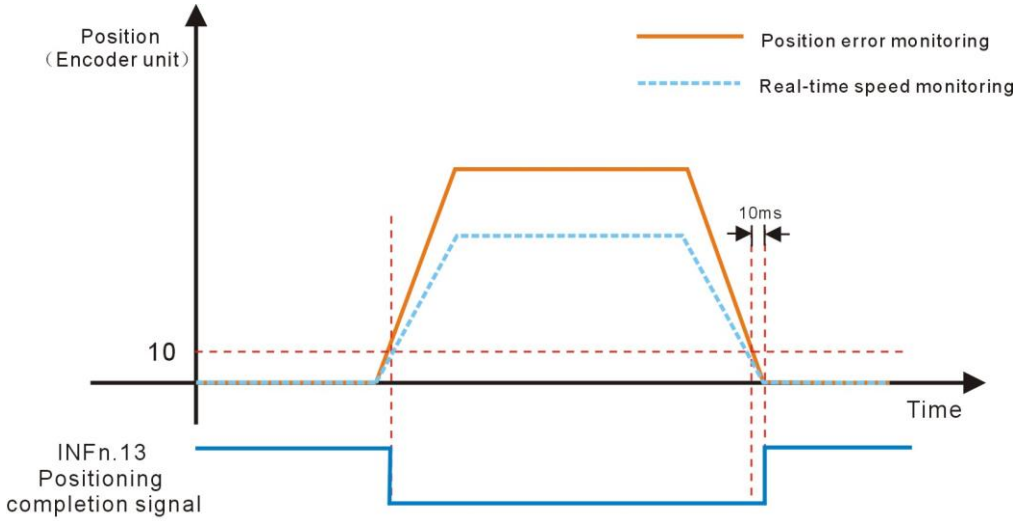
Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.21	Position error clear signal INFn.25 pattern 0- clear position error when INFn.25 is active 1- clear postion error when INFn.25 from deactive to active 2- clear position error when INFn.25 is deactive 3- clear postion error when INFn.25 from active to deactive	0~3	-	Set Position error clear signal INFn.25 pattern	anytime	Immediately	0	RW
P03.22	**Position error clear option** 0- clear postion error and speed cmd fored to zero 1- Reserved 3- Reserved 4- Clear the position error while the speed drops to zero in a straight line, and the falling time is set by P02.16. 5- Reserved 6- Clear the position error and the speed will drop to zero with the quadratic curve. The fall time is set by P02.16	0~6	-	Set **Position error clear option**	anytime	Immediately	0	RW

5.2.8 Positioning completed/close output

The positioning completion function means that the absolute value of the position error P03.17 satisfies the condition P03.45 set by the user and the time threshold (ms) set by P03.49 is maintained. It can be considered that the positioning is completed in the position control

mode. At this time, the servo driver can output a positioning completion signal, and the host controller receives the signal to confirm that the servo driver is positioned. The positioning completion/close output signal can be directly configured with the DOx function control register, and the signal is monitored by the DO terminal active state (P06.49).

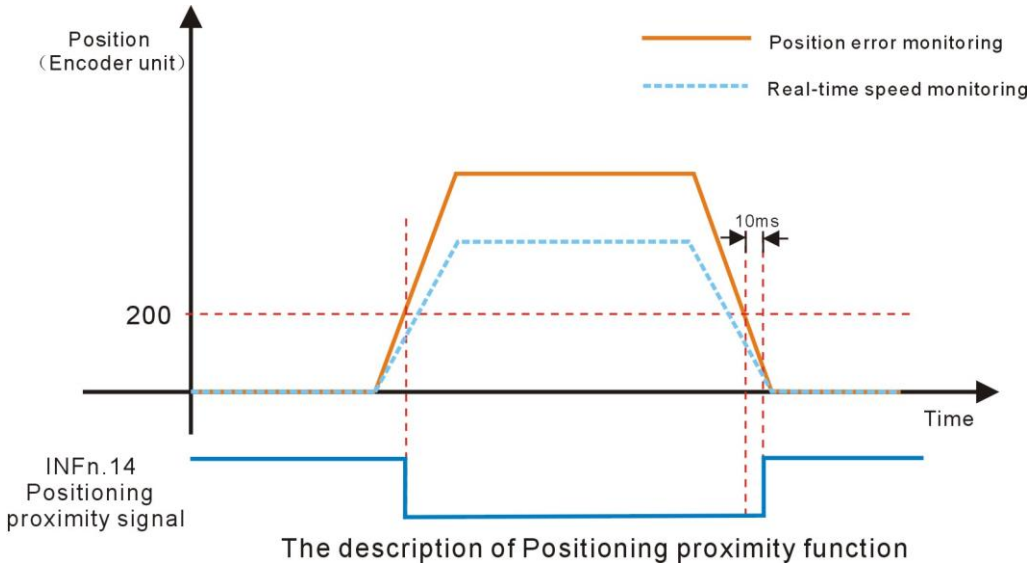
As shown in the figure below, the positioning completion threshold is set to 10 units (10*0.0001 weeks), and when the hold time is set to 10ms, the DO output positioning completion signal.



The description of Positioning completion function

The positioning close function means that the absolute value of the position error P03.17 satisfies the condition P03.47 set by the user, and the time threshold (ms) set by P03.49 is maintained, and the positioning is considered to be close in the position control mode. At this time, the servo driver can output a positioning close signal, and the host constroller receives the signal to confirm that the servo driver is positioned close.

As shown in the figure below, the positioning close threshold is set to 200 pulses, and when the hold time is set to 10 ms, the DO output the positioning signal.



The description of Positioning proximity function

相关参数如下。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.45	Positioning completion signal output condition	0~3	-	anytime	Immediately	0	RW
	In the position control mode, when the servo is running, the absolute value of the position error P03.17 is within the set value of P03.46 (positioning completion threshold), and after P03.49 (positioning completion/proximity time threshold) is maintained, the servo will be Output positioning completion signal; The output condition of the positioning completion signal can be set by P03.45. 0-Output when the position error is less than the positioning completion threshold, otherwise clear the output; 1- Output whenThe position error is smaller than the positioning completion threshold and the speed command in position mode P03.95 is zero, otherwise the output is cleared; 2- Output when The position error is less than the positioning completion threshold and the filtered speed command in position mode P03.96 is zero, otherwise the output is cleared; 3-Output when the position error is less than the positioning completion threshold and the speed command in position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero						
P03.46	positioning completion threshold	0~32767	0.0001round	anytime	Immediately	10	RW
	Set the positioning completion threshold (The positioning completion signal is valid only when the servo driver is in position control mode and is in the running state)						
P03.47	Positioning close signal output condition	0~3	-	anytime	Immediately	0	RW
	In the position control mode, when the servo is running, the absolute value of the position error P03.17 is within the set value of P03.48 (positioning close threshold), and after P03.49 (positioning completion/close time threshold) is maintained, the servo will be Output positioning close signal; The output condition of the positioning close signal can be set by P03.47. 0-Output when the position error is less than the positioning close threshold, otherwise clear the output; 1- Output whenThe position error is smaller than the positioning close threshold and the speed command in position mode P03.95 is zero, otherwise the output is cleared; 2- Output when The position error is less than the positioning close threshold and the filtered speed command in position mode P03.96 is zero, otherwise the output is cleared; 3-Output when the position error is less than the positioning close threshold and the speed command in position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero						
P03.48	positioning close threshold	0~32767	0.0001round	anytime	Immediately	100	RW
	Set the positioning close threshold (The positioning close signal is valid only when the servo driver is in position control mode and is in the running state)						
P03.49	positioning completion/close time threshold	0~32767	ms	anytime	Immediately	10	RW
	In the position control mode, when the servo is running, the absolute value of the position error P03.17 is within the positioning completion/close threshold, and after P03.49 (positioning completion/close time threshold) is maintained, the servo will be Output positioning completion/close signal						
P03.17	position error	-	0.0001ro	-	-	-	RO

			und				
P03.95	the speed command in position mode	-	rpm	-	-	-	RO
P03.96	the filtered speed command in position mode	-	rpm	-	-	-	RO

The relevant output function bits are as follows.。

num	Bit description
OUTFn.13	Positioning completion signal output，active when Positioning completion
OUTFn.14	Positioning close signal output，active when Positioning close

5.2.9 Divided Pulse output

There are two types of divided pulse output types: open collector signal output and differential signal output.

When the output signal is the open collector signal, the servo can output the motor encoder pulse by setting P06.40. The motor pulse can be divided and output, and the maximum frequency of the motor pulse output is 3 KHz, and the output port is DO1 and DO2. When the output signal is a differential signal, the full-closed function must be turned off (setting P03.31=0), the servo can output the command pulse or the motor encoder pulse, the output pulse type is set by P03.78, and the output port is 37, 38, 39, 40 pins in CN3. For differential signals, only the motor pulse can be divided.

The division factor of the motor pulse output can be set by P03.79. The larger the division factor, the lower the output pulse frequency. For example, P03.78 sets the output motor pulse, and P03.79 is set to 2, then when the motor rotates 2 motor pulses, the terminal outputs 1 pulse.

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.78	Select source of Divided Pulse output	0~2	-	Select source of Divided Pulse output	anytime	Immediately	0	RW
	0-output motor encoder pulse；1-output pulse command；2-do not output,as input port							
P03.79	division factor	1~65535	-		anytime	Immediately		RW
	If the motor type is incremental, this value indicates the number of motor encoder output pulses when the pulse output terminal outputs 1 pulse. If the motor is an absolute value of the encoder type, this value indicates the number of pulses output from the pulse output terminal when the motor rotates one revolution, and the Z-point output port outputs a Z-point pulse. This value is only valid for the motor pulse division, invalid for the command pulse, the incremental encoder defaults to 1; the absolute encoder defaults to 10							
P03.80	Pulse output direction	0~1	-		anytime	Immediately	0	RW

	Set the active level type of the divided pulse output. Only valid for motor pulses, invalid for command pulses. 0-normal output, 1-inverted output.							
P06.40	Control register of the DO1and DO2	0~2	-	Control register of the DO1and DO2	anytime	Immediately	0	RW
	0- DO1、DO2 output depend on the configure byt P06.41、P06.42 1- DO1、DO2 output motor encoder A、B pulse 2- DO1 output Z index , DO2 output depend on the configure by P06.42							

5.2.10 Output motor encoder Z index

The servo can set the DO1 output Z point pulse signal through P06.40. The Z-point pulse is an open-collector signal output with an effective level width of 5 ms.

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.81	Z pulse polarity selection 0- postive 1- negtive	0~1	-	Set the output level when the pulse output terminal Z pulse is active.	anytime	Immediately	0	RW

5.2.11 Homing

This section describes the method by which a driver seeks the home position (also called, the datum, reference point or zero point). There are various methods of achieving this using limit switches at the ends of travel or a home switch (zero point switch) in mid-travel, most of the methods also use the index (zero) pulse train from an incremental encoder. VEC servo has a variety of homing mode. The user can select the appropriate homing mode according to the site conditions and process requirements. The parameters related to the homing are as follows.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.51	Homing method	0~99	-	Disable to set	Immediately	0	RW
P03.52	Homing acceleration and deceleration time	0~32767	ms	anytime	Immediately	500	RW
	Set acceleration and deceleration time when execute homing						
P03.53	First homing speed	0~32767	rpm	anytime	Immediately	500	RW
	Also called high speed hoing speed						
P03.54	Second homing speed	0~32767	rpm	anytime	Immediately	100	RW

	Also called low speed hoing speed,						
P03.55	Homing offset	-2147483647~2147483647	customize unit	anytime	Immediately	0	RW
P03.57	Zero point range	0~32767	0.0001round	anytime	Immediately	5	RW

The relevant input function bits are as follows.

num	Bit description
INFn.26	Trigger Homing
INFn.34	Zero point switch input
INFn.43	positive postion limit switch
INFn.44	negtive postion limit switch

The relevant output function bits are as follows.

num	Bit description
OUTFn.15	Homing completes output. When the encoder position of the motor is within the Zero point range, and the speed reference in the position mode P09.89=0, the time of P03.49 is also maintained, and the Homing completes output signal is output.

The vec servo has a variety of homing method to choose from, including:

(1) Method 1: Depends on the negtive postion limit switch and Z index pulse;

(2) Method 2: Depends on the positive postion limit switch and Z index pulse;

(3) Method 3-Method 6: Depends on the zero postion switch and Z index pulse;

(4) Method 7-Method 10: Depends on the zero postion switch, positive postion limit switch and Z index pulse;

(5) Method 11 - Method 14: Depends on the zero postion switch, negtive postion limit switch and Z index pulse

(6) Method 17: Depends on the negtive postion limit switch

(7) Method 18: Depends on the positive postion limit switch

(8) Method 19 - Method 22: Depends on the zero postion switch

(9) Method 23 - Method 26: Depends on the zero postion switch, positive postion limit switch

(10) Method 27 - Method 30: Depends on the zero postion switch, negtive postion limit switch

(11) Method 33 - Method 34: Depends on the Z pulse

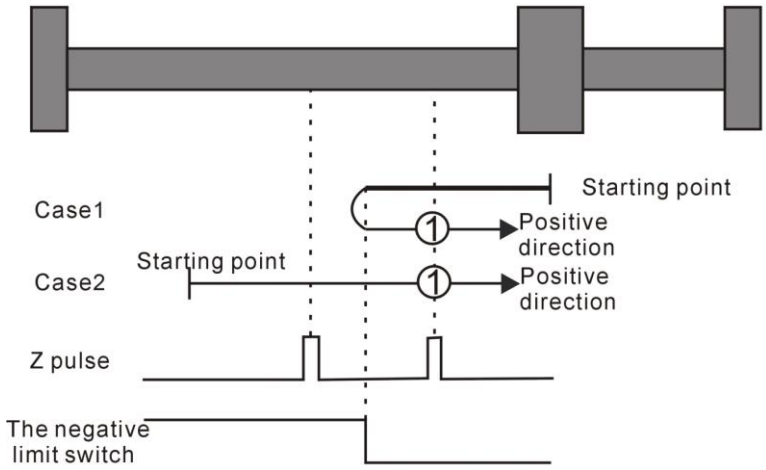
(12) Method 35: Depends on the current position

Homing method 1: Homing on the negative limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the negative limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and the starts to move at second speed; the position where the first Z index pulse is encountered when the negative

limit switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the negative limit switch state is at the high level, the axis starts to move in the positive direction at the second speed, and the first Z index pulse is encountered when the negative limit switch state is at the low level. The location is the zero point position.

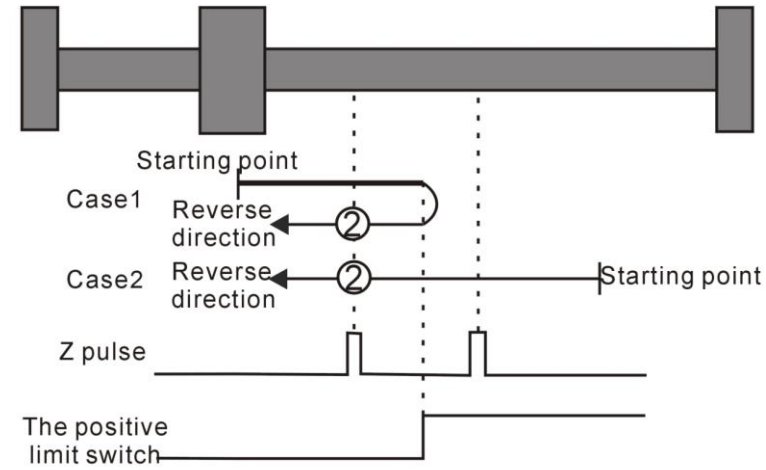


Homing method 1: Homing on the negative limit switch and Z index pulse

Homing method 2: Homing on the positive limit switch and Z index pulse

Case 1: When the user triggers the execution of homing, if the positive limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive limit switch is in the high level, the moving direction changes and moving speed changes at the second speed, the position where the first Z index pulse is encountered when the positive limit switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the positive limit switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the first Z index pulse is encountered when the positive limit switch state is at the low level. The location is the zero point position.



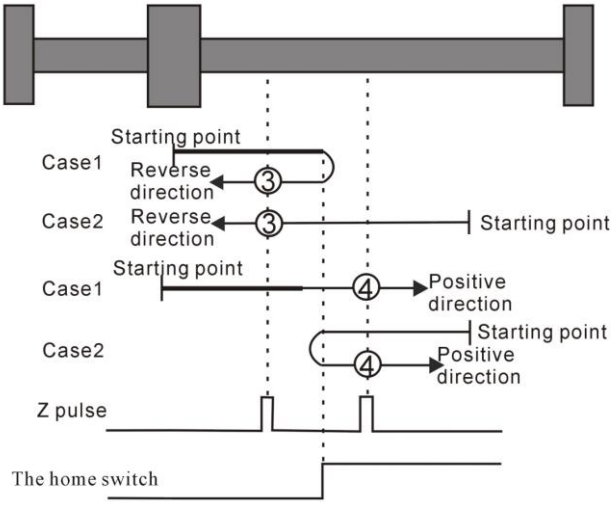
Homing method 2: Homing on the positive limit switch and Z index pulse

Homing method 3 ~ 6 Homing on the home switch and the Z index pulse

Homing method 3

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the origin switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the position where the first Z index pulse is encountered when the home switch state is at the low level is the zero point position.



Homing method 3 ~ 4 Homing on the home switch and the Z index pulse

Homing method 4

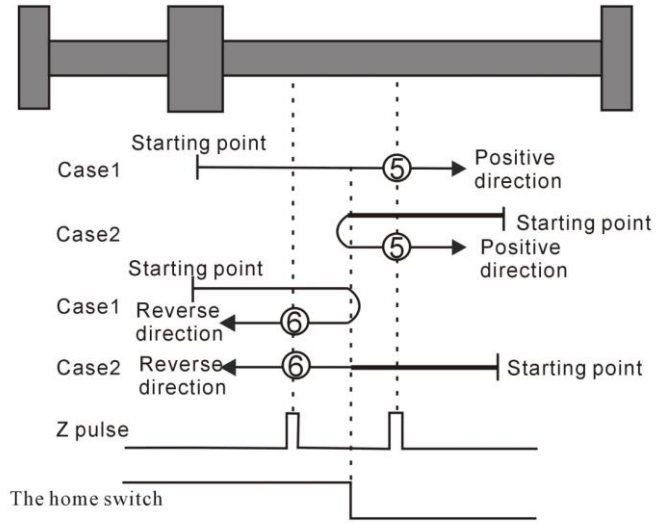
Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed is reversed. The position of a Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves in the reverse direction at the second speed, and the position where the first Z index pulse is encountered is the zero point position.

Homing method 5

Case 1: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts to move forward at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.



Homing method 5 ~ 6 Homing on the home switch and the Z index pulse

Homing method 6

Case 1: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move forward in the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. When the home switch is in the high level again, it moves forward in the second speed, and the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers to perform zero return, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered is the zero point position.

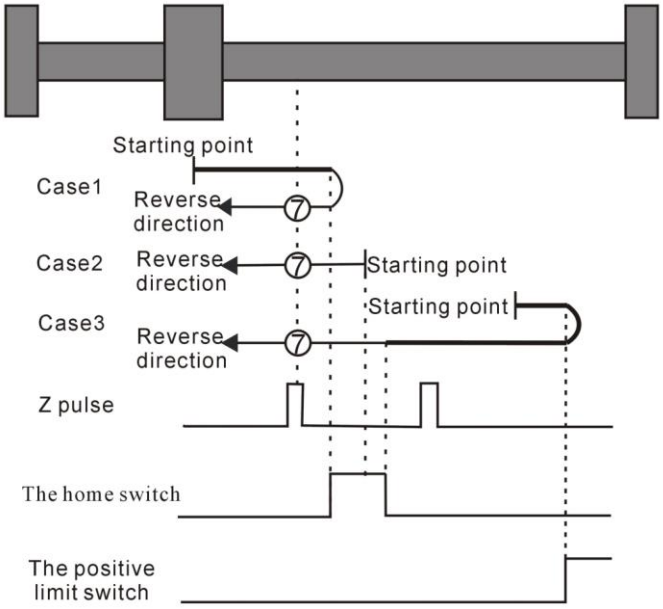
Homing method 7 ~ 10 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 7

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed, and the position where the first Z index pulse is encountered when the home switch state is at the low level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The movement starts at the first speed, and when the home switch is in the high level, the movement starts at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.



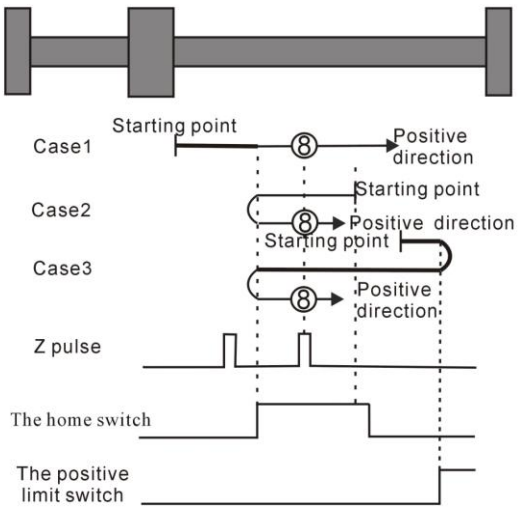
Homing method 7 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 8

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the second speed starts to move. The position of the first Z index pulse is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis directly starts the reverse motion at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

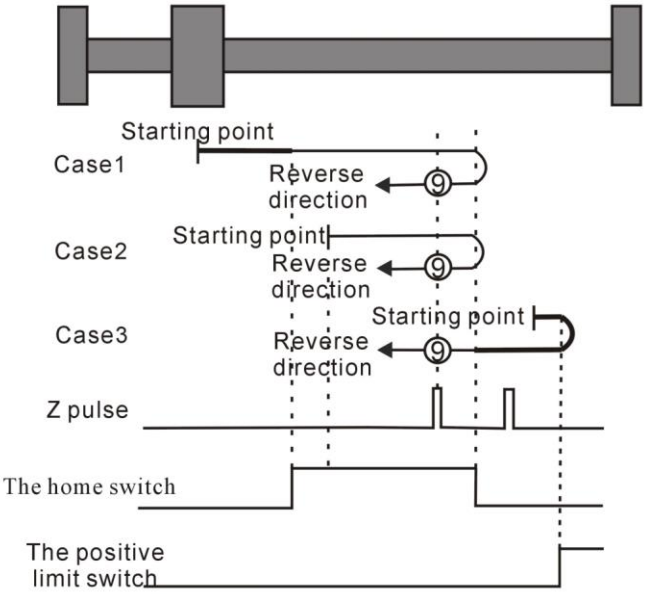
Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. When the home switch is in the high level, it still moves at the first speed. The motion direction changes when the home switch state is low, and then starts to move at the second speed. When the home switch in the high level, and the position where the first Z index pulse is encountered is the zero point position.



Homing method 8 Homing on the home switch, positive limit switch, and Z index pulse

Homing method 9

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the direction of motion changes and continues to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.



Homing method 9 Homing on the home switch, positive limit switch, and Z index pulse

Case 2: When the user triggers to perform zero return, if the home switch state is at a high level, the axis starts to forward at the second speed. The direction of motion changes and untill the home switch is in the low level. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

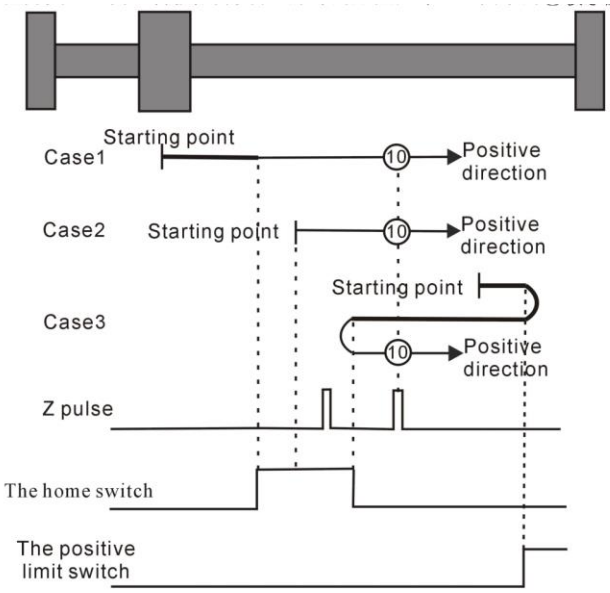
Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive postion limit switch is in the high level, the moving direction changes. When the home switch is in the high level, start the movement at the second speed. The position where the first Z index pulse is encountered is the zero point position.

Homing method 10

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to forward at the first speed. The speed changes to the second speed untill the home switch is in the high level., the position where the first Z index pulse is encountered and the home switch is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to forward at the second speed. The position where the first Z index pulse is encountered and the home switch is in the low level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive postion limit switch is in the high level, the moving direction changes.When the home switch is in the high level, the motion direction changes again and starts to move at the second speed. When the home switch is in the low level, the position where the first Z index pulse is encountered is the zero point position.



Homing method 10 Homing on the home switch, positive limit switch, and Z index pulse

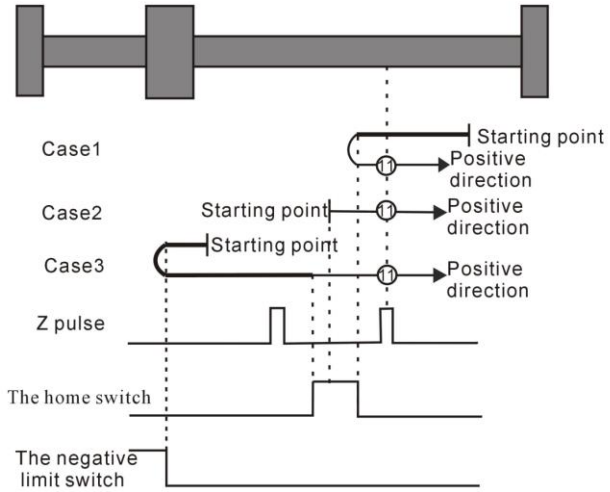
Homing method 11 ~ 14 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 11

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position where the first Z index pulse is encountered when the home switch state is low is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis directly starts the forward motion at the second speed, and the position where the first Z index pulse is encountered when the home switch state is at the low level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. when the home switch is in the high level, the movement starts at the second speed, and the position where the first Z index pulse is encountered when the home switch state is low is the zero point position.



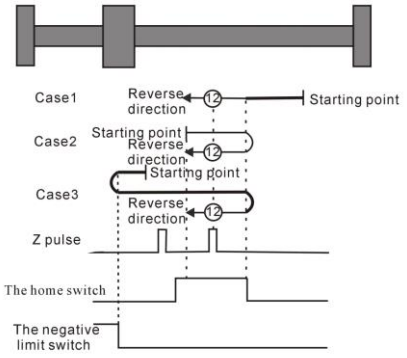
Homing method 11 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 12

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. The motion starts at the second speed untill the home switch is in the high level. The position of the first Z index pulse when the home switch is in the high level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts to move forward at the second speed. The direction of motion changes untill the home switch is in the low level. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. The motion direction changes again until the home switch state is low. When home switch state is in the high level, the movement starts at the second speed, and the position where the first Z index pulse is encountered is the zero point position.



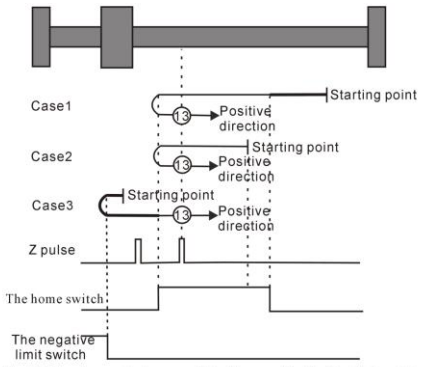
Homing method 12 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 13

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the direction of motion changes and starts to move at the second speed. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is at a high level, the axis directly moves in the second speed, and when the home switch is in the low level, the motion direction changes. When the home switch is in the high level, the position where the first Z index pulse is encountered is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. When the home switch is in the high level, start the movement at the second speed. The position where the first Z index pulse is encountered is the zero point position.



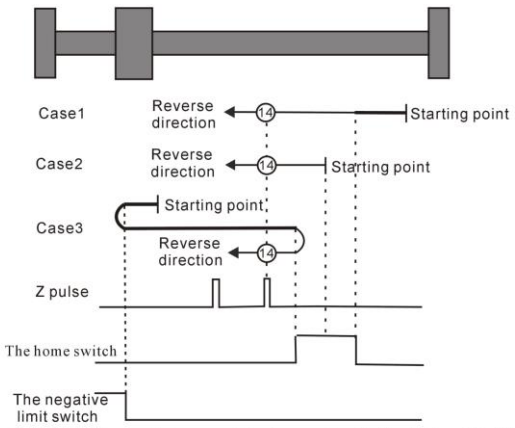
Homing method 13 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 14

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the position where the first Z index pulse is encountered is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move in the second speed in the reverse direction. When the home switch is in the low level, the position where the first Z index pulse is encountered is the zero point position. .

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative postion limit switch is in the high level, the motion direction changes. The motion direction changes again untill the home switch is in the high level, and then move at the second speed. When the home switch is in the low level, the position where the first Z index pulse is encountered is the zero point position.



Homing method 14 Homing on the home switch, the negative limit switch and the Z index pulse

Homing method 15 ~ Homing method 16 Reserved

• Homing method 15 and Homing method 16 are reserved as the Homing method for future development.

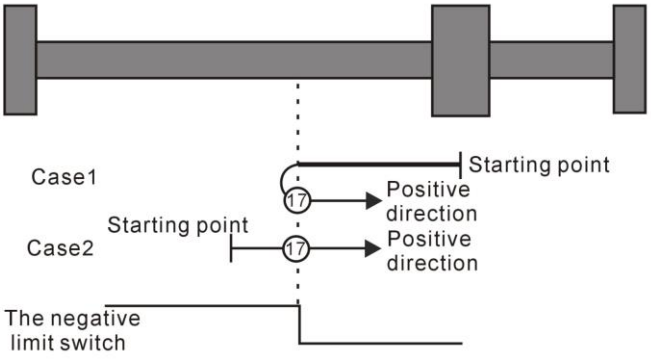
Homing method 17 ~ homing method 30 does not require Z index pulse

Homing method 17 to 30 are similar to Homing method 1 to Homing method 14, respectively, except that the positioning of their zero point no longer requires Z index pulses, but only based on the state changes of the associated home switches and limit switches. Homing method 17 is similar to Method 1, Homing method 18 is similar to Homing method 2, Homing method 19 and Homing method 20 are similar to the Homing method 3, Homing method 21 and Homing method 22 are similar to the Homing method 5, and Homing method 23 and Homing method 24 are similar to the Homing method 7, Homing method 25 and Homing method 26 are similar to the Homing method 9. Homing method 27 and 28 are similar to the Homing method 11, which is similar to the Homing method 13.

Homing method 17: Homing on the negative limit switch

Case 1: When the user triggers the execution of homing, if the negative postion limit switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the negative limit switch is in the high level, the moving direction changes and starts to move at the second speed; the position when the negative limit switch state is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the negative postion limit switch state is at the high level, the axis directly starts the forward motion at the second speed, and the position when the negative limit switch state is at the low level is the zero point position.

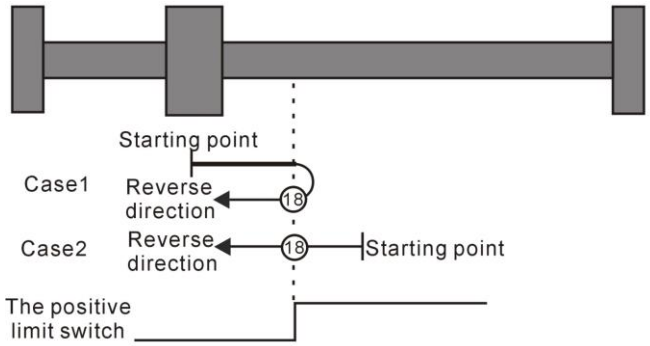


Homing method 17: Homing on the negative limit switch

Homing method 18: Homing on the positive limit switch

Case 1: When the user triggers the execution of homing, if the positive postion limit switch state is in the low level, the axis starts to move forward at the first speed, and when the positive postion limit switch is in the high level, the moving direction changes and starts to move at second speed, and the position at the time when the positive limit switch state is at the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the positive postion limit switch state is at the high level, the axis directly starts the reverse motion at the second speed, and the position when the positive postion limit switch state is at the low level is the zero point position.



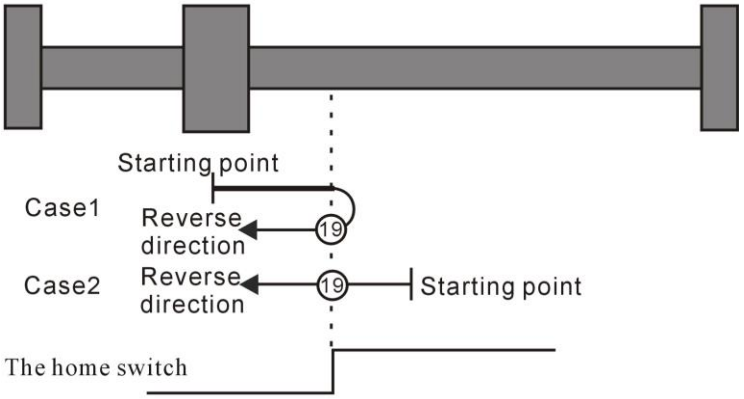
Homing method 18: Homing on the positive limit switch

Homing method 19 ~ 22 Homing on the home switch

Homing method 19

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position when the home switch is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move in the reverse direction at the second speed, and the position when the home switch is in the low level is the zero point position.

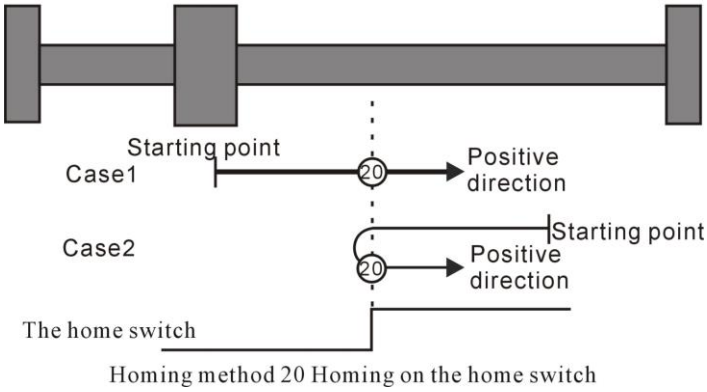


Homing method 19 Homing on the home switch

Homing method 20

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the positive direction at the first speed, and the position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts the reverse motion directly at the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. The position when the home switch is in the high level is the zero point position.

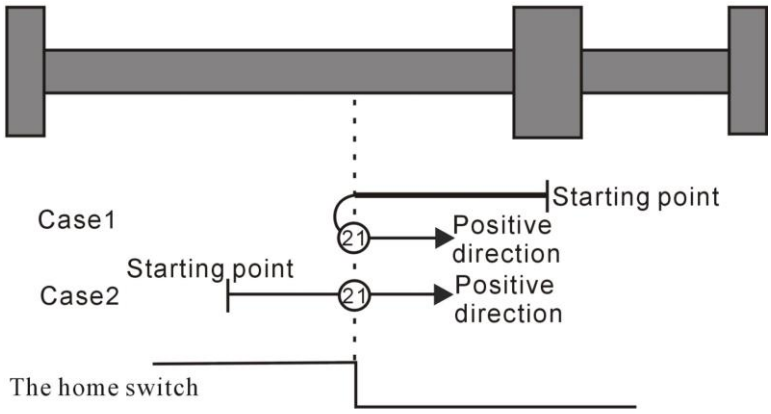


Homing method 20 Homing on the home switch

Homing method 21

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position when the home switch is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move forward in the second speed, and the position when the home switch is in the low level is the zero point position.

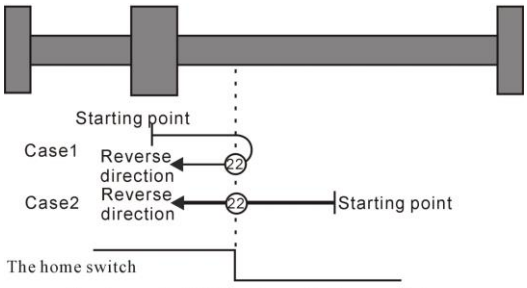


Homing method 21 Homing on the home switch

Homing method 22

Case 1: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to move forward in the second speed. When the home switch is in the low level, the motion direction changes and starts to move at the first speed. The position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed, and the position when the home switch is in the high level is the zero point position.



Homing method 22 Homing on the home switch

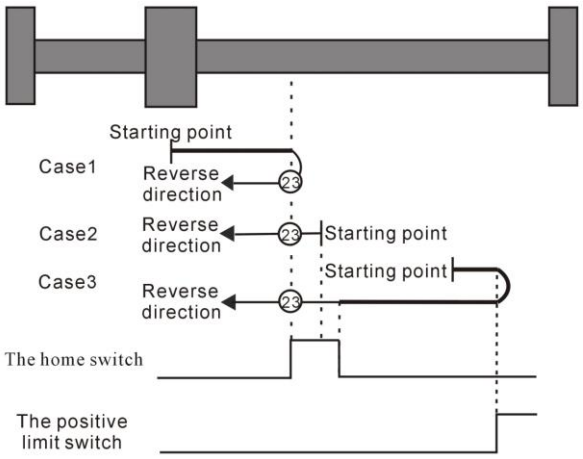
Homing method 23 ~ 26 Homing on the home switch, positive limit switch

Homing method 23

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position when the home switch state is in the low level is the home position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high position, the axis directly starts the reverse motion at the second speed, and the position when the home switch state is at the low position is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The movement starts at the first speed, and when the home switch is in the high level, the movement starts at the second speed, and the position when the home switch state is low is the zero point position.



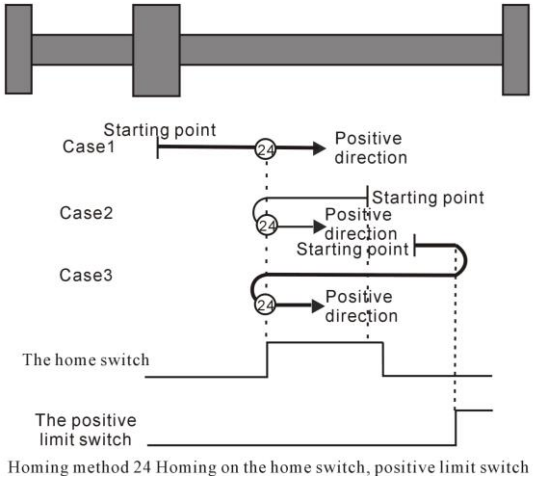
Homing method 23 Homing on the home switch, positive limit switch

Homing method 24

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the positive direction at the first speed, and the position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high position, the axis directly starts the reverse motion at the second speed. The motion direction changes when the home switch is in the low level. The position where the home switch is in the high level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes.When the home switch is in the high level, it still moves at the first speed. The motion direction changes untill the home switch state is low, and starts to move at the second speed.The position when the home switch is encountered is the zero point position.



Homing method 24 Homing on the home switch, positive limit switch

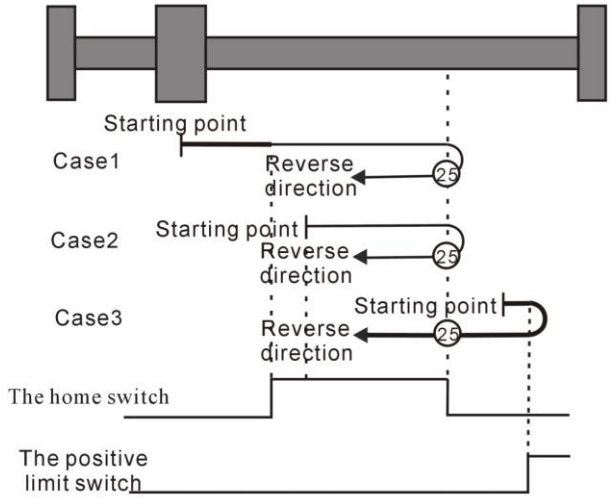
Homing method 25

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis forward at the first speed. When the home switch is in the high level, the motion starts at the second speed. The direction of motion changes untill the switch is in the

low level, and the position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is at a high level, the axis forward at the second speed. The direction of motion changes untill the home switch is in the low level. The position when the home switch is in the high level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The position when the home switch is in the high level is the zero point position.



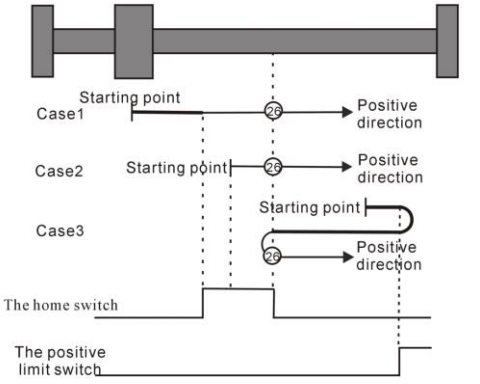
Homing method 25 Homing on the home switch, positive limit switch

Homing method 26

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts forward at the first speed. When the home switch is in the high level, the motion starts at the second speed. The position when the switch is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is in the high level, the axis starts to forward at the second speed, and the position when the home switch is in the low level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move forward at the first speed. When the home switch is in the low level and the positive limit switch is in the high level, the moving direction changes. The moving direction changes again untill the home switch is in the high level,then starts to move at the second speed. When the home switch is in the low level, the position is the zero point position.



Homing method 26 Homing on the home switch, positive limit switch

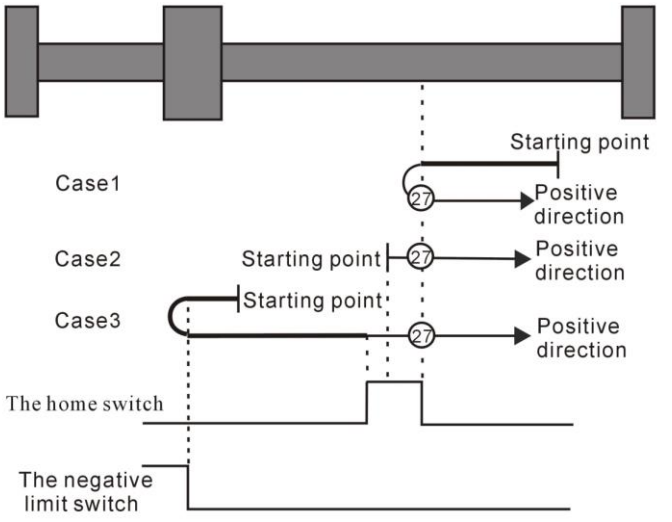
Homing method 27 ~ 30 Homing on the home switch, the negative limit switch

Homing method 27

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion direction changes and starts to move at the second speed. The position when the home switch state is in the low level is the home position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high position, the axis starts to move forward at the second speed, and the position when the home switch state is at the low position is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. When the home switch is in the high level, the movement starts at the second speed, and the position when the home switch state is low is the zero point position.



Homing method 27 Homing on the home switch, the negative limit switch

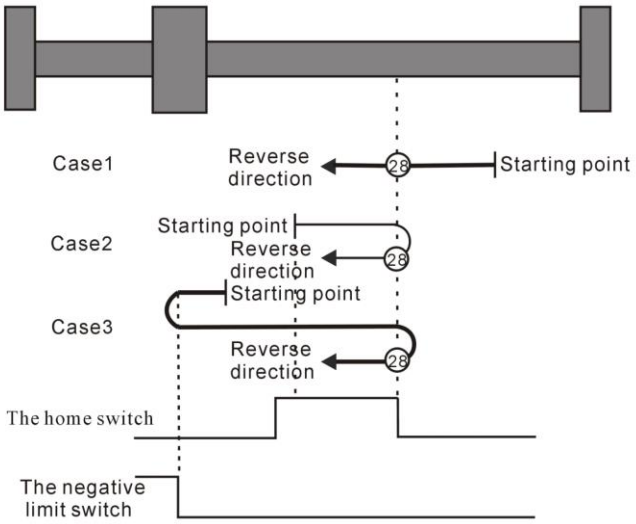
Homing method 28

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed, and the position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the

high level, the axis starts to move forward at the second speed. The direction of motion changes untill the home switch is in the low level. The position when the home switch is in the high level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. The motion direction changes again when the home switch state is from high to low, and starts to move at the second speed. The position at the high level when the home switch is encountered is the zero point position.



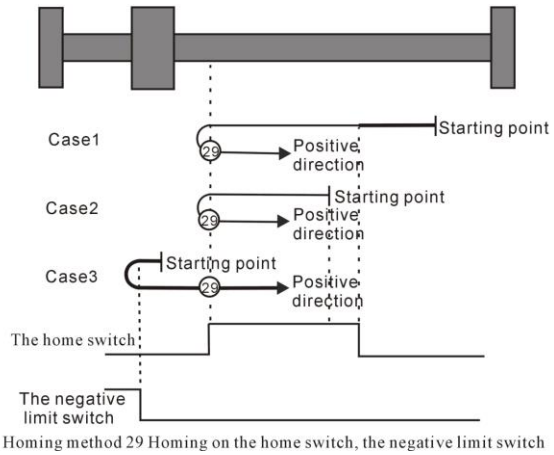
Homing method 28 Homing on the home switch, the negative limit switch

Homing method 29

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion starts at the second speed. When the switch is in the low level, the direction of motion changes and starts to move at the second speed, and the position when the home switch is in the high level is the zero point position.

Case 2: When the user triggers to perform homing, if the home switch state is at a high level, the axis start to reverse in the second speed, and when the home switch is in the low level, the motion direction changes. The position when the home switch is in the high level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. And then keep forwarding; the position when the home switch is in the high level is the zero point position.



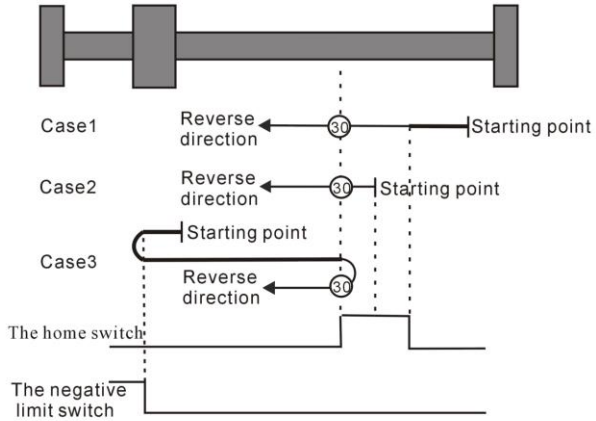
Homing method 29 Homing on the home switch, the negative limit switch

Homing method 30

Case 1: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the high level, the motion starts at the second speed. The position when the switch is in the low level is the zero point position.

Case 2: When the user triggers the execution of homing, if the home switch state is at the high level, the axis starts to move in the reverse direction at the second speed, and the position when the home switch is in the low level is the zero point position.

Case 3: When the user triggers the execution of homing, if the home switch state is in the low level, the axis starts to move in the reverse direction at the first speed. When the home switch is in the low level and the negative limit switch is in the high level, the motion direction changes. And then keep forwarding, the motion direction changes again untill the home switch is in the high level. The position when the home switch is in the low level is the zero point position.



Homing method 30 Homing on the home switch, the negative limit switch

Homing method 31 and 32 are reserved.

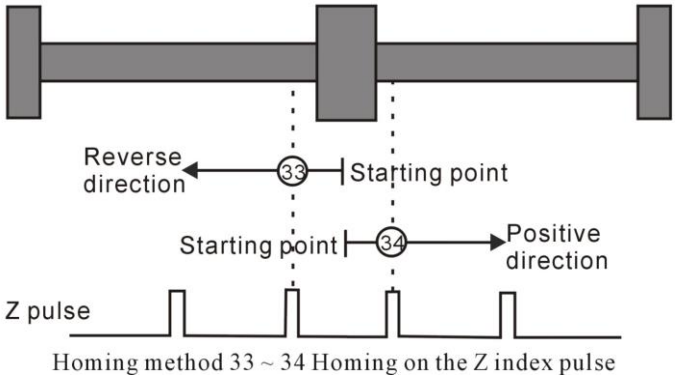
Homing method 33 ~ 34 Homing on the Z index pulse

Homing method 33

In method 33, when the user triggers the execution of homing, the axis begins to move in the reverse direction at the second speed, and the position where the first Z index pulse is encountered is the zero point position.

Homing method 34

In method 34, when the user triggers a zero return, the axis begins to move forward at the second speed, and the position where the first Z index pulse is encountered is the zero point position.



Homing method 33 ~ 34 Homing on the Z index pulse

Homing method 35: Homing on the current position

In method 35, when the user triggers the execution of homing, the axis does not move, and the current position is the zero point position.

5.2.12 Cubic speed curve

In general, the servo uses a trapezoidal velocity curve for position planning. The trapezoidal speed curve has a certain impact on the machine. In order to reduce the impact of the trapezoidal speed curve on the machine, the cubic speed curve function can be enabled. When enabled, the speed curve is planned using a cubic curve, which greatly reduces the impact on the mechanical system.

Num	Description	Range	unit	detail	Set moment	active moment	default	ACCESS
P03.82	Enale Cubic speed curve 0- use trapezoidal velocity curve 1- use Cubic speed curve	0~1	-	Set the position curve planning method	Disable to set	immediately	1	RW

5.2.13 Full closed loop function

In actual field applications, such as steel plate feeding, the displacement between the steel plate and the motor is inconsistent due to the sliding between the steel plate and the motor. Therefore, an external encoder is required to measure the displacement of the actual material. The servo driver controls the motor speed based on the given position command and the position signal fed back by the second encoder. That is, the position of the second encoder is closed-loop controlled so that the position of the given position command and the feedback of the second encoder are consistent.

Related parameters are as follows

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.31	Enable full closed loop 0- does not enable full closed loop 1- Enable full-closed loop (P03.78 setting is invalid, servo pulse port (CN3's 37, 38, 39, 40 pins) is used as the second encoder input)	0~1	-	Disable to set	immediately	0	RW
P03.32	Full closed loop mode 0- semi-closed loop; using electronic gear ratio 1 1- full closed loop; using electronic gear ratio 1 2- Switch full-closed and semi-closed according to IO; IO is invalid, servo runs in semi-closed loop, adopts electronic gear ratio 1; IO is valid, servo runs in full closed loop, adopts electronic gear ratio 2 Full closed loop feedback polarity	0~2	-	anytime	immediately	0	RW
P03.33	Full closed loop feedback polarity 0- The values of the motor encoder counter and the second encoder counter are incremented or decremented simultaneously 1- The value of the motor encoder counter and the second encoder counter are incremented, one decremented	0~1	-	anytime	immediately	0	RW
P03.34	The number of pulses of the second encoder corresponding to one revolution of the motor	0~2147483647	-	anytime	immediately	10000	RW
P03.36	Full closed loop position error excessive threshold, unit is 0.0001 round	0~2147483647	0.0001round	anytime	immediately	10000	RW
P03.38	Full closed loop position error, 0.0001 weeks	-	0.0001 round	-	-	-	RO

P03.40	Full closed loop position error clearing weeks	0~32767	-	anytime	immediately	0	RW
P03.41	Motor encoder speed in full closed loop mode	-	clk/5ms	-	-	-	RO
P03.42	Second encoder rate in full-closed mode	-	clk/5ms	-	-	-	RO
P00.32	Second encoder software filter time constant	0~32767	ms	anytime	immediately	5	RW

Self-learning feedback polarity and the number of second encoder pulses corresponding to one revolution of the motor in full-closed mode

In the full-closed mode, the feedback polarity P03.33 and P03.34 need to be set, and the appropriate value can be automatically calculated by this function operation. When performing this function operation, please make sure that the second encoder measuring wheel is in close contact with the material to ensure that no slippage occurs between the measuring wheel and the material.

The steps are as follows:

- Press the MODE button to switch the mode to the function operation mode. At this time, the first two digits of the digital tube display Fn;
- Combine "▲" (increase), "◄◄" (shift), "▼" (decrease) 3 buttons to set the display value of the digital tube to Fn013;
- Click SET to display LFCP. (Learn Full_Close Parameter);
- Press the "◄◄" (shift) button; The electric machine made a forward rotation of 3 turns at a speed of 10 rpm.

Related input function bits.。

num	Bit description
INFn.45	Switching semi-closed loop and full-closed loops When invalid, the servo is in semi-closed mode, using electronic gear ratio 1; when valid, the servo is in full-closed mode, using electronic gear ratio 2

5.2.14 Travel limit function

In the position mode, the servo has a software limit function. After the software limit is enabled, if the encoder position value is detected to be less than the software limit lower limit value (P03.74) and the motor moves in the negative direction, the software limit fault is

reported(Er207). If it is detected that the encoder position value is greater than the software limit upper limit value (P03.76) and the motor moves in the positive direction, the software limit fault (Er207) is reported.

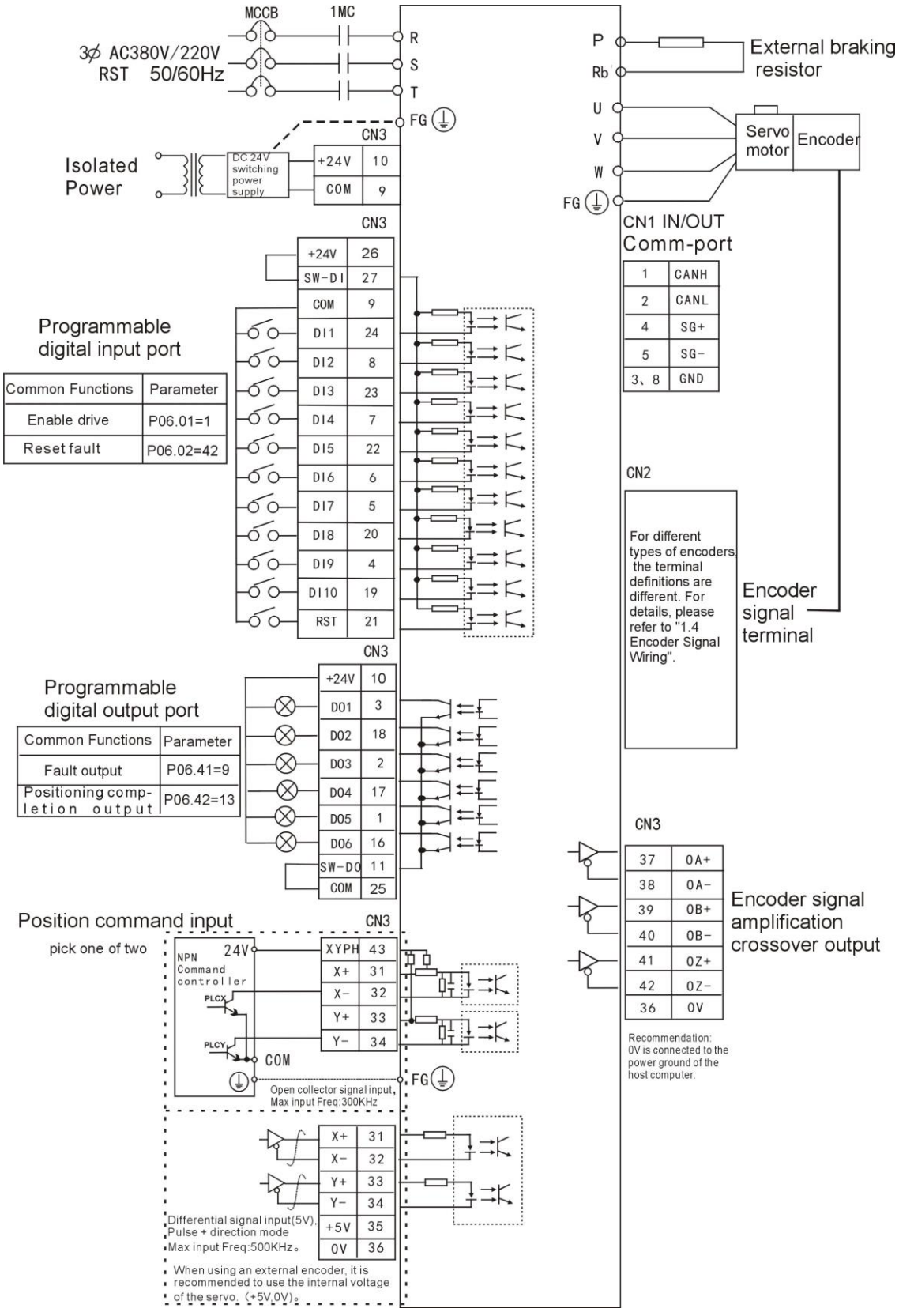
In position mode, the servo also has a hardware limit detail. If INFn.43 is valid and the speed is greater than zero, the hardware limit fault Er208 is reported. If INFn.44 is valid and the speed is less than zero, the hardware limit fault Er208 is reported.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P03.73	Enable software travel limit 0- does not enable software travel limit 1- Power-on direct enable software travel limit 2- Enable software travel limit after zero return	0~2	-	anytime	immediately	0	RW
P03.74	Software travel limit lower limit	-2147483647 ~ 2147483647	customize unit	anytime	immediately	-10000000	RW
P03.76	Software travel limit upper limit	-2147483647 ~ 2147483647	customize unit	anytime	immediately	10000000	RW

Related input function bits.。

num	Bit description
INFn.43	Hardware positive limit switch in position mode, when the speed is greater than zero, and INFn.43 is valid, the hardware limit fault is reported.
INFn.44	Hardware negative limit switch in position mode, when the speed is less than zero, and INFn.44 is valid, the hardware limit fault is reported.

5.2.15 Position mode typical wiring diagram (NPN mode)



MCCB：空气开关 1MC：交流接触器

1. Indicates a twisted pair shielded wire.

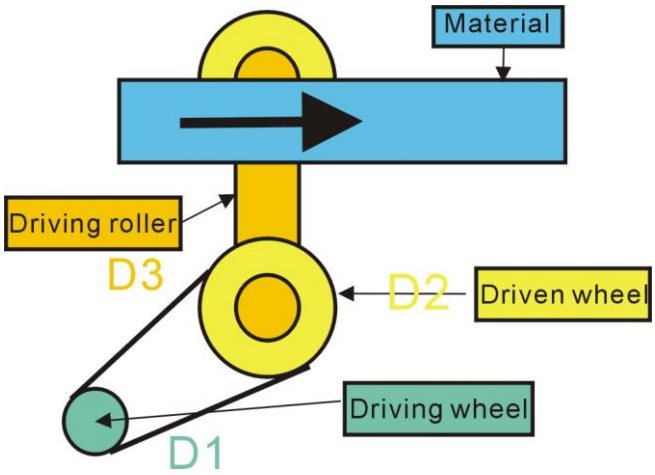
2. DC24V power supply is prepared by the user. The DC24V switching power supply should be powered by an isolation transformer, and its grounding terminal should be directly connected to the ground terminal of the driver.

3. For the wiring of the position command input, refer to the detailed description in "3.4.4 Position Command Input Wiring Example".

4. The position command mode is the default working mode of the drive. The parameters in the illustration are set at the factory.

5.2.16 Position tracking (pulse + direction) example

The PLC pulse (pulse + direction) position mode is the most commonly used servo position control mode. The application is very rich, and the transmission material is one of them, as shown below.



The servo motor drives the driving wheel (diameter D1), and the driven wheel (diameter D2) is rotated by the belt. The driving roller (diameter D3) and the driven wheel rotate coaxially, and the material is driven to the right.

In order for the material to move accurately for a distance (displacement L), the electronic gear ratio must be set first and then the XY pulses (number N) must be sent. Assuming that the number of lines of the encoder is 2500 and the AB pulse is 4 times, the motor encoder resolution (P00.11) = 2500 * 4 = 10000. Send N XY pulses, requiring the material to be displaced by L

$$L = \frac{N * \text{electronic gear ratio}}{2500 * 4} * \frac{D1}{D2} * \pi * D3 \ \ (meters)$$

Then the electronic gear ratio is set to，

$$\frac{\text{electronic gear ratio num(P03.08)}}{\text{electronic gear ratio den(P03.10)}} = \frac{2500 * 4}{N} * \frac{D2}{D1} * \frac{L}{\pi * D3}$$

For example, sending 100 XY pulses requires a material displacement of 0.01 m, D1 = 0.05 m, D2 = 0.10 m, and D3 = 0.08 m.

then,

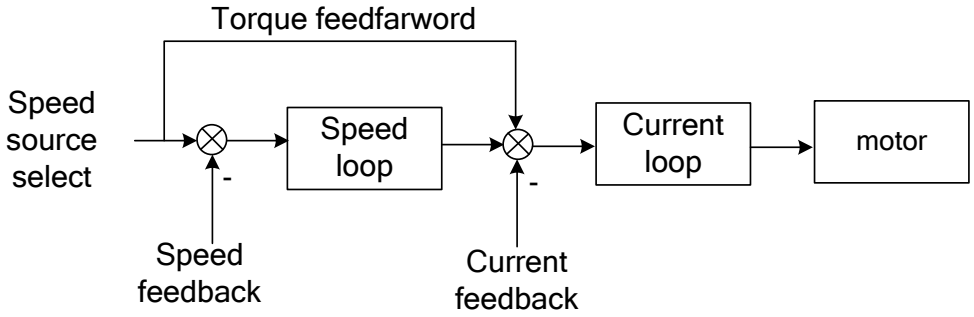
$$\frac{\text{electronic gear ratio num(P03.08)}}{\text{electronic gear ratio den(P03.10)}} = \frac{2500 * 4}{100} * \frac{0.1}{0.05} * \frac{0.01}{\pi * 0.08} = \frac{7958}{1000}$$

The specific parameters are set as follows:

P02.01=0	work in position mode
P03.01=0	position command is from external pulse
P03.02=0	pulse command pattern is pulse + direction
P03.08=7958	Set the electronic gear ratio Numerator
P03.10=1000	Set the electronic gear ratio denominator
P06.01=1	Enable servo when terminal DI1 is valid
P06.02=42	Reset the driver when terminal DI2 is valid
P06.41=9	Servo driver failure when terminal DO1 is active
P06.42=13	Servo motor positioning completed when terminal DO2 is valid

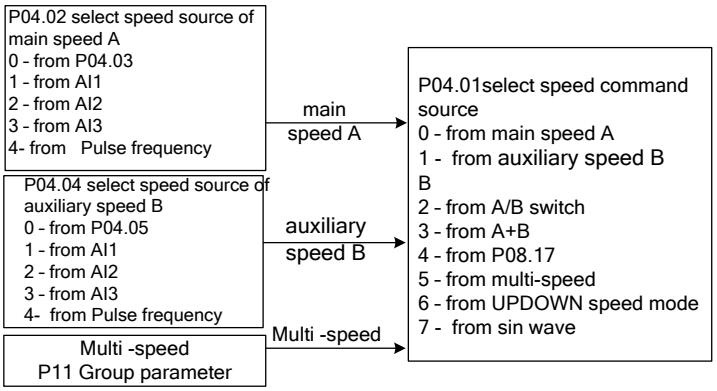
5.3 Speed Mode

The speed mode is a control mode in which the motor speed is used as a control target, and is often used for dragging the spindle. The speed mode is implemented as shown in the figure below.



5.3.1 Speed command source

The servo has two speeds to choose from, namely the main speed A and the auxiliary speed B. These two speeds can be superimposed on each other or can be switched to each other. Both the main speed A and the auxiliary speed B have multiple speed sources. As shown below.



Related parameter as follows。

Num	Description	Range	unit	Set	activ	defa	ACCESS

				mom ent	e mom ent	ult	
P04.01	Speed command source 0- main speed A 1- auxiliary speed B 2- INFn.12 switch A/B 3- A+B 4- P08.17 5- mulit speed 6-UP/DOWN speed mode 7- sin wave	0~7	-	anyti me	imme diatel y	0	RW
P04.02	main speed A source 0- from P04.03 1- from AI1 2- from AI2 3- from AI3 4- from pulse frequency	0~4	-	anyti me	imme diatel y	0	RW
P04.03	Digit setting of main speed A	-32767~32 767	rpm	anyti me	imme diatel y	500	RW
P04.04	auxiliary speed B source 0- from P04.05 1- from AI1 2- from AI2 3- from AI3 4- from pulse frequency	0~4	-	anyti me	imme diatel y	0	RW
P04.05	Digital setting of auxiliary speed B	-32767~32 767	rpm	anyti me	imme diatel y	500	RW
P08.17	Communication setting	-32767~32 767	rpm	anyti me	imme diatel y	0	RW

Related input function bits.

num	Bit description
INFn.12	Switch the main speed A and the auxiliary speed B, and use the auxiliary speed B when it is active.

When the speed command is derived from AIx, please refer to “6.3.1 Analog Input AI” for details.

5.3.2 Multi-speed mode

The servo supports multi-speed mode. There are three Methods for multi-speed, which are single-run stop, cycle run, and IO switch run.

The single-run stop means that after the motor is enabled, the first speed is run first. After the operation, the next speed is run until the running segment number is equal to the total number of speed segments, and then the machine stops.

For example, the total number of speed is set to 2, using a single run stop mode. After the motor is enabled, the motor runs the first speed first. After the operation is completed, the second speed is run again. After the operation is completed, the motor stops.

The cycle operation is to run the first stage speed again when the single operation is to be stopped, so that the cycle does not stop.

For example, the total number of segments is set to 3, using the loop mode. After the motor is enabled, the motor runs the first speed first, then the second speed, then the third speed, and then the first speed.

IO switching operation means that after the motor is enabled, the driver reads the value of DI, thereby obtaining the segment number, and then running the segment speed. After the state of DI changes, the driver re-reads the value of IO, regains the segment number, and then runs the Segment speed.

The relevant parameters are as follows.

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P11.01	Multi-speed mode 0- single-run stop 1-cycle run 2- IO switch run	0~2	-	Disable to set	immediately	0	RW
P11.02	the total number of speed segments	1~16	-	anytime	immediately	16	RW
P11.03	Running time unit 0- ms 1- s	0~1	-	anytime	immediately	1	RW
P11.04	Acceleration time1	0~32767	ms	anytime	immediately	500	RW
P11.05	deceleration time 1	0~32767	ms	anytime	immediately	500	RW
P11.06	Acceleration time2	0~32767	ms	anytime	immediately	500	RW

P11.07	deceleration time 2	0~32767	ms	anytime	immediately	500	RW
P11.08	Acceleration time3	0~32767	ms	anytime	immediately	500	RW
P11.09	deceleration time 3	0~32767	ms	anytime	immediately	500	RW
P11.10	Acceleration time 4	0~32767	ms	anytime	immediately	500	RW
P11.11	deceleration time 4	0~32767	ms	anytime	immediately	500	RW
P11.12	1st speed command	-32767~32767	rpm	anytime	immediately	0	RW
P11.13	1st speed command run time This parameter unit is set by P11.03.	0~32767	ms(s)	anytime	immediately	10	RW
P11.14	The first speed acceleration and deceleration time selection 0-Use acceleration/deceleration time P04.17 P04.18 1- Use acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4	0~4	-	anytime	immediately	0	RW
P11.15	2nd speed command	-32767~32767	rpm	anytime	immediately	0	RW
P11.16	2nd speed command run time This parameter unit is set by P11.03.	0~32767	ms(s)	anytime	immediately	10	RW
P11.17	The second speed acceleration and deceleration time selection 0-Use acceleration/deceleration time P04.17 P04.18 1- Use acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4	0~4	-	anytime	immediately	0	RW

P11.18	Third speed command	-32767~32767	rpm	anytime	immediately	0	RW
P11.19	Third speed command run time This parameter unit is set by P11.03.	0~32767	ms(s)	anytime	immediately	10	RW
P11.20	The Third speed acceleration and deceleration time selection 0-Use acceleration/deceleration time P04.17 P04.18 1- Use acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4	0~4	-	anytime	immediately	0	RW
P11.21	4th speed command	-32767~32767	rpm	anytime	immediately	0	RW
P11.22	4th speed command run time This parameter unit is set by P11.03.	0~32767	ms(s)	anytime	immediately	10	RW
P11.23	The 4th speed acceleration and deceleration time selection 0-Use acceleration/deceleration time P04.17 P04.18 1- Use acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3 4- Using acceleration/deceleration time 4	0~4	-	anytime	immediately	0	RW
****							
P11.57	16th speed command	-32767~32767	rpm	anytime	immediately	0	RW
P11.58	16th speed command run time This parameter unit is set by P11.03.	0~32767	ms(s)	anytime	immediately	10	RW
P11.59	The 16th speed acceleration and deceleration time selection 0-Use acceleration/deceleration time P04.17 P04.18 1- Use acceleration/deceleration time 1 2- Using acceleration/deceleration time 2 3- Using acceleration/deceleration time 3	0~4	-	anytime	immediately	0	RW

	4- Using acceleration/deceleration time 4						

Related input function bits.如下。

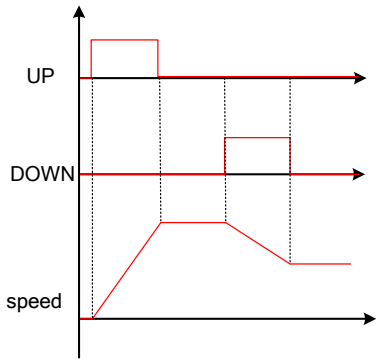
num	Bit description
INFn.17	Multi-speed speed segment number selection 0
INFn.18	Multi-speed speed segment number selection 1
INFn.19	Multi-speed speed segment number selection 2
INFn.20	Multi-speed speed segment number selection 3

According to the state of INFn17~20, the multi-speed speed segment number = INFn.20*8 + INFn.19*4 + INFn.18*2 + INFn.17*1 +1. See the table below for details.

INFn.20	INFn.19	INFn.18	INFn.17	speed segment number
0	0	0	0	1
0	0	0	1	2
0	0	1	0	3
.....				
1	1	1	1	16

5.3.3 UP/DOWN speed mode

When the UP/DOWN speed mode is selected, the speed is controlled by the input detail bits INFn.63 (UP) and INFn.64 (DOWN). When it is detected that INFn.63 is active, the speed raises; when it is detected that INFn.64 is active, the speed decreases; when both signals are deactive, the speed remains unchanged. The timing diagram is shown below.



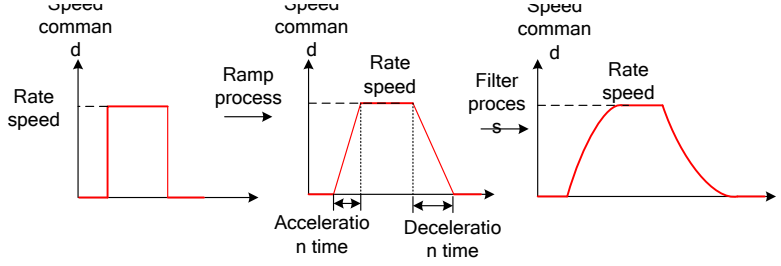
Related input function bits.

num	Bit description
INFn.63	UP signal
INFn.64	DOWN signal

5.3.4 Ramp control and speed command filtering

All speed sources have ramp control to prevent the impact of a given speed on the machine. The ramp control is achieved by setting the acceleration/deceleration time of the

speed. The speed command after the ramp processing is then subjected to low-pass filtering to make the speed command smoother. For example, when the set speed is the rated speed, the actual running speed is processed as shown below.



It should be noted that the actual acceleration/deceleration time is related to the change of the given speed. The set acceleration/deceleration time refers to the acceleration time required to accelerate from 0 to the rated speed.

The advantage of the filtering process is to make the speed output smoother. The disadvantage is that the speed command will be delayed. The larger the set filter time constant, the smoother the speed output and the larger the lag time.Related parameters are as follows.

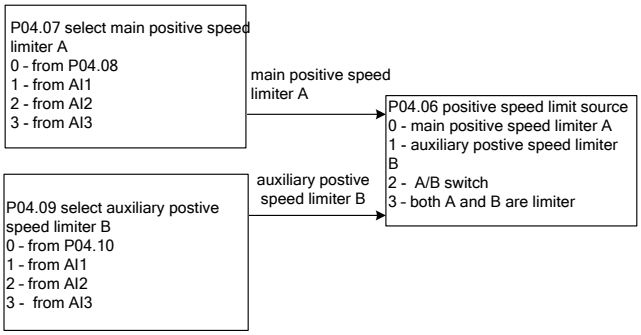
Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P04.20	Time const for speed command filter	0~32767	ms	anytime	immediately	20	RW
P04.17	Acceleration time	0~65535	ms	anytime	immediately	500	RW
P04.18	deceleration time	0~65535	ms	anytime	immediately	500	RW

5.3.5 Speed limit

Speed limiting includes forward limiting and reverse limiting, each of which has a primary limiting A source and an auxiliary limiting B source. That is, the main postive limiter A, the auxiliary postive limiter B, the main negative limiter A, and the auxiliary negative limiter B.

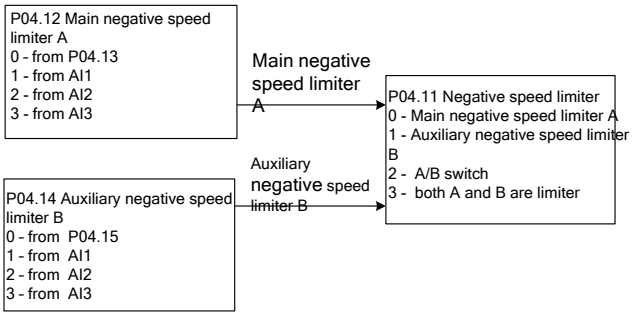
5.3.5.1 Postive speed limiting

The source of the forward speed limit is shown below. There are two types of postive speed limiting, one is the main postive speed limiter A, and the other is the auxiliary postive speed limiter B. Both speed limits have different speed limit sources.



5.3.5.2 Negative speed limiter

The source of the reverse speed limit is shown below. There are two types of reverse speed limiting, one is the main negative speed limiter A, and the other is the auxiliary reverse speed limiter B. Both speed limits have different speed limit sources.



Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P04.06	source of postive speed limiting 0- main postive speed limiter A 1- auxiliary reverse speed limiter B 2- A/B switch 3-both A and B are limiter	0~3	-	anytime	immediately	0	RW
P04.07	Soure of main postive speed limiter A 0- from P04.08 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.08	Digital value of postive speed limiter A	0~32767	rpm	anytime	immediately	3000	RW
P04.09	Soure of auxiliary reverse speed limiter B 0- fromP04.10 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW

P04.10	Digital value of postive speed limiter B	0~32767	rpm	anytime	immediately	3000	RW
P04.11	source of negative speed limiting 0- main negative speed limiter A 1- auxiliary negative speed limiter B 2- A/B switch 3- both A and B are limiter	0~3	-	anytime	immediately	0	RW
P04.12	Source of main negative speed limiter A, 0- fromP04.13 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.13	Digital value of main negative speed limiter A	0~32767	rpm	anytime	immediately	3000	RW
P04.14	Source of auxiliary negative speed limiter B 0- fromP04.15 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.15	Digital value of auxiliary negative speed limiter B	0~32767	rpm	anytime	immediately	3000	RW

Related input function bits.

num	Bit description
INFn.07	postive speed limiter A/B switch ,active select B
INFn.08	negative speed limiter A/B switch，active select B

5.3.6 Torque limit

Please refer to "5.4.2 Torque Limiting" of the torque mode. Both are same。

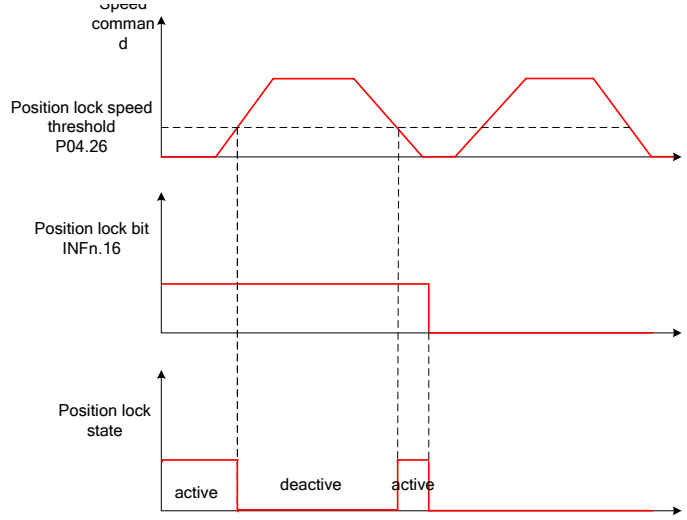
Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P05.10	Torque limit method 0- Forward and reverse limit are from positive limiting 1- Forward and reverse limit separately	0~1	-	anytime	immediately	0	RW
P05.11	Positive torque limiting source 0- Forward Limit A 1- Forward limiter B	0~3	-	anytime	immediately	0	RW

	2- A/B switching 3- A and B are simultaneously limit						
P05.12	Source of forward torque limit A 0- from P05.13 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.13	Set value of forward torque limiter A	0~300.0	%	anytime	immediately	150.0	RW
P05.14	Forward Torque Limit B Source 0- from P05.15 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.15	Set value of forward torque limiter B	0~300.0	%	anytime	immediately	150.0	RW
P05.16	Reverse torque limiting source 0- Reverse Limit A 1- Reverse limit B 2- A/B switching 3- A and B are simultaneously limit	0~3	-	anytime	immediately	0	RW
P05.17	Source of reverse torque limit A 0- from P05.18 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.18	Set value of reverse torque limiter A	0~300.0	%	anytime	immediately	150.0	RW
P05.19	Reverse Torque Limit B Source 0- from P05.20 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.20	Set value of reverse torque limiter B	0~300.0	%	anytime	immediately	150.0	RW

5.3.7 Position lock function

The position lock function means that when the position lock DI signal INFn.16 is valid in the speed control mode, when the speed command amplitude is less than or equal to the set value of P04.26, the servo motor enters the position lock state. At this time, the position loop is built inside the servo driver, and the speed command is invalid. The servo motor is fixed within ±1 pulse of the lock position, and the lock position is returned even if the external force is rotated. If the speed command amplitude is greater than P04.26, the servo motor exits the position lock state, and the servo motor continues to run according to the currently input speed command.

If the position lock DI signal INFn.16 is invalid, the position lock function is invalid.



Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P04.26	Position lock speed threshold	0~32767	rpm	anytime	immediately	5	RW

Related input function bits.。

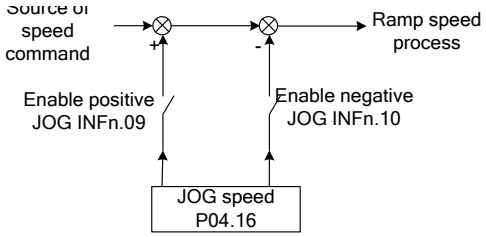
Num	Bit description
INFn.16	Position lock Enable Bit

5.3.8 Other functions

5.3.8.1 Speed JOG

In the speed mode, there are positive jog and reverse jog, which are controlled by INFn.09 and INFn.10 respectively. When INFn.09 or INFn.10 is active, the speed output will be superimposed with a jog speed P04.16 based on the current speed command. As shown

below.



5.3.8.2 Speed command reverse

When INFn.11 is active, the speed command will be inverted.

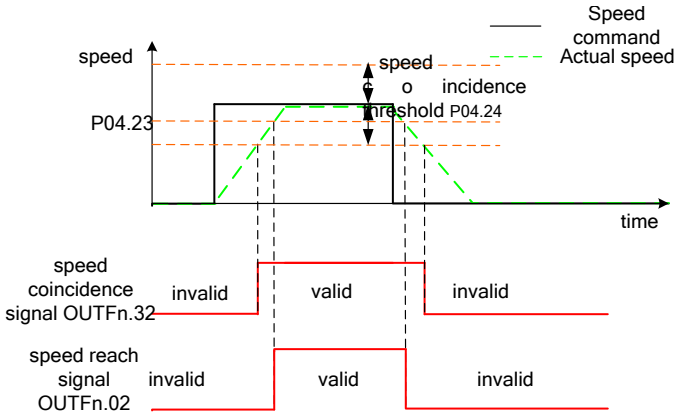
5.3.8.3 Speed pause

Speed command is set to zero when INFn.13 is active。

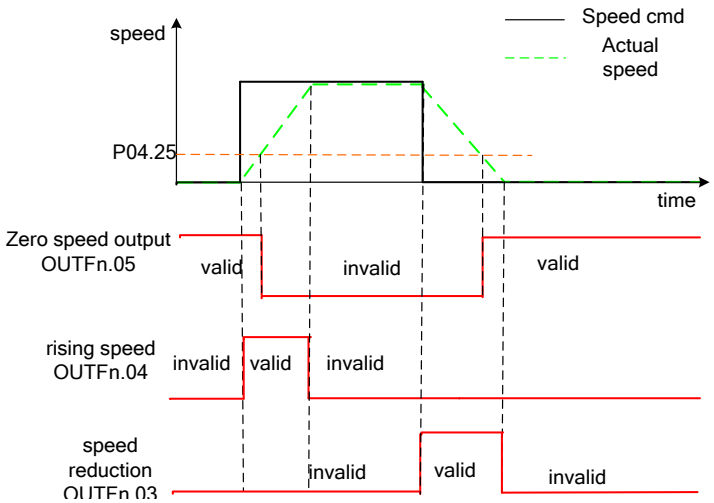
5.3.8.4 Speed mode related signal output

When the actual output speed P04.21 and the speed reference command are different from the speed matching threshold P04.24, the speed coincidence signal OUTFn.32 is valid. When the absolute value of the actual output rotational speed P04.21 is greater than the speed reaching threshold P04.23, the speed reaching signal OUTFn.02 is valid.

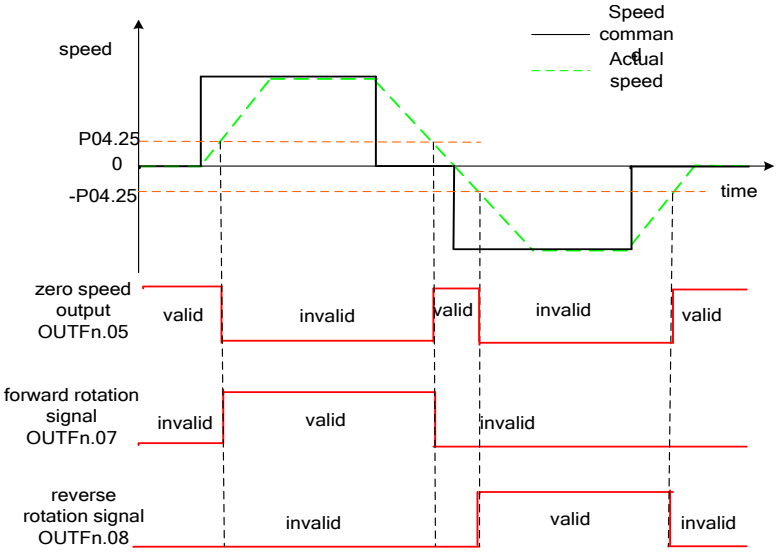
The signal output is shown below.



When the amplitude of the actual output speed P04.21 is less than the zero speed threshold P04.25, the zero speed signal OUTFn.05 is valid. When the amplitude of the acceleration is greater than the lifting speed threshold P04.27, the rising speed OUTFn.04 is valid. When the amplitude of the deceleration is greater than the lifting speed threshold P04.27, the speed reduction OUTFn.03 is valid. The signal output is shown below.



When the actual output speed P04.21 is greater than the zero speed threshold, the forward rotation signal OUTFn.07 is valid, and when the actual output rotation speed P04.21 is smaller than the negative zero speed threshold, the reverse rotation signal OUTFn.08 is valid. The signal output is shown below.



5.3.8.5 Speed feedback filtering and display filtering

The speed feedback value is low-pass filtered by setting the software filter time constant P00.10. It is also possible to set the speed display filter time constant P04.22 to filter the speed display value.

5.3.8.6 Related parameters

Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P04.16	JOG speed	0~32767	rpm	anyti	imme	20	RW

				me	diately		
P04.17	acceleration time	0~65535	ms	anyti me	imme diately	500	RW
P04.18	deceleration time	0~65535	ms	anyti me	imme diately	500	RW
P04.20	Speed command first-order filtering time constant	0~32767	ms	anyti me	imme diately	20	RW
P04.21	Filtered speed value	-	rpm	-	-	-	RO
P04.22	Speed display filter time	0~32767	ms	anyti me	imme diately	300	RW
P04.23	Speed arrival threshold	0~32767	rpm	anyti me	imme diately	1000	RW
P04.24	Speed consistent threshold	0~32767	rpm	anyti me	imme diately	10	RW
P04.25	Zero speed threshold	0~32767	rpm	anyti me	imme diately	5	RW
P04.27	Lifting speed threshold	0~32767	rpm/s	anyti me	imme diately	375	RW
P00.10	Motor encoder software filter time	0~32767	ms	anyti me	reset takes effect	5	RW

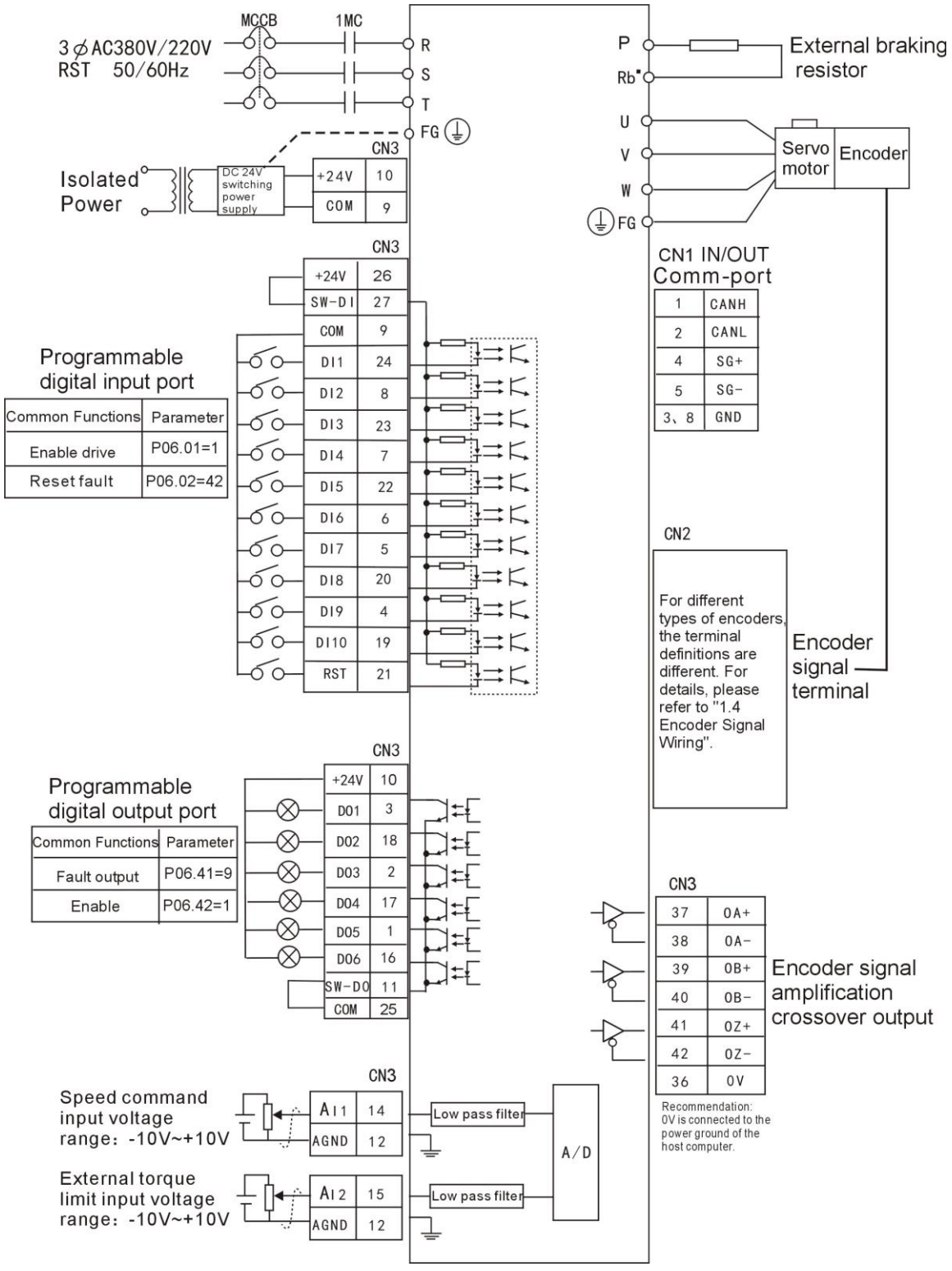
Related input function bits.。

num	Bit description
INFn.09	Forward speed jog
INFn.10	Reverse speed jog
INFn.11	Speed reverse
INFn.12	Main speed A/B switching
INFn.13	Speed pause

相关输出 detail 位。

num	Bit description
OUTFn.02	Speed arrival
OUTFn.03	Speed down
OUTFn.04	Speed up
OUTFn.05	Zero speed
OUTFn.06	Speed overrun
OUTFn.07	Forward rotate
OUTFn.08	Reverse rotate
OUTFn.32	Consistent speed

5.3.10 Speed mode typical wiring diagram (NPN mode)



MCCB：air switch 1MC：AC contactor

1. ⌇ is Twisted pair shielded wire。

2. The DC24V power supply is prepared by the user. The DC24V switching power supply should be powered by an isolation transformer, and its grounding terminal should be

directly connected to the ground terminal of the driver.

5.3.11 VC servo for analog voltage control speed example

(1) Analog signal wiring

The analog signal can be input from AI1 (14-pin) or AI2 (15-pin) or AI3 (29-pin). Here, taking AI1 as an example, the analog signal line is connected to AI1 (14-pin) of CN3, and the analog ground is connected to AGND (12-pin).

(2) Correspondence between analog voltage and actual speed command

Under the default parameters, -10V corresponds to the negative rated speed of the motor and 10V corresponds to the positive rated speed of the motor. Taking the AI1 input command voltage as an example, if you need to change the correspondence, you can modify the AI1 offset (P06.64) and AI1 magnification (P06.66). If the dead band is set to zero, the corresponding relationship between the input voltage and the speed command is:

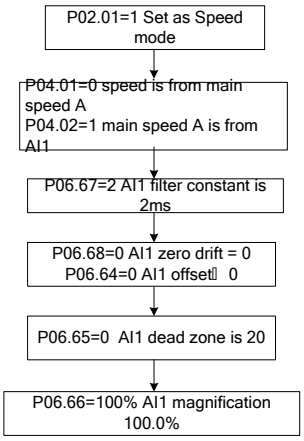
$$\text{actual speed cmd=rate speed} \times (AI1\ \text{magnification}\ P06.66)\% \times \frac{(\text{AI1 input voltage P06.61}) - (\text{AI1 Zero drift P06.68}) - (\text{AI1 offset P06.64})}{10000}$$

For example:

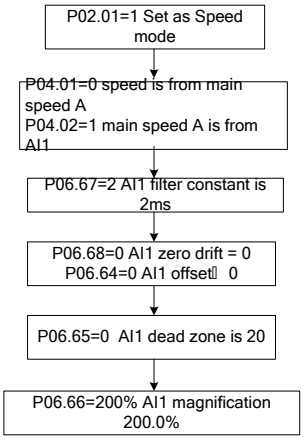
- By default, AI1 magnification = 100.0%, AI1 zero drift = 0 mV; AI1 offset = 0 mV;When inputting ±10000mV, the actual output speed is = ± rated speed;
- If AI1 magnification = 200.0%; AI1 zero drift = 0mV; AI1 offset = 0 mV;When inputting ±5000mV, the actual output speed is = ± rated speed;
- If AI1 magnification = 200.0%; AI1 zero drift = 0 mV; AI1 offset = 5000 mV;When inputting 0-10000mV, the actual output speed is = ± rated speed;

（3）Parameter setting step

a. Input the speed command with AI1, input ±10V corresponding to ± rated speed as an example:



b. Input the speed command with AI1, input ±5V corresponding to ± rated speed as an example:



(4) Enable the motor

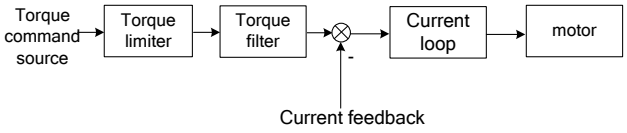
In the case of default parameters, P06.01=1, the enable signal is input from DI1. If P06.21 is set to 1, the servo can be enabled without any signal.

(5) Zero drift correction

In the case of analog input 0mV, set P06.79=4 once, then trigger zero drift correction once. Zero drift can also be corrected by DI.

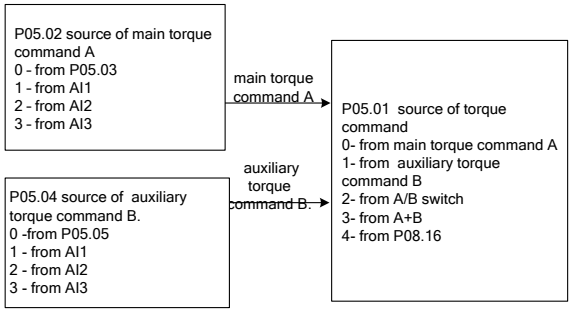
5.4 Torque mode

The torque mode is a control mode in which the motor output torque is used as a control target, such as tension control. The implementation of the torque mode is shown in the figure below.



5.4.1 Torque command source

The servo has two torque commands to choose from, namely the main torque command A and the auxiliary torque command B. Two torque commands can be superimposed on each other or can be switched to each other. Both the main torque A and the auxiliary torque B have multiple sources of torque. As shown below.



Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P05.01	Torque command source 0- main torque command A 1- auxiliary torque command B 2- INFn.03 switching A/B 3- A+B 4- from P08.16	0~4	-	anytime	immediately	0	RW
P05.02	Source of main torque command A 0- from P05.03 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.03	Digital value of main torque command A	-300.0~300.0	%	anytime	immediately	0.0	RW
P05.04	Source of auxiliary torque command B 0- from P05.05 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.05	Digital value of auxiliary torque command B	-300.0~300.0	%	anytime	immediately	0.0	RW
P08.16	Communication setting	-3276.7~3276.7	%	anytime	immediately	0.0	RW

Related input function bits.。

num	Bit description
INFn.03	Switch the main torque command A and the auxiliary torque command B, and use the auxiliary torque command B when it is valid.

For torque instructions from AIx, please refer to “6.3.1 Analog Input AI” for details.。

5.4.2 Torque limiting

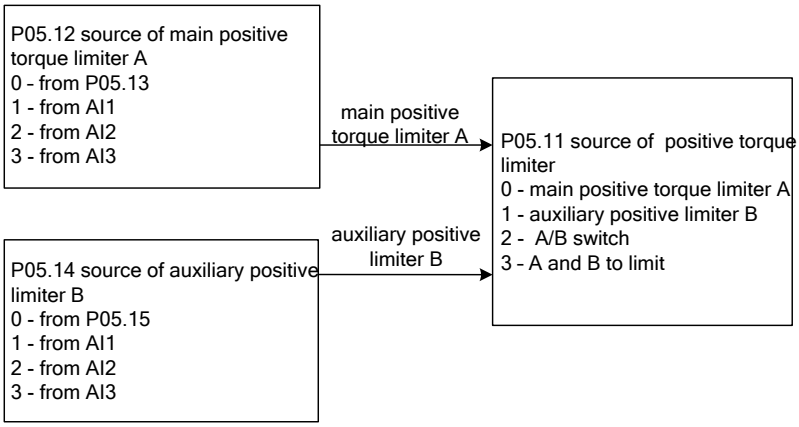
Torque limiting is achieved by limiting the output current of the driver to limit the output torque of the motor. The larger the torque limit value is, the larger the motor output torque is, and the easier the driver is to over-current. There are two kinds of limiting methods for torque limiting. One is that the forward and reverse limiters are from the positive limiter value; the other is the positive and negative limiting separately. Which one depends on P05.10. Both the positive limiting and the reverse limiting have a primary limiter A source and an auxiliary limiter B source, respectively a primary forward torque limiter A, an auxiliary forward torque limiter B, and a primary reverse torque limiter A, auxiliary reverse torque limiter B.

In addition to the above torque limiter, in order to protect the motor, the torque output is limited according to the three values of the rated motor current P00.01, the rated current of the driver P01.03, and the current peak current percentage P00.24.the value of this limit is calculate as follows:

$$\frac{\text{motor rated current P00.01}}{\text{driver rate current P01.03}} \times \text{current peak current percentage P00.24}$$

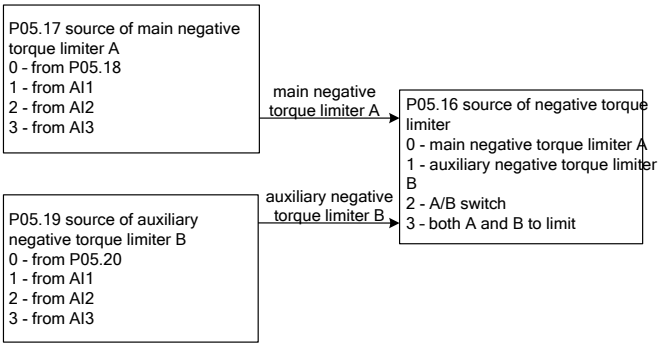
5.4.2.1 Positive torque limiting

The source of the positive torque limit is shown below. There are two types of positive torque limiting, one is the main positive torque limiter A, and the other is the auxiliary positive limiter B. Both torque limits have different sources of torque.



5.4.2.2 Negative torque limiting

The source of the negative torque limit is shown below. There are two types of negative torque limiting, one is the main negative torque limiter A, and the other is the auxiliary negative torque limiter B. Both torque limiters have different sources.。



Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P05.10	Torque limit method 0- Forward and reverse limit are from positive limiting 1- Forward and reverse limit separately	0~1	-	anytime	immediately	0	RW

P05.11	Positive torque limiting source 0- Forward Limit A 1- Forward limiter B 2- A/B switching 3- A and B are simultaneously limit	0~3	-	anytime	immediately	0	RW
P05.12	Source of forward torque limit A 0- from P05.13 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.13	Set value of forward torque limiter A	0~300.0	%	anytime	immediately	150.0	RW
P05.14	Forward Torque Limit B Source 0- from P05.15 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.15	Set value of forward torque limiter B	0~300.0	%	anytime	immediately	150.0	RW
P05.16	Reverse torque limiting source 0- Reverse Limit A 1- Reverse limit B 2- A/B switching 3- A and B are simultaneously limit	0~3	-	anytime	immediately	0	RW
P05.17	Source of reverse torque limit A 0- from P05.18 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.18	Set value of reverse torque limiter A	0~300.0	%	anytime	immediately	150.0	RW
P05.19	Reverse Torque Limit B Source 0- from P05.20 1- from AI1 2- from AI2 3- from AI3	0~3	-	anytime	immediately	0	RW
P05.20	Set value of reverse torque limiter B	0~300.0	%	anytime	immediately	150.0	RW

Related input function bits.。

num	Bit description
INFn.05	Forward torque limiting source A/B switching, positive limiting B is used when active
INFn.06	Reverse torque limiting source A/B switching, reverse limiting B is used when active

5.4.3 Speed limit

When the motor is unloaded, given a large torque will increase the speed of the motor, so the speed needs to be limited. The speed limit is the same as the speed limit in the speed mode.

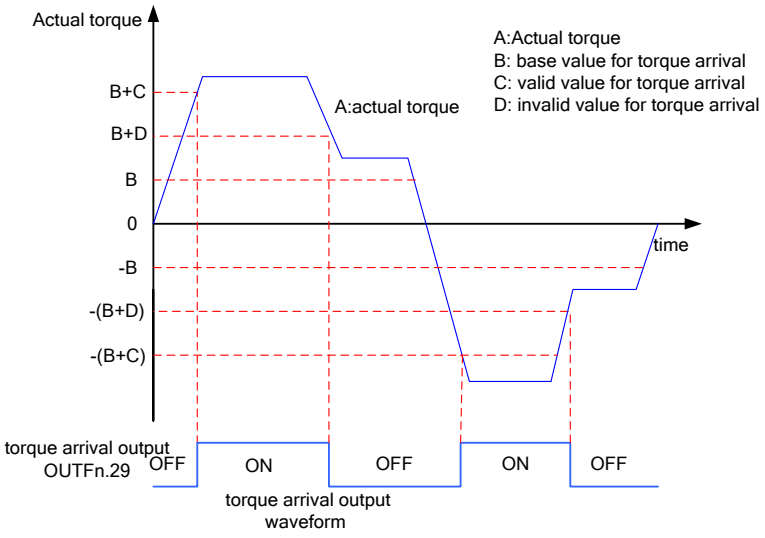
Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P04.06	source of postive speed limiting 0- main postive speed limiter A 1- auxiliary reverse speed limiter B 2- A/B switch 3-both A and B are limiter	0~3	-	anytime	immediately	0	RW
P04.07	Soure of main postive speed limiter A 0- from P04.08 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.08	Digital value of postive speed limiter A	0~32767	rpm	anytime	immediately	3000	RW
P04.09	Soure of auxiliary reverse speed limiter B 0- fromP04.10 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.10	Digital value of postive speed limiter B	0~32767	rpm	anytime	immediately	3000	RW
P04.11	source of negative speed limiting 0- main negative speed limiter A 1- auxiliary negative speed limiter B 2- A/B switch 3- both A and B are limiter	0~3	-	anytime	immediately	0	RW
P04.12	Source of main negative speed limiter A,	0~3	-	anytime	immediately	0	RW

	0- fromP04.13 1- fromAI1 2- fromAI2 3- fromAI3						
P04.13	Digital value of main negative speed limiter A	0~32767	rpm	anytime	immediately	3000	RW
P04.14	Source of auxiliary negative speed limiter B 0- fromP04.15 1- fromAI1 2- fromAI2 3- fromAI3	0~3	-	anytime	immediately	0	RW
P04.15	Digital value of auxiliary negative speed limiter B	0~32767	rpm	anytime	immediately	3000	RW

5.4.4 Torque arrival output

The torque arrival function is used to determine whether the actual torque has reached the set interval. When the actual torque reaches the torque threshold, the driver can output the corresponding DO signal (OUTFn29: torque arrival).



Actual torque：A；

Base value for torque arrival P05.31：B；

Valid value for torque arrival P05.32：C；

Invalid value for torque arrival P05.33：D；

Therefore, when the torque arrival signal (OUTFn29) from invalid to active, the actual torque must satisfy:

$$|A| \geq B+C$$

Otherwise, the torque reaching signal remains inactive.

When the torque arrival signal from active to inactive, the actual torque must satisfy:

$$|A| < B+D$$

Otherwise, the torque arrival signal remains valid。

Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P05.31	Base value for torque arrival	0~300.0	%	anytime	immediately	50.0	RW
P05.32	Valid value for torque arrival	0~300.0	%	anytime	immediately	10.0	RW
P05.33	Invalid value for torque arrival	0~300.0	%	anytime	immediately	0.0	RW

Related output function bits.

num	Bit description
OUTFn.29	The torque arrival signal;

5.4.5 Small torque jitter suppression

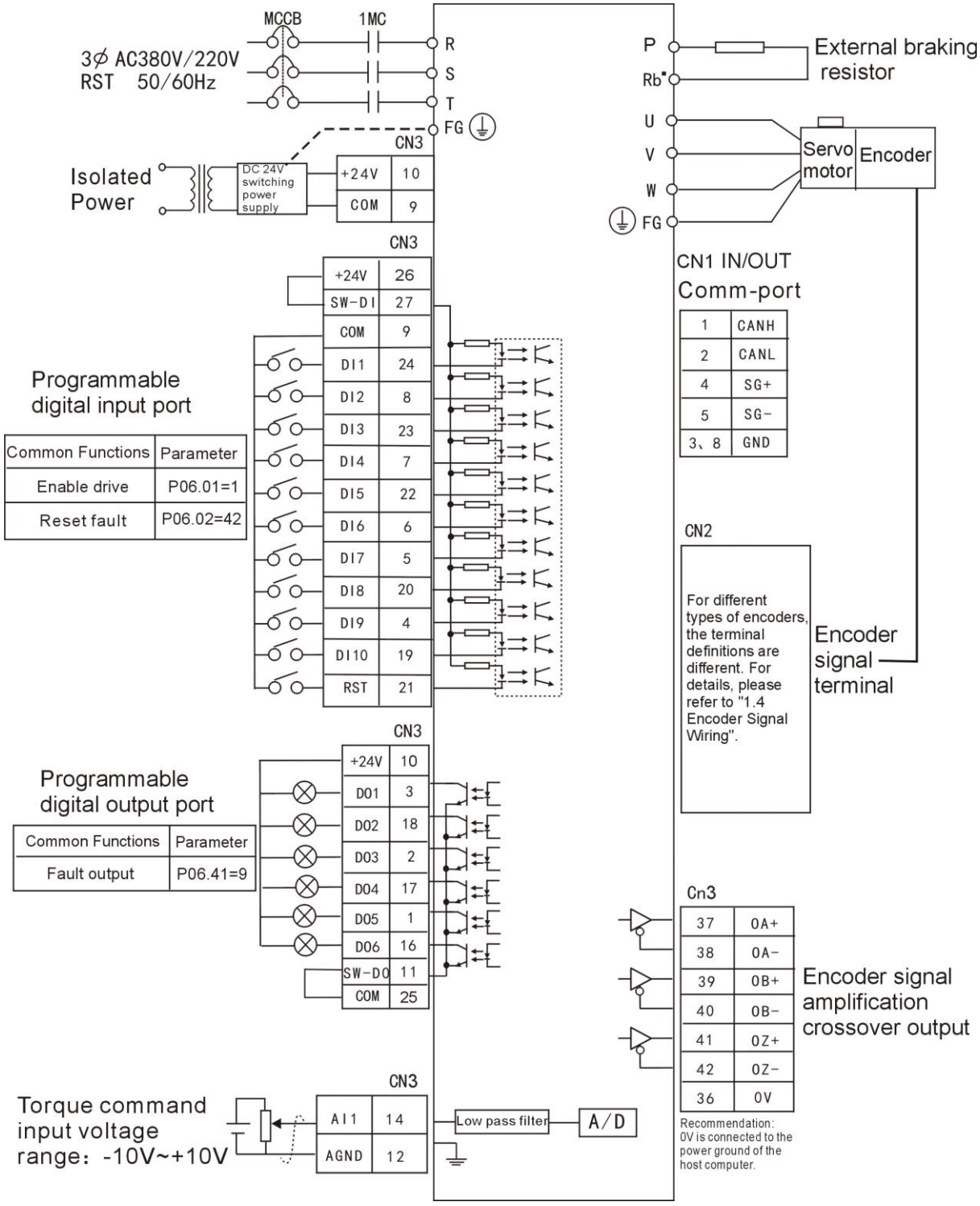
When the given torque is small, the motor may be shaken due to uneven distribution of the magnetic poles of the motor. The motor can output a certain reverse torque to overcome the motor shake, so that the motor speed output is stable.

Related parameters are as follows：

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P05.35	Maximum output limit of torque that suppresses jitter	0~10.0	%	anytime	immediately	0	RW
P05.36	Percentage of gain that suppresses jitter	0~300.0	%	anytime	immediately	100.0	RW
P05.37	time constant for detect Jitter speed	0-32767	ms	anytime	immediately	500	RW
P05.38	detected Jitter speed	-	ms	anyti	imme	-	RO

				me	diatel y		
P05.39	Torque output that suppresses jitter	-	ms	anyti me	imme diatel y	-	RO

5.4.6 Torque mode typical wiring diagram (NPN mode)



MCCB：air switch 1MC：AC contactor

1. is Twisted pair shielded wire。

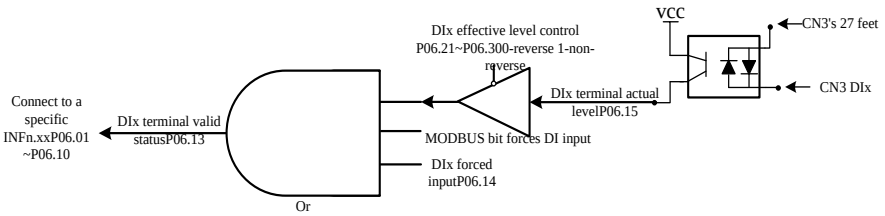
2. The DC24V power supply is prepared by the user. The DC24V switching power supply should be powered by an isolation transformer, and its grounding terminal should be directly connected to the ground terminal of the driver.

Chapter 6 Inputs and Outputs Function

6.1 Entity DI/DO function

The servo has 10 physical DIs, which are DI1~DI10. Each entity DI can be assigned an input function bit INFn.xx. The effective level of each entity DI can be set separately (P06.21-P06.30). Each entity DI can be forced to enter a specific level via P06.14, or a DI input can be forced via the Modbus bit.

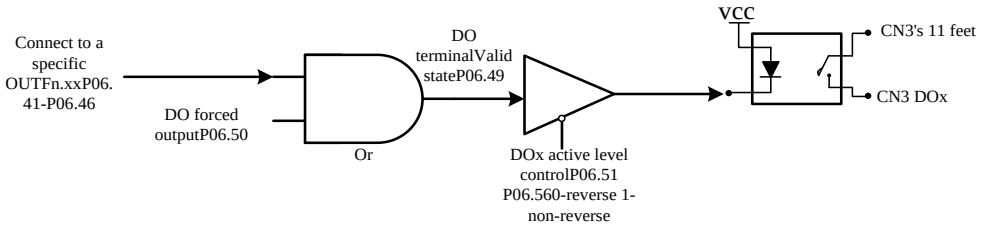
The internal logic of DI is shown in the figure below.



（Remark: SW-DI: CN3's 27-pin and +24V are short-circuited to NPN mode; short-circuit with COM is PNP mode.）

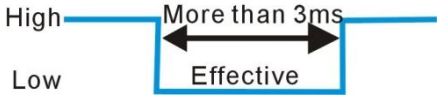
As can be seen from the above figure, to make the DIx terminal valid, you can modify the actual level of DIx, or by setting the MODBUS communication bit, or setting the forced valid register P06.14. If input from an external terminal, a voltage difference of 24V is required between the 27th pin of the servo CN3 terminal and the corresponding DIx pin.

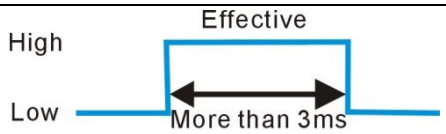
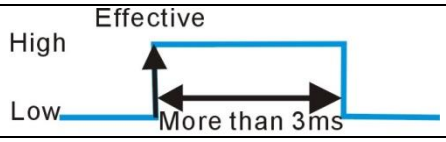
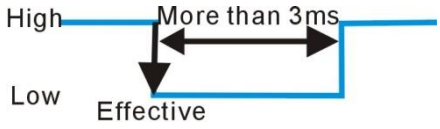
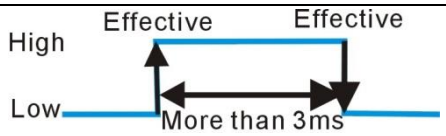
The servo has a total of 6 physical DOs, which are DO1~DO6. Each DO can be assigned an output function bit OUTFn.xx. The active level of each entity DO can be set separately, or a DO bit can be output by the P06.50 forced register. The effective level output of DO eventually drives an opt coupler. Once the opt coupler is turned on, DOx outputs the voltage at pin 11 of CN3 port.

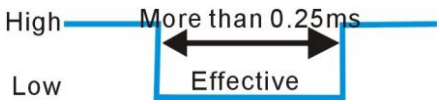
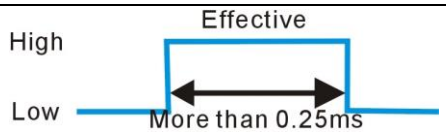
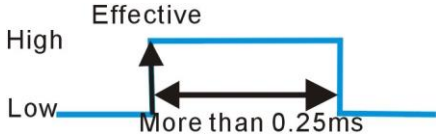
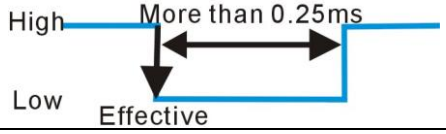
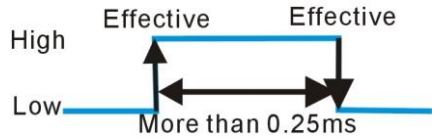


（Remark: SW-DO: CN11's 11 pin is shorted to COM in NPN mode; shorted to +24V is PNP mode.）

Among them, DI1~DI8 are hardware low speed DI, DI9 and DI10 are hardware high speed DI, the details are as follows:

Hardware low speed DI description (DI1~DI8)	
DI function effective logic state	Remarks
Low level	

High level	
Rising edge	
Falling edge	
Rising and falling edges	

Hardware high speed DI description (DI9, DI10)	
DI function effective logic state	Remarks
Low level	
High level	
Rising edge	
Falling edge	
Rising and falling edges	

DO1 and DO2 are set to output the A, B, and Z signals of the motor encoder through P06.40.

The relevant parameters are as follows:

Num	Description	Range	unit	function	Set moment	active moment	Default	RO/RW
P06.01	DI1 function control register	0~99	-	Set the DI function corresponding to the hardware DI1 terminal.	anytime	immediately	1	RW

				See the DI function table for specific functions.				
P06.02	DI2 function control register	0~99	-	-	anytime	immediately	42	RW
P06.03	DI3 function control register	0~99	-	-	anytime	immediately	0	RW
P06.04	DI4 function control register	0~99	-	-	anytime	immediately	0	RW
P06.05	DI5 function control register	0~99	-	-	anytime	immediately	0	RW
P06.06	DI6 function control register	0~99	-	-	anytime	immediately	0	RW
P06.07	DI7 function control register	0~99	-	-	anytime	immediately	0	RW
P06.08	DI8 function control register	0~99	-	-	anytime	immediately	0	RW
P06.09	DI9 function control register	0~99	-	-	anytime	immediately	0	RW
P06.10	DI10 function control register	0~99	-	-	anytime	immediately	0	RW
P06.13	DI terminal valid status	-	-	Displayed in decimal format, converted to binary format, containing 0-9 digits, low to high indicates the state of digital output terminals DI1~DI10, 0=OFF, 1=ON, the 0th bit corresponds to DI1,..., 9 bits correspond to DI10. For the parameter valid status display, see "4.6 Variable Monitoring".	anytime	-	-	RO
P06.14	DI forced input	0~1023	-	When the DI forced input is valid, the level logic of the DI function is set by this parameter. Input in decimal (BCD) format, converted to	anytime	immediately	0	RW

				binary (Binary) is the corresponding DIx input signal. For example: P06.14=42 (BCD)=0000101010 (Binary), indicating DI2, DI4 and DI6 terminals are ON.				
P06.15	DI Actual terminal level	-	-	Displayed in decimal format, after conversion to binary format, it contains 0-9 digits, and the low to high digits indicate the state of digital output terminals DI1~DI10. For the parameter valid status display, see "4.6 Variable Monitoring".	anytime	-	-	RO
P06.16	High speed DI filter configuration	1~32767	us	When the high-speed pulse input terminal is in the peak interference, the spike interference can be filtered out by setting P06.16. INFn.34 and INFn.40 are high-speed DI signals whose filtering time is determined by P06.16; other input signals are low-speed DI signals, and the filtering time is determined by P06.17.	anytime	immediately	10	RW
P06.17	Low speed DI filter configuration	1~32767	us	When there is spike interference at the low-speed pulse input, the spike interference can be suppressed by setting P06.17 to prevent the interference signal from entering the servo	anytime	immediately	1000	RW

				driver.				
P06.21	DI1 active level 0-active low 1-active high	0~1	-	Set the level logic of the hardware DI1 terminal when the DI function selected by DI1 is enabled.	anytime	immediately	0	RW
P06.22	DI2 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.23	DI3 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.24	DI4 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.25	DI5 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.26	DI6 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.27	DI7 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.28	DI8 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.29	DI9 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.30	DI10 active level 0-active low 1-active high	0~1	-	-	anytime	immediately	0	RW
P06.40	DO1 and DO2 function configuration registers 0- DO1, DO2 function output configured with P06.41,	0~2			anytime	immediately	0	RW

	P06.42 respectively 1- DO1, DO2 output A, B pulse respectively 2- DO1 outputs Z point signal, DO2 functions output with P06.42 configuration							
P06.41	DO1 function control register	0~99	-	Set the DO function corresponding to the hardware DO1 terminal. See the DO function table for specific functions.	anytime	immediately	9	RW
P06.42	DO2 function control register	0~99	-	-	anytime	immediately	13	RW
P06.43	DO3 function control register	0~99	-	-	anytime	immediately	0	RW
P06.44	DO4 function control register	0~99	-	-	anytime	immediately	0	RW
P06.45	DO5 function control register	0~99	-	-	anytime	immediately	0	RW
P06.46	DO6 function control register	0~99	-	-	anytime	immediately	0	RW
P06.49	DO terminal valid status	-	-	Displayed in decimal format, after conversion to binary format, it contains 0-5 digits. The low to high digits indicate the state of digital output terminals DO1~DO6, 0=OFF, 1=ON, and the 0th bit corresponds to DO1,..., 5 bits correspond to DO6. For the parameter valid status display, see "4.6	anytime	-	-	RO

				Variable Monitoring".				
P06.50	DO forced output	0~63	-	When the DO forced output is valid, this parameter is used to set whether the DO function is valid. Input in decimal (BCD) format, converted to binary (Binary) is the corresponding DOx input signal. For example: P06.50=42 (BCD)=101010 (Binary), indicating that DO2, DO4 and DO6 output are ON.	anytime	immediately	0	RW
P06.51	DO1 active level 0-active low 1- active high	0~1	-	The output level logic of the hardware DO1 terminal is set when the DO function selected by DO1 is enabled.	anytime	immediately	0	RW
P06.52	DO2 active level 0-active low 1- active high	0~1	-	-	anytime	immediately	0	RW
P06.53	DO3 active level 0-active low 1- active high	0~1	-	-	anytime	immediately	0	RW
P06.54	DO4active level 0-active low 1- active high	0~1	-	-	anytime	immediately	0	RW
P06.55	DO5 active level 0-active low 1- active high	0~1	-	-	anytime	immediately	0	RW
P06.56	DO6 active level 0-active low 1- active high	0~1	-	-	anytime	immediately	0	RW

The DI specific function INFn.xx configuration is shown in the table below, and its valid status can be monitored by P06.13.

DI function number	DI function	Effective rule

0	None	-
1	Enable servo	Valid when the valid state is high
2	Reset servo	Effective state changes from low to high
3	Torque AB selector	Valid when the valid state is high
4	Torque reverse selector	Valid when the valid state is high
5	Forward torque limit selector	Valid when the valid state is high
6	Reverse torque limit selector	Valid when the valid state is high
7	Forward speed limit selector	Valid when the valid state is high
8	Reverse speed limit selector	Valid when the valid state is high
9	Positive jog	Valid when the valid state is high
10	Reverse jog	Valid when the valid state is high
11	Speed given reverse	Valid when the valid state is high
12	Main speed AB selector	Valid when the valid state is high
13	Speed stop input	Valid when the valid state is high
14	Download ARM program reset	Effective state changes from low to high
15	Clear encoder position counter	Effective state changes from low to high
16	Zero position fixed in speed mode	Valid when the valid state is high
17	Multi-speed selector 0	Valid when the valid state is high
18	Multi-speed selector 1	Valid when the valid state is high
19	Multi-speed selector 2	Valid when the valid state is high
20	Multi-speed selector 3	Valid when the valid state is high
21	Position instruction prohibited	Valid when the valid state is high
22	Position command reversal	Valid when the valid state is high
23	Pulse command prohibition	Valid when the valid state is high
24	Electronic gear ratio selector 1	Valid when the valid state is high
25	Position error clear	Depends on P03.21
26	Trigger position mode homing	Effective state changes from low to high
27	Multi-segment position trigger signal	The rising edge of the active state triggers the start of the multi-segment position.The falling edge of the active state triggers the stop of multiple positions
28	Multi-segment position selector 0	Valid when the valid state is high
29	Multi-segment position selector 1	Valid when the valid state is high
30	Multi-segment position selector 2	Valid when the valid state is high
31	Multi-segment position selector 3	Valid when the valid state is high
32	Position direction in multi-segment position mode	Valid when the valid state is high
33	Reserved	Reserved
34	Return home signal input	Depends on return home mode
35	XY pulse tracking and multi-segment position switching in position mode	Valid when the valid state is high
36	Control mode selector 0	Valid when the valid state is high
37	Control mode selector 1	Valid when the valid state is high

38	Enable detection trigger interrupt fixed length signal INFn.40	Valid when the valid state is high
39	Uninterrupted fixed length	Valid when the valid state is high
40	Trigger an input signal that interrupts the fixed length	Effective state from low to high
41	First or second set of gain switch	Valid when the valid state is high
42	Reset fault	Valid when the valid state is high
43	Position mode positive limit switch	Valid when the valid state is high
44	Position mode reverse limit switch	Valid when the valid state is high
45	Open-closed switching in full-closed mode	Valid when the valid state is high
46	FPGA download program reset	Effective state from low to high
47	Tension compensation direction	Valid when the valid state is high
48	Tension tracking direction	Valid when the valid state is high
49	Forced to limit at maximum compensation speed	Valid when the valid state is high
50	Prohibit roll diameter calculation	Valid when the valid state is high
51	Change volume	Valid when the valid state is high
52	Initial roll diameter switch	Valid when the valid state is high
53	Clear feed length	Valid when the valid state is high
54	Forced fast tightening	Valid when the valid state is high
55	No tension compensation in closed loop speed mode	Valid when the valid state is high
56	Electronic gear ratio selector 2	Valid when the valid state is high
57	Motor overheating	Valid when the valid state is high
58	Emergency stop input	Valid when the valid state is high
59	Internal trigger reset	Effective state from low to high
60	Internal trigger set	Effective state from low to high
61	Internal counter count pulse	Effective state from low to high
62	Internal counter clear	Valid when the valid state is high
63	UPDOWN mode UP signal in speed mode	Valid when the valid state is high
64	UPDOWN mode DOWN signal in speed mode	Valid when the valid state is high
65	UPDOWN mode speed hold signal in speed mode	Valid when the valid state is high
66	Speed stack enable	Valid when the valid state is high
67	Correct all zero drift of AI	Valid when the valid state is high to low
68	Tension closed loop speed / torque mode switching	Valid when the valid state is high

The DO specific function OUTFn.xx is shown in the following table.

DO function number	DO function
0	None
1	Drive is enabling
2	Speed has arrived

3	Speed is falling
4	Speed is rising
5	Speed is at zero speed
6	Speed overrun
7	Speed forward
8	Speed reversal
9	Fault output
10	Forward speed limit in torque mode
11	Negative speed limit in torque mode
12	Speed limit in torque mode
13	Positioning completion output
14	Positioning close to the output
15	return home completed output
16	Position error too large output
17	Interrupt fixed length output
18	Software limit output
24	Brake output
25	Input command is valid
26	Often OFF
27	Always ON
28	Torque limit output
29	Torque arrival
30	Internal trigger status
31	Internal counter count arrives
32	Consistent speed
33	Pulse position command is zero output

6.2 Virtual DI/DO function

The servo drive has 16 general-purpose virtual DIs (VDIs), and each virtual DI has two levels of level types, including write 1 always active and rising edge valid. The function of each virtual DI (P12.01 to P12.16) can be configured separately. The level of the VDI is simulated by writing a value to the virtual DI input register (P12.20).

The servo driver has 16 general-purpose virtual DOs (VDOs). There are two types of level types for each virtual DO. One is output when it is valid, and the output is 0 when it is valid. The function of each virtual DO (P12.41-P12.56) can be configured separately. The output level of the DO can be displayed in P12.60.

The servo drive also has two sets of dedicated inputs and outputs: VDI20 and VDO20, VDI21 and VDO21. These two VDI/VDOs are internally connected.

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set mom	active mome	def ault	RO/ RW

					ent	nt		
P12.01	VDI1 function configuration register	0~99	-	Set the DI function corresponding to VDI1 (virtual input terminal 1). The specific function of the VDI port is the same as that of the physical DI port.	anyti me	immedi ately	0	RW
P12.02	VDI2 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.03	VDI3 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.04	VDI4 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.05	VDI5 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.06	VDI6 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.07	VDI7 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.08	VDI8 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.09	VDI9 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.10	VDI10 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.11	VDI11 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.12	VDI12 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.13	VDI13 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.14	VDI14 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.15	VDI15 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.16	VDI16 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.17	VDI20 function	0~99	-	-	anyti	immedi	0	RW

	configuration register				me	ately		
P12.18	VDI21 function configuration register	0~99	-	-	anyti me	immedi ately	0	RW
P12.19	Monitor value of virtual DI20 and virtual DI21.	-	-	Read the virtual values of the VDI20 and VDI21 terminals.	-	-	-	RO
P12.20	Virtual DI1-virtual DI16 input value setting register	0~65535	-	Set the input value of VDI1-16.	anyti me	immedi ately	0	RW
P12.21	VDI1 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	Set the DI function selected by VDI1 to be valid, and the input level logic of the VDI1 terminal.	anyti me	immedi ately	0	RW
P12.22	VDI2 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.23	VDI3 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.24	VDI4 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.25	VDI5 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.26	VDI6 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.27	VDI7 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.28	VDI8 level type 0-Write 1 is always	0~1	-	-	anyti me	immedi ately	0	RW

	valid 1- rising edge is valid							
P12.29	VDI9 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.30	VDI10 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.31	VDI11 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.32	VDI12 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.33	VDI13 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.34	VDI14 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.35	VDI1 5level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.36	VDI16 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.37	VDI20 level type 0-Write 1 is always valid 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW
P12.38	VDI21 level type 0-Write 1 is always valids 1- rising edge is valid	0~1	-	-	anytime	immediately	0	RW

P12.41	VDO1 configuration register	0~99	-	Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.	anytime	immediately	0	RW
P12.42	VDO2 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.43	VDO3 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.44	VDO4 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.45	VDO5 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.46	VDO6 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.47	VDO7 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.48	VDO8 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.49	VDO9 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.50	VDO10 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.51	VDO11 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.52	VDO12 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.53	VDO13 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.54	VDO14 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.55	VDO15 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.56	VDO16 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.57	VDO20 configuration register	0~99	-	-	anytime	immediately	0	RW
P12.58	VDO21 configuration register	0~99	-	-	anytime	immediately	0	RW

P12.59	Output level of virtual DO20 D021	-	-	Read the virtual level of the VDO20 and VDO21 terminals.	-	-	-	RO
P12.60	Virtual DO1-DO16 output level	-	-	Read the virtual level of the VDO1 - VDO16 terminal.	-	-	-	RO
P12.61	Active level of virtual DO1 0-Output 1 when valid 1-Output 0 when valid	0~1	-	The output level logic of the VDO1 terminal is set when the DO function selected by VDO1 is enabled.	anyti me	immedi ately	0	RW
P12.62	Active level of virtual DO2 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.63	Active level of virtual DO3 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.64	Active level of virtual DO4 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.65	Active level of virtual DO5 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.66	Active level of virtual DO6 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.67	Active level of virtual DO7 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.68	Active level of virtual DO8 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	
P12.69	Active level of virtual	0~1	-	-	anyti	immedi	0	RW

	DO9 0-Output 1 when valid 1-Output 0 when valid				me	ately		
P12.70	Active level of virtual DO10 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.71	Active level of virtual DO11 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.72	Active level of virtual DO12 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.73	Active level of virtual DO13 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.74	Active level of virtual DO14 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.75	Active level of virtual DO15 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.76	Active level of virtual DO16 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.77	Active level of virtual DO17 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.78	Active level of virtual DO21 0-Output 1 when valid 1-Output 0 when valid	0~1	-	-	anyti me	immedi ately	0	RW
P12.79	Whether the virtual DI1-DI16 input value register P12.20 is powered on is cleared.	0~1	-	Whether the VDI1 -VDI16 input value register is powered on is	anyti me	immedi ately	1	RW

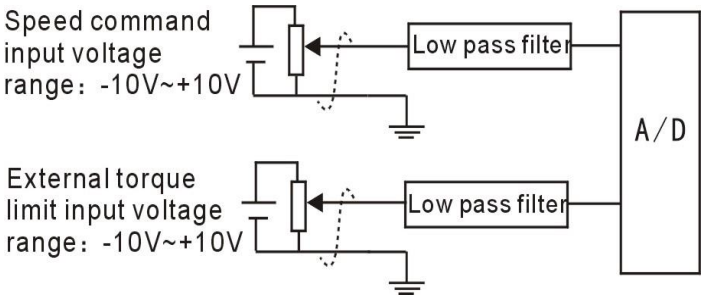
	0-not clear 1-Clear			cleared.				

6.3 Analog input analog output AI/AO function

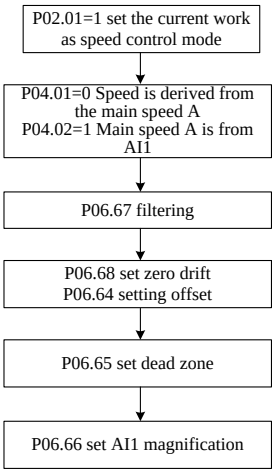
6.3.1 Analog input AI

The servo drive has 3 AI terminals, and the input range of AI1-AI3 is ±10V input.

Analog input circuit:



Operation method and steps: Take AI1 as an example to explain the analog voltage setting speed command method.



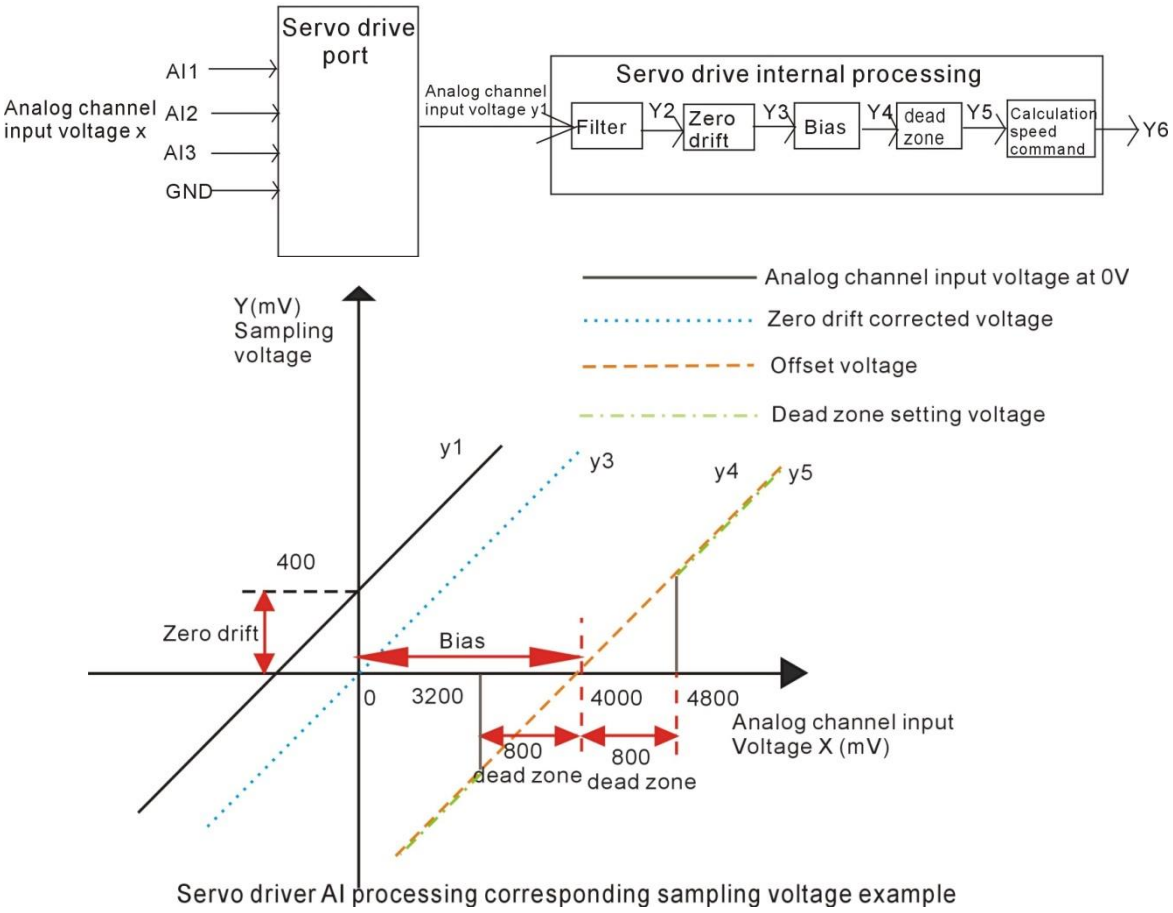
Glossary:

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

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

Dead zone: refers to the input voltage range of the analog channel when the sampling voltage is zero.

The unprocessed analog channel output voltage is shown in Figure y1. After being processed internally by the servo driver, the speed command y6 is finally obtained.



Servo driver AI processing corresponding sampling voltage example

●Filtering:

The servo driver provides analog channel filtering. By setting the filter time constants P06.67, P06.72, and P06.77, it can prevent the motor command fluctuation caused by the unstable analog input voltage, and can also reduce the motor fault caused by the interference signal. . The filtering function has no elimination or suppression of zero drift and dead zone.

● Zero drift correction:

When the actual input voltage is corrected to 0V, the voltage P06.61 collected by the analog channel AI1 deviates from the value of 0V.

In the figure, the analog channel output voltage that is not processed internally by the driver is shown as y1. Taking the filter time constant P06.67=0.00ms as an example, the filtered sample voltage y2 is consistent with y1.

It can be seen that when the actual input voltage x=0, the collected voltage P06.61=y1=400mV, this 400mV is called zero drift.

After zero drift correction, the sample voltage is shown as y3. Y3=y1-400.0.

● Offset correction:

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

As shown in the figure, when the sampling voltage y4=0 is preset, the corresponding actual input voltage x=4000mV, which is called offset. Set P06.64=4000.

● Dead zone setting:

A valid input voltage range when the drive sample voltage is not zero.

After the offset setting is completed, when the input voltage x is between 3200mV and

4800mV, the sampled voltage value is 0. This 800mV is called the dead zone. Set P06.65 = 800.0. After setting the dead band, the sampling voltage is as shown in y5.

$$y_5 = \begin{cases} 0, 3200 \le x \le 4800 \\ y_4, 4800 \le x \le 10000 \text{或} -10000 \le x \le 3200 \end{cases}$$

● Calculate the percentage of analog instructions

After the zero drift, offset, and dead zone settings are completed, divide by 10000mV and multiply by the magnification percentage to get the final simulation command percentage.

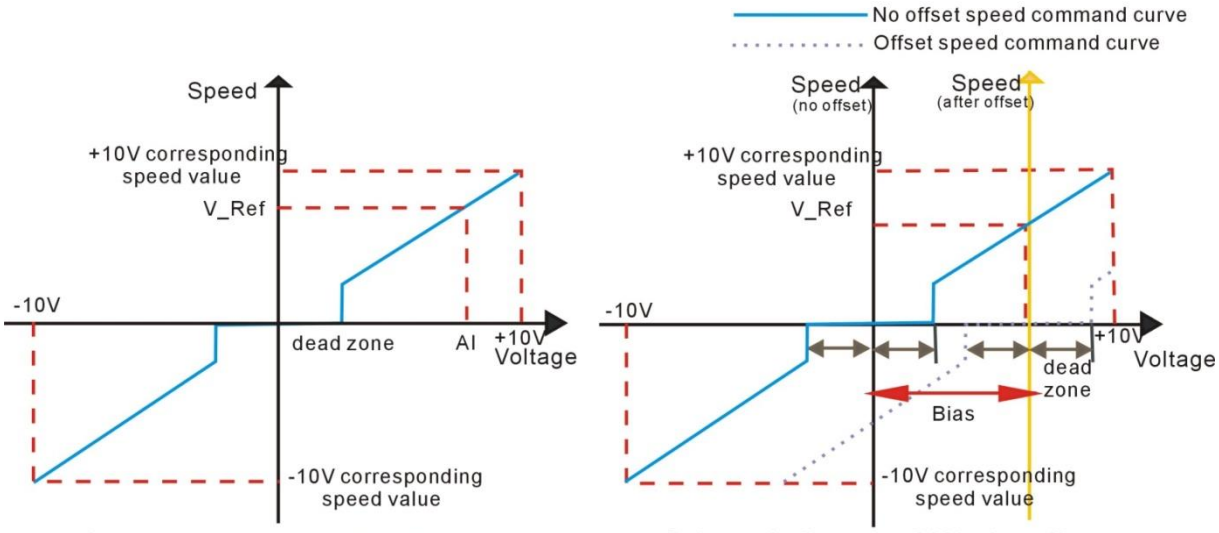
$$y_6 = \frac{y_5}{10000} \times (P06.66)\%$$

● Calculate speed command y6 or torque command

Speed command (rpm) =rated speed (rpm) X Analog instruction percentage.

Torque command percentage = Analog instruction percentage.

For example, when there is no offset, as shown on the left of the figure below, there is an offset as shown in the right figure below. When the correct settings are completed, the AI1 sampled voltage value and the speed command value corresponding to the analog input can be viewed in real time through the oscilloscope channel.



Schematic diagram of No offset AI1 Schematic diagram of AI1 after offset

The relationship between the final speed command value percentage y6 and the input voltage x:

$$y6 = \begin{cases} 0, & B - C \le x \le B + C \\ \frac{(x - B)}{10000} \times (P06.66 or P06.72 or P06.77)\%, & B + C \le x \le 10000 \text{or} -10000 \le x \le B - C \end{cases}$$

Where: B: offset; C: dead zone.

To sum up, assuming that the AI1 filter time constant is 0, the AI1 analog command calculation process is as follows:

（1） Eliminate zero drift and offset

b1 = (AI1 input voltage value P06.61)-（AI1 zero drift P06.68）-(AI1 offset P06.64)

（2） Join the dead zone

$$b2 = \begin{cases} 0, & |b1| < \text{dead zone P06.65} \\ b1, & |b1| > \text{dead zone P06.65} \end{cases}$$

（3） Calculate the percentage of analog instructions

$$\text{AI1 analog command percentage P06.91} = \frac{b2}{10000} \times (AI1\ magnification\ P06.66)\%$$

（4） Calculate the speed command or torque command

Speed command (rpm) = AI1 analog command percentage P06.91×rated speed P00.02

Torque command (%) = AI1 analog command percentage P06.91.

The AI correction zero drift method is as follows: write 1 to P06.79, trigger calibration AI1 zero drift; write 2 trigger to P06.79 to correct AI2 zero drift; write P06.79 to 3 trigger correction AI3 zero drift; for P06. 79 write 4 trigger correction AI1, AI2, AI3 zero drift. Or trigger INFn67 through DI, and perform zero drift correction on AI1, AI2, and AI3.

The AI related parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P06.61	AI1 input voltage	-	mV	Display AI1 input voltage	-	-	-	RO
P06.62	AI2 input voltage	-	mV	--	-	-	-	RO
P06.63	AI3 input voltage	-	mV	-	-	-	-	RO
P06.64	AI1 bias	-10000~10000	mV	Set the actual input voltage of AI1 when the zero-drift corrected driver sample voltage value is 0.	anytime	immediately	0	RW
P06.65	AI1 dead zone	0~5000	mV	When the drive sample voltage value is set to 0, the AI1 input voltage range.	anytime	immediately	0	RW
P06.66	AI1 magnification	0~1000.0	%	Set the AI1 magnification.	anytime	immediately	100.0	RW
P06.67	AI1 low pass filter time constant	0~32767	ms	Set the filter time constant of the software to the AI1 input voltage signal.	anytime	immediately	2	RW
P06.68	AI1 zero drift	-32767~32767	mV	Zero drift: refers to the value of the sampled voltage value of the servo driver relative to GND when the input voltage of the analog channel is zero.	anytime	immediately	0	RW

P06.69	AI2 bias	-10000~10000	mV	-	anytime	immediately	0	RW
P06.70	AI2 dead zone	0~5000	mV	-	anytime	immediately	0	RW
P06.71	AI2 magnification	0~1000.0	%	-	anytime	immediately	100.0	RW
P06.72	AI2 low pass filter time constant	0~32767	ms	-	anytime	immediately	2	RW
P06.73	AI2 zero drift	-10000~10000	mV	-	anytime	immediately	0	RW
P06.74	AI3 bias	-10000~10000	mV	-	anytime	immediately	0	RW
P06.75	AI3 dead zone	0~5000	mV	-	anytime	immediately	0	RW
P06.76	AI3 magnification	0~1000.0	%	-	anytime	immediately	100.0	RW
P06.77	AI3 low pass filter time constant	0~32767	ms	-	anytime	immediately	2	RW
P06.78	AI3 zero drift	-10000~10000	mV	-	anytime	immediately	0	RW
P06.79	Automatic zero drift correction Write 1 trigger to correct AI1 zero drift; Write 2 trigger correction AI2 zero drift; Write 3 trigger correction AI3 zero drift; Write 4 trigger correction AI1-AI3 zero drift; Write 5 trigger correction current sensor; Write 6 to clear the current sensor zero drift value;	0-7		-	anytime	immediately	0	RW
P06.91	AI1 analog	-3276.7~	%	显示	-	-	-	RO

	instruction percentage	3276.7						
P06.92	AI2 analog command percentage	-3276.7~ 3276.7	%	显示	-	-	-	RO
P06.93	AI3 analog command percentage	-3276.7~ 3276.7	%	显示	-	-	-	RO

Related input function bits.。

num	Bit description
INFn.67	Valid to invalid jump triggers zero drift of AI1, AI2, AI3

6.3.2 Analog output AO

The servo drive has two AO outputs with an output range of ±10V. The AO can output a specific value by configuring P06.84 and P06.85.

Actual port output voltage =

The corresponding variable is converted to the value of the voltage × AOx Magnification - AOx Bias.

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/ RW
P06.80	AO1 offset	-10000~ 10000	mV	When the theoretical output voltage is set to 0V, AO1 actually outputs the voltage value after being biased.	anytime	immediately	0	RW
P06.81	AO1 magnification	-1000.0~ 1000.0	%	Set the theoretical output voltage to 1V. After amplification, AO1 actually outputs the voltage value.	anytime	immediately	100	RW
P06.82	AO2 bias	-10000~ 10000	mV	When the theoretical output voltage is set to 0V, the AO2 actually outputs the voltage value after being biased.	anytime	immediately	0	RW

P06.83	AO2 magnification	-1000.0~ 1000.0	%	Set the theoretical output voltage to 1V. After amplification, AO2 actually outputs the voltage value.	anyti me	immedi ately	100	RW
P06.84	AO1 configuration register value 0-Actual speed, 1mv corresponds to 1rpm 1- Speed loop speed command, 1mv corresponds to 1rpm 2-Torque command, 1mv corresponds to 0.1% rated torque 3-Position error before filtering, 1mv corresponds to 1 motor encoder pulse 4- Filtered position error, 1mv corresponds to 1 motor encoder pulse 5-Feed forward speed, 1mv corresponds to 0.1% rated speed 6-Position command speed, 1mv corresponds to 1rpm 7-Filtered position command speed, 1mv corresponds to 1rpm 8-A phase current instantaneous value, 1mV corresponds to 0.1A 9-B phase current instantaneous value, 1mV corresponds to 0.1A 10-torque feedback, 1mv corresponds to 0.1% rated torque	-10000~ 10000	-	Set the output signal type of analog output terminal 1 (AO1).10000 corresponds to output 10V; -10000 corresponds to output -10V.	anyti me	immedi ately	0	RW
P06.85	AO2 configuration	-10000~	-	Set the output signal	anyti	immedi	0	RW

	register value 0-Actual speed, 1mv corresponds to 1rpm 1- Speed loop speed command, 1mv corresponds to 1rpm 2-Torque command, 1mv corresponds to 0.1% rated torque 3-Position error before filtering, 1mv corresponds to 1 motor encoder pulse 4- Filtered position error, 1mv corresponds to 1 motor encoder pulse 5-Feed forward speed, 1mv corresponds to 0.1% rated speed 6-Position command speed, 1mv corresponds to 1rpm 7-Filtered position command speed, 1mv corresponds to 1rpm 8-A phase current instantaneous value, 1mV corresponds to 0.1A 9-B phase current instantaneous value, 1mV corresponds to 0.1A 10-torque feedback, 1mv corresponds to 0.1% rated torque	10000		type of analog output terminal 2 (AO2).10000 corresponds to output 10V; -10000 corresponds to output -10V.	me	ately		

Chapter 7 Auxiliary Function

7.1 Fault protection

7.1.1 Fault Downtime

The failure of the servo drive is divided into three categories.

Class I is a serious fault. Once such a fault is reported, the motor power must be cut off immediately and the motor is free to stop. The fault code range for class I is Er.100-Er.199.

Class II is a general fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.10. The fault code range for a Type II fault is Er.200-Er.599.

Class III is not a serious fault. When reporting such a fault, customize can report the running action of the motor after the fault according to parameter P02.11. The fault code range for Class III faults is Er.600-Er.999.

When the hardware/software travel limit occurs, the servo over travel fault stop mode can be set separately by P02.12.

There are five types of downtime. The first type is free stop; the second type is rapid deceleration stop, the drive is disconnected after stop, the motor is powered off; the third is slow deceleration stop, disconnected after parking is enabled, the motor is powered off; the fourth is Quickly decelerate to stop, keep enabling after parking, users need to disconnect the enable signal to disable; the fifth is slow deceleration stop, keep enabled after parking, users need to disconnect the enable signal to disable. Free parking means that the drive is broken and the motor is free to stop by frictional resistance. Deceleration stop means that the servo drive drives the motor to decelerate. In this process, the motor is kept energized. The deceleration time for rapid deceleration stop is set by P02.16. The deceleration time for slow deceleration stop is set by P02.17. The deceleration time refers to the time from the rated speed to the zero speed. The actual deceleration time is determined by the speed at the time of the fault and the set deceleration time.

Actual deceleration time = Set deceleration time $\times \frac{Speed\ at\ failure}{rated\ speed}$

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P02.10	Servo type 2 failure stop mode selection 0-break enable free parking 1-Fast deceleration and	0~4	-	Set the servo motor's type II fault, the servo motor's deceleration mode from rotation to	anytime	immediately	0	RW

	stop after the parking is enabled 2-Slow deceleration stop and enable 3- Fast deceleration stop and keep enabled4-Slow deceleration stop and keep enabled			stop, and the motor state after stopping.				
P02.11	Servo three types of failure mode selection 0- break enable free parking 1- Fast deceleration and stop after the parking is enabled 2- Slow deceleration stop and enable 3- Fast deceleration stop and keep enabled4-Slow deceleration stop and keep enabled	0~4	-	Set the servo motor's type III fault, the servo motor's deceleration mode from rotation to stop, and the motor state after stopping.	anytime	immediately	0	RW
P02.12	Over travel stop mode selection 0- break enable free parking 1- Fast deceleration and stop after the parking is enabled 2- Slow deceleration stop and enable 3- Fast deceleration stop and keep enabled 4- Slow deceleration stop and keep enabled	0~4	-	Set the deceleration mode of the servo motor from rotation to stop and the state of the motor after stopping when the over travel occurs during servo motor operation.	anytime	immediately	0	RW
P02.16	Fast stop time	0~65535	ms	Set the deceleration time when the servo is fast stopped.	anytime	immediately	500	RW
P02.17	Slow parking time	0~65535	ms	Set the deceleration time when the servo is slow to stop.	anytime	immediately	1000	RW

7.1.2 All faults

The servo supports the following faults.

error code	Fault description
Er.100	Software over-current, when the percentage of current detected by software P09.31 is greater than the value set by P10.01, the software over-current fault is reported, and the fault can be shielded by BIT1 of P10.33.
Er.101	Hardware overcurrent
Er.102	Overvoltage, for 220V driver, overvoltage when bus voltage P01.08 is greater than 420V.For 380V drivers, overvoltage is reported when the bus voltage P01.08 is greater than 750V.
Er.103	Under voltage, under voltage when the bus voltage P01.08 is less than the rated voltage P01.07*1.414*0.7.
Er.104	The current sensor is faulty. It is detected that the current is not 0 before the relay is turned on for the first time.
Er.105	If the encoder fails and the encoder is not connected, the fault is reported.
Er.106	The EEPROM verify fault, and the fault is reported when the value written to the EEPROM and the value of the read EEPROM are inconsistent.
Er.107	The phase sampling fault is reported when the phase obtained by the HALL switch and the phase obtained by the encoder differ too much.
Er.108	When the FPGA and ARM communication are faulty, the fault is reported when the values written and read by the ARM are inconsistent.
Er.109	If the current changes greatly, the fault is reported when the two samples are separated by 50%.
Er.110	Magnetic encoder failure
Er.111	Current phase sequence learning failure
Er.112	The output is out of phase.
Er.113	Did not scan to Z point during self-learning
Er.114	Z point offset not found
Er.115	Hall code value learning error
Er.117	The driver overheats and reports a driver overheat fault when it detects that the driver temperature P01.10 is greater than the driver overheat threshold P10.06.
Er.118	The line-saving encoder does not have a feedback threshold value at power-on.
Er.119	Motor encoder type does not match
Er.121	RST input phase loss
Er.200	When returns to home, the home signal INFn.34 is not assigned.
Er.201	INFn.xx repeated allocation, one input function bit is assigned to two or more DI
Er.202	Over speed, when the speed percentage (actual speed / rated speed) exceeds P10.05, the over speed is reported.
Er.203	The position error is too large. When the position error P03.17 is greater than P03.19 and P03.19 is not equal to 0, the fault is reported. Note that it is easy to report this fault if the

	position is set to a large filter time.
Er.204	Unassigned interrupt fixed length trigger signal INFn.40
Er.205	No return to home before absolute point motion
Er.206	Motor overload
Er.207	Software limit, after enabling the software limit P03.73, when the encoder position value is less than the software limit limit or greater than the software limit limit, report this fault.
Er.208	Hardware limit
Er.209	Curve planning failed
Er.210	Excessive tension
Er.211	Breakage failure
Er.212	XY pulse type selection error in tension control mode
Er.213	Full closed loop position error is too large
Er.214	Prohibit positive (reverse) turn
Er.216	Z point signal is unstable
Er.217	RPDO receive timeout
Er.218	Reserved
Er.219	Motor stall
Er.220	Braking resistor overload
Er.221	The forward stroke switch input function bit INFn.43 is not assigned to the entity DI
Er.222	Reverse stroke switch input function bit INFn.44 is not assigned to entity DI
Er.223	Search home error
Er.224	CAN bus state switching error, switching CiA402 state machine when the bus is in non-Operation state
Er.225	Unsupported CANopen control mode
Er.226	Absolute value mode lap overflow
Er.227	Absolute encoder battery failure
Er.228	Inertia learning failed, need to reset P07.03 and P07.04
Er.229	When learning the full closed loop parameter, the position value detected by the second encoder is too small
Er.231	Bus error
Er.232	Second encoder battery failure
Er.600	Motor overheating
Er.601	DIfunction code is not assigned
Er.602	The AI zero drift is too large. When the AIx zero drift P06.68/P06.73/P06.78 is greater than the threshold P10.10, the zero drift is too large.
Er.603	return home timeout, when the zero return time is greater than P10.08, the fault is reported.
Er.604	When the absolute encoder is self-learning, the motor rotates in the wrong direction and needs to change the UVW wiring.
Er.605	Absolute encoder battery voltage is too low, need to replace the new battery when the drive is powered on
Er.606	The second encoder battery voltage is too low, you need to replace the new battery when the drive is powered on.

Er.607	Inertia learning fails, need to increase P07.33 and then learn

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P09.31	Q axis current loop feedback	-	%	Displays the Q-axis current loop feedback value.	-	-	-	RO
P10.01	Software overcurrent threshold	0~800	%	When the detected current percentage P09.31 is greater than this value, the software overcurrent fault is reported.	anytime	immediately	400.0	RW
P10.02	Motor overload value	0~3276.7	%	Set the overload protection point, which is generally set to the motor rated current / drive rated current * 100%.	anytime	immediately	100.0	RW
P10.03	Stall protection current threshold	0~300.0	%	When the driver current percentage P09.31 exceeds this value and the time of P10.04 continues, and the speed is less than 5 rpm, the jam is faulty. This value is recommended to be set to the motor rated current / drive rated current * 100%.	anytime	immediately	100.0%	RW
P10.04	Motor Blocked protection time threshold	0~65535	ms	-	anytime	immediately	800	RW
P10.05	Percentage of speed	0~3276.7	%	When the	anyti	immedi	150	RW

				percentage of the actual speed/rated speed is greater than the overspeed percentage, the overspeed fault is reported.	me	ately	.0	
P10.06	Drive overheat threshold	0~3276.7	℃	When the drive temperature P01.10 is greater than this value, the drive is overheated.	anyti me	immedi ately	80. 0	RW
P10.08	return home timeout	0~32767	s	When the zero return time exceeds this value, a zero timeout fault is reported. When set to 0, zero return timeout protection is not performed.	anyti me	immedi ately	0	RW
P10.09	Power-off motor encoder position memory function 0-Power off does not remember motor encoder position 1-Power-off memory motor encoder position	0~1	-	Set whether to remember the motor encoder position after power off.	anyti me	immedi ately	0	RW
P10.10	AI zero drift threshold	0~32767	mV	When the zero drift of AIx is greater than this value, the zero drift drifts over a large fault.	anyti me	immedi ately	500	RW
P10.11	Motor overload curve selection	0~4	-	Select the motor overload curve.	anyti me	immedi ately	0	RW
P10.20	Current fault code	-	-	Display fault code	-	-	-	RO
P10.21	Selected last x failures	1~5	-	Used to select to view the last 5	anyti me	immedi ately	1	RW

				faults of the servo drive. This function code is used to set the number of faults to be viewed:				
P10.22	Fault code for selected x times of failure	-	-	-	-	-	-	RO
P10.23	Time of selected x times of failure	-	min	-	-	-	-	RO
P10.24	Motor speed of x times selected	-	rpm	-	-	-	-	RO
P10.25	Motor current rms value for selected x faults	-	A	-	-	-	-	RO
P10.26	Instantaneous value of V-phase motor current for selected x faults	-	A	-	-	-	-	RO
P10.27	Instantaneous value of W-phase motor current for selected x faults	-	A	-	-	-	-	RO
P10.28	Bus voltage for selected x faults	-	V	-	-	-	-	RO
P10.29	Drive temperature for selected x faults	-	℃	-	-	-	-	RO
P10.30	Entity DI status of selected x times of failure	-	-	-	-	-	-	RO
P10.31	Entity DO status of selected x times of failure	-	-	-	-	-	-	RO
P10.32	Hardware fault count value	-	-	-	-	-	-	RO
P10.33	Fault shielding	0~65535	-	BIT0 Shield Overload BIT1 Shield Software Overcurrent BIT2 Shield Phase Fault BIT3 Shield Current Change Large BIT4 Shield	anytime	immediately	12	RW

				Hardware Overcurrent BIT5 Shield Speed Change Large BIT6 Shield Z Point Unstable BIT7 Shield SYNC Loss BIT8 Shield Current Sensor Fault BIT9 Shield Under voltage BIT10 Shield Encoder malfunction				

7.1.3 Troubleshooting

（1）Er.100 Software overcurrent

Fault generation conditions:

The percentage of current detected by the software P09.31 is greater than the P10.01 overcurrent threshold, and the software overcurrent fault is reported. The fault can be shielded by BIT1 of P10.33.

Cause	Confirmation method	Processing method
1、Motor UVW phase sequence reversed or missing phase	➢ Confirm UVW phase sequence and lack of phase	Adjust the UVW phase sequence or replace the motor
2、P10.01 setting is too small	➢ Check if the value of parameter P10.01 is too small	Increase P10.01
3、Gain setting is too large	➢ Check P07.01 current loop ratio, P07.02 current loop integral gain, P07.03 speed loop proportional gain, P07.10 torque feed forward coefficient, whether these parameters are set too large	Reduce gain related parameters
4、Motor peak current percentage setting is too	➢ Check the P00.24 motor peak	Correct P20.24 motor peak current percentage

large	current percentage, whether it is consistent with the actual peak current of the motor	
5、Motor power is too small	➢ Confirmation based on actual load	Replace the more powerful motor
6、Motor output current is greater than motor peak current	➢ Check if the drive torque limit value (default limiter source P05.13) is greater than the motor peak current	Reduce the torque limit value

（2）Er.101 Hardware overcurrent

Fault generation conditions:

The hardware detects that the driver output current has reached the peak threshold.

Cause	Confirmation method	Processing method
1、The initial phase of the magnetic pole is incorrect	➢ Check the UVW phase sequence ➢ Is the servo motor a standard motor?	Operate Fn005, re-learn the encoder
2、Motor UVW power cable connection is abnormal	➢ Check the driver and motor terminals of the UVW cable for poor contact and port aging. ➢ Unplug the UVW motor cable and check if the wire is shorted.	Connect the motor cable correctly
3、Motor power is too small	➢ Determined based on actual load conditions	Replace the more powerful motor
4、Motor damage	➢ Unplug the motor cable and measure the resistance between the motor's UVW by the multimeter.	If the UVW resistor is unbalanced, replace the motor
5、Braking resistor too small or shorted	➢ Measure whether the resistance across the driver P, Rb' is normal	Replace the brake resistor
6、Drive failure	➢ Unplug the motor cable, then enable	Replace the drive

	the servo and still report the fault.	
7 、 Unreasonable gain setting	➢ During the rotation of the motor, it can shake sharply or make a sharp sound. You can also observe the curve of the current loop through VECObserve.	Adjust the gain
8、The acceleration and deceleration time is too short	➢ VECObserve observes whether the control command is too drastic ➢ Check if the acceleration/deceleration time parameter setting is too small	Modify the acceleration given by the control command, increase the filter time of the control command, increase the acceleration and deceleration time
9 、 Motor UVW line connected to capacitive load	➢ Check if the motor cable is too long ➢ Check if the motor UVW is connected to the capacitor	Shorten the motor wire and eliminate the capacitance on the UVW terminal
10、Mechanical clearance is too large	➢ Check if the mechanical clearance is too large	Reduce mechanical clearance

（3）Er.102 High voltage

Fault generation conditions:

When the DC bus voltage detection value P01.08 is greater than the overvoltage threshold, an overvoltage is reported.

For drives with a rated voltage of P01.07 less than 300V, the overvoltage threshold is 420V. For drives with a rated voltage of P01.07 greater than 300V, the overvoltage threshold is 750V.

Cause	Confirmation method	Processing method
1、Drive rated voltage setting error	➢ Check if the P01.07 parameter setting is correct.	Modify the drive rated voltage parameter P01.07
2 、 DC bus voltage calibration coefficient setting error	➢ Check if the P01.09 parameter setting is correct.	Modify the bus voltage calibration coefficient P01.09 (adjustment range 90%~110%)
3、Drive RST power supply	➢ Oscilloscope checks	Adjust the power supply or

is unstable	if the RST power supply is normal	increase the power supply noise filter
4、DC bus voltage is too high	➢ The multimeter measures whether the voltage across the driver P and N is normal.	Adjust the bus voltage calibration coefficient P01.09 (adjustment range 90%~110%) or adjust the power supply
5、Brake resistor is not working properly	➢ Check the brake resistor for poor contact, short circuit or open circuit ➢ The multimeter measures whether the resistance at both ends of the driver P and Rb' is normal.	Correct wiring or replacement of braking resistor
6 、 Braking resistor parameter setting is unreasonable	➢ Check whether the energy consumption brake P02.20 parameter, the braking resistor resistance value P02.21, and the braking resistor power P02.22 are set correctly.	Set P02.20, P02.21 correctly,P02.22 can be set up to 5 times the braking resistor power
7、The system is a large inertia load and the deceleration time is too short	➢ View actual deceleration time	Adjust the deceleration time appropriately
8 、 Unreasonable gain setting	➢ Check if the motor is oscillating	Adjust the gain

（4）Er.103 Under voltage

Fault generation conditions:

When the bus voltage detection value P01.08 is less than the under voltage threshold, the under voltage is reported. Under voltage threshold = rated voltage of the driver P01.07*1.414*0.7.

Cause	Confirmation method	Processing method
1、The driver RST power supply does not match the rated voltage of the driver P01.07.	➢ Check if the P01.07 parameter setting is correct.	Modify the rated voltage of the drive P01.07

2、Acceleration time is too short	➢ View actual acceleration time	Reduce acceleration time
3、Grid voltage is too low	➢ Measuring grid voltage	Adjust the rated voltage of the drive P01.07 to be consistent with the grid voltage
4、Other heavy equipment starts	➢ As soon as other heavy-duty devices are started, the drive reports this failure.	Adjust RST power
5 、 Charging circuit failure	➢ Report the fault as soon as the drive is enabled	Replace the drive
6、Braking resistors P, Rb' are shorted to ground	➢ Check if the P and Rb' terminals of the driver are shorted to the ground.	Prevent braking resistors P, Rb' from shorting to ground
7、Overloaded	➢ When using a single-phase power supply, the actual load is too large	Use three-phase power or reduce the load
8、Main power supply RST three-phase current imbalance	➢ Measuring power supply RST three-phase current	Adjust RST three-phase power supply
9、RST power cable cross section is too small	➢ Calculate whether the RST wire meets the driver current	Thickening RST power cable

（5）Er.104 Current sensor failure

Fault generation conditions:

The current sensor is faulty.

Cause	Confirmation method	Processing method
1、Current sensor failure	➢ -	Replace the drive

（6）Er.105 Encoder failure

Fault generation conditions:

The encoder has no signal or the signal is unstable.

Cause	Confirmation method	Processing method
1、Encoder line interface definition error	➢ View encoder line interface definitions	Adjust encoder wiring
2 、 Poor encoder line	➢ Detect encoder line	Correct wiring

contact		
3、Encoder line disconnected	➢ Multimeter detection encoder line	Replace the encoder line
4、Subject to electromagnetic interference	➢ Turn off other devices that may cause interference	Eliminate interference

（7）Er.106 EEPROM failure

Fault generation conditions:

EEPROM read and write data error.

Cause	Confirmation method	Processing method
1、EEPROM read data error	➢ -	Replace the drive

（8）Er.107 Phase sampling fault

Fault generation conditions:

When the phase obtained by the HALL switch is too different from the phase obtained by the encoder,Report this fault.

Cause	Confirmation method	Processing method
1、Phase sampling fault	➢ -	Set BIT2 of fault mask parameter P10.33 to 1 to shield this fault.

（9）Er.108 FPGA and ARM communication failure

Fault generation conditions:

The fault is reported when the value written by ARM does not match the value read to the FPGA.

Cause	Confirmation method	Processing method
1、The fault is reported when the value written by ARM does not match the value read to the FPGA.	➢ -	Replace the drive

（10）Er.109 Large current change

Fault generation conditions:

The fault is reported when the two sampled currents differ by 50%.

Cause	Confirmation method	Processing method
1、when the two sampled currents differ by 50%.	➢ -	Set BIT3 of fault mask parameter P10.33 to 1 to shield this fault.

（11）Er.111 Motor winding abnormal

Fault generation conditions:

When the motor learns the winding direction, the current changes direction wrong.

Cause	Confirmation method	Processing method
1、Motor winding abnormal	➢ Check motor UVW wiring	Correctly connect the UVW motor line

（12）Er.113 No encoder Z point detected

Fault generation conditions:

When the encoder is self-learning, the Z-point signal is not detected.

Cause	Confirmation method	Processing method
1、Poor encoder line contact	➢ Check the encoder line	Connect the encoder cable correctly
2、编码器损坏	➢ Correctly connect the encoder cable, after learning a few times, still report this fault	Replace the motor

（13）Er.114 Z point offset error

Fault generation conditions:

When the encoder is self-learning, the detected Z-point signal position is greater than the encoder resolution.

Cause	Confirmation method	Processing method
1、Encoder signal is abnormal	➢ Correctly connect the encoder cable, after learning a few times, still report this fault	Replace the motor

（14）Er.115 HALL code value is wrong

Fault generation conditions:

When learning the encoder, the HALL code value is zero or one at the same time.

Cause	Confirmation method	Processing method
1、Encoder signal is abnormal	➢ -	Replace the motor

（15）Er.117 overheat

Fault generation conditions:

When the driver temperature P01.10 is greater than the overheat threshold P10.06, the overheat fault is reported.

Cause	Confirmation method	Processing method
1、Drive temperature overheating	➢ Measuring drive surface temperature	Increase drive cooling
2、The cooling fan is not working properly	➢ Check the fan running status	Replace the cooling fan
3、The site temperature is too high	➢ Thermometer measures field temperature	Reduce ambient temperature or Increase drive cooling
4、Long-term low frequency and high current operation of the motor	➢ Monitor actual load conditions	Increase drive power

（16）Er.118 The HALL encoder value of the line-saving encoder is incorrect at

power-on

Fault generation conditions:

The HALL encoder value of the line-saving encoder is incorrect at power-on

Cause	Confirmation method	Processing method
1 、 Provincial line encoder signal is abnormal	➢ Correctly connect the encoder cable, after learning a few times, still report this fault	Replace the motor

（17）Er.119 Encoder type does not match

Fault generation conditions:

The encoder type recognized by the FPGA does not match the encoder type set by the drive.

Cause	Confirmation method	Processing method
1 、 Incorrect parameter setting	➢ Check that P00.08 is consistent with the actual encoder type.	Modify parameter P00.08
2、Motor type error	➢ Check that the encoder type identified in the FPGA version (P01.02) matches the actual connected encoder type.	Replace the motor type or change the FPGA program

（18）Er.200 Return home signal is assigned

Fault generation conditions:

The return home mode requires access to the home switch, and the home switch is not assigned in the DI configuration.

Cause	Confirmation method	Processing method
1、DI is not configured with the return home signal INFn.34	➢ Check if DI is configured with the return home signal INFn.34	DI configuration return home signal INFn.34

（19）Er.201 DI repeat distribution

Fault generation conditions:

The same INFn function is assigned to two different DI or VDI terminals.

Cause	Confirmation method	Processing method
1、The same INFn function is assigned to two different DI or VDI terminals.	➢ Check DI or VDI configuration	Modify DI or VDI configuration

（20）Er.202 Over speed

Fault generation conditions:

The over speed fault is reported when the speed percentage (actual speed/rated speed) is greater than the over speed percentage 10.05.

Cause	Confirmation method	Processing method
1、Over speed percentage 10.05 setting is too small	➢ Check the value of parameter 10.05	Increase 10.05 or decrease the speed
2、Gain setting is too large	➢ Check the P07.03, P07.04, P07.05 parameter settings	Reduce the gain
3、HALL switch detection error	➢ -	Re-learning encoder
4、Z point offset P00.71 error	➢	If it is the company's motor, the value is set to 0. Set this value before setting P02.35=8421.

（21）Er.203 Position error is too large

Fault generation conditions:

When the difference P03.17 between the given position and the actual position is greater than the position error excessive threshold P03.19, the fault is reported.

Cause	Confirmation method	Processing method
1、Position command filter parameters P03.06 and P03.07 are too large	➢ Check the values of P03.06 and P03.07	Decrease P03.06 and P03.07
2、The gain is too small	➢ Check whether the P07.03, P07.04, and P07.05 parameter settings are reasonable.	Adjust the gain
3、Position command too fast	➢ Check position command	Reduce position command speed
4、Position error threshold P03.19 is too small	➢ Check position error too large threshold P03.19	Increase position error too large threshold P03.19
5、Mechanical stuck motor	➢ Check if the mechanical transmission is stuck	Handling mechanical jam problems

（22）Er.204 DI function does not assign interrupt fixed length trigger signal

Fault generation conditions:

The interrupt fixed length function is enabled, but the DI of the interrupt fixed length trigger function number INFn.40 is not assigned.

Cause	Confirmation method	Processing method
1 、 DI unassigned interrupt fixed length trigger function number INFn.40	➢ View DI configuration	Configure a DI to interrupt the fixed length trigger function number INFn.40

（23）Er.205 No return to home before running absolute position mode

Fault generation conditions:

No return to home before running absolute position mode

Cause	Confirmation method	Processing method
1、No return to home before running absolute position mode	➢ -	Return to home before running absolute position mode

（24）Er.206 Motor overload

Fault generation conditions:

The motor current is greater than the servo rated current and runs continuously for a period of time to report motor overload.

Cause	Confirmation method	Processing method
1、Incorrect parameter settings	➢ Check the value of P10.02	Set P10.02 as a percentage of the rated motor current to the rated current of the drive.
2、Motor power is not enough	➢ Confirm according to actual load	Replace the servo motor with more power

（25）Er.207 Software limit

Fault generation conditions:

After the software limit is enabled by P03.73, when the actual user position is less than the lower limit of the position and the speed is negative, the software limit is reported. When the actual user position is greater than the upper limit of the position and the speed is positive, the software limit is reported.

Cause	Confirmation method	Processing method
1、Incorrect parameter settings	➢ View P03.73	Modify P03.73
2、Software limit value setting is unreasonable	➢ View P03.74, P03.76	Modify P03.74, P03.76

（26）Er.208 Hardware limit

Fault generation conditions:

After the hardware limit is enabled by P03.73, when the reverse position limit switch is valid and the speed is negative, the hardware limit is reported. When the positive position limit switch is active and the speed is positive, the hardware limit is reported.

Cause	Confirmation method	Processing method
1、Incorrect parameter settings	➢ View P03.73	Modify P03.73

2、Whether the limit Signal sensor is installed properly.	➢ Check that the limit Signal sensor is installed properly.	Adjust the limit signal sensor installation position

（27）Er.209 4th power position curve planning failed

Fault generation conditions:

4th power position curve planning failed

Cause	Confirmation method	Processing method
1、4th power position curve planning failed	➢ -	Reset reasonable speed and position planning values

（28）Er.213 Full closed loop position error is too large

Fault generation conditions:

In the full closed loop, the detected second encoder position error is too large

Cause	Confirmation method	Processing method
1、Material slippage	➢ Observe the movement of materials	Press the material to prevent the material from slipping.
2、Full closed loop position error too large threshold P03.36 setting too small	➢ View full closed loop position error excessive threshold P03.36	Increase the full closed loop position error excessive threshold P03.36
3、Fully closed-loop position error clear parameter P03.40 setting is unreasonable	➢ View P03.40	Set reasonable full-closed position error clear parameter P03.40
4、Full-closed mode encoder polarity setting error	➢ Check whether the parameters set in the full-closed mode encoder polarity P03.33 match the actual conditions.	Modify P03.33

（29）Er.214 Prohibit positive/reverse

Fault generation conditions:

Prohibited forward/reverse is set by P02.03, but the forward/reverse command is actually input.

Cause	Confirmation method	Processing method
1、Prohibited forward/reverse is set by P02.03, but the forward/reverse command is actually input.	➢ Check the input command direction	Modify the direction of the command

（30）Er.216 Z point signal is unstable

Fault generation conditions:

The detected encoder position difference of two Z points is too different from the actual

encoder resolution.

Cause	Confirmation method	Processing method
1、Poor encoder line contact	➢ Check the encoder line	Correct wiring
2、Encoder signal is abnormal	➢ After the encoder has learned a few times, it still reports this fault.	Replace the motor

（31）Er.217 SYNC signal timeout

Fault generation conditions:

The SYNC signal was received for longer than the actual synchronization period.

Cause	Confirmation method	Processing method
1、The SYNC signal was received for longer than the actual synchronization period.	➢ Check if the CANopen/EtherCAT communication line is connected normally	Correct wiring

（32）Er.219 Motor stall

Fault generation conditions:

When the driver current percentage P09.31 is greater than P10.03, and the speed is close to zero, and the time of P10.04 continues, it is blocked.

Cause	Confirmation method	Processing method
1、Improper parameter setting	➢ Check out P10.03 and P10.04. Generally, P10.03 is set to motor current to drive current %; P10.04 is set to 200.	Modify P10.03, P10.04
2、Mechanical stuck motor	➢ Check if the mechanical drive is stuck	Handling mechanical transmission problems
3、Motor power is too small	➢ Judging according to the actual load	Increase motor power

（33）Er.220 Braking resistor overload

Fault generation conditions:

When the braking resistor is continuously in the braking state, and the actual braking average power is greater than the braking resistor power, the braking resistor overload fault is reported.

Cause	Confirmation method	Processing method
1、Improper parameter setting	➢ View brake resistance value P02.21, braking	Reasonably set P02.21, P02.22, P02.23

	resistor power P02.22, braking resistor heat dissipation coefficient P02.23	
2、Braking resistor power is too small	➢ Braking is frequent, braking resistor heat is too small	Replace high power braking resistor

（34）Er.221 Forward travel limit DI function number is not assigned

Fault generation conditions:

The return home mode requires access to the forward stroke limit signal, but the forward stroke limit DI function number INFn.43 is not assigned in the DI configuration.

Cause	Confirmation method	Processing method
1、Unassigned forward stroke limit DI function number INFn.43	➢ View DI function configuration parameters	Assign forward stroke limit DI function number INFn.43

（35）Er222 Reverse travel limit DI function number is not assigned

Fault generation conditions:

The return home mode requires access to the reverse stroke limit signal, but the reverse stroke limit DI function number INFn.44 is not assigned in the DI configuration.

Cause	Confirmation method	Processing method
1、Unassigned reverse stroke limit DI function number INFn.44	➢ View DI function configuration parameters	Assign reverse stroke limit DI function number INFn.44

（36）Er223 Finding home failed

Fault generation conditions:

During the return home process, the signal was not found.

Cause	Confirmation method	Processing method
1、Not connected to the home signal	➢ Check if the home signal is correctly connected to the servo DI	Connect the home signal correctly

（37）Er224 CAN bus status switch failed

Fault generation conditions:

During the enable servo process, the state machine of the CAN bus switches to the pre-operation mode.

Cause	Confirmation method	Processing method
1、During the enable servo process, the state machine of the CAN bus switches to the pre-operation mode.	➢ View the servo enable process	CAN bus state machine cannot be switched to pre-operation mode during servo enable

（38）Er.225 Unsupported CANopen bus mode of operation

Fault generation conditions:

Unsupported CANopen bus mode of operation

Cause	Confirmation method	Processing method
1、Unsupported CANopen bus mode of operation	➢ -	Use other CANopen bus operating modes

（39）Er.226 Absolute encoder lap overflow in absolute mode

Fault generation conditions:

Absolute encoder lap overflow in absolute mode.

Cause	Confirmation method	Processing method
1、Absolute encoder lap overflow in absolute mode	➢ -	_

（40）Er.227 Absolute encoder with battery failure in absolute mode

Fault generation conditions:

Absolute encoder loses battery in absolute mode, absolute position information is lost.

Cause	Confirmation method	Processing method
1、Battery is dead	➢ Measuring encoder battery voltage	Replacement battery

（41）Er.228 Inertia learning failure

Fault generation conditions:

When self-learning system inertia, the frictional resistance is too large, and the self-learning current limit P02.36 is too small.

Cause	Confirmation method	Processing method
1、When self-learning system inertia, the frictional resistance is too large, and the self-learning current limit P02.36 is too small.	➢ View P02.36	Increase P02.36
2、The system inertia is too large, and the acceleration and deceleration time P07.33 of the learning habit is too small.	➢ View P07.33	Increase P07.33
3、Unreasonable gain setting	➢ Motor jitter	Increase P07.03 and decrease P07.04

（42）Er.229 Full closed loop parameter learning failure

Fault generation conditions:

During the full closed loop parameter learning process, the position value of the second encoder changes too little.

Cause	Confirmation method	Processing method
During the full closed loop parameter learning process, the position value of the second encoder changes too little. 1、	➢ Check whether the second encoder works normally during the full closed loop learning process.	Ensure that the second encoder works properly during full-closed learning and that the material does not slip.

（43）Er.600 Motor overheating

Fault generation conditions:

Motor temperature is too high

Cause	Confirmation method	Processing method
1、Because the load is too large, the motor is hot	➢ Observe the load	Replace the more powerful motor
2、The site temperature is too high	➢ Detecting the ambient temperature	Reduce the ambient temperature around the motor

（44）Er.601 DI function code is not assigned

Fault generation conditions:

DI function code is not assigned

Cause	Confirmation method	Processing method
1、The speed/torque is derived from AB switching, but the AB switching function number is not assigned.	➢ View DI configuration	Configure DI correctly

（45）Er.602 AI zero drift too large

Fault generation conditions:

AI1 zero drift P06.68/AI2 zero drift P06.73/AI3 zero drift P06.78 is greater than AI zero drift threshold P10.10.

Cause	Confirmation method	Processing method
1、AI zero drift too large	➢ Check if the input analog is normal	Make sure the analog input is normal

（46）Er.603 Return home timeout

Fault generation conditions:

The actual time of return home exceeds the return home timeout threshold P10.08.

Cause	Confirmation method	Processing method
1、The return home signal is not properly connected.	➢ Check if the home signal is normally connected to the servo	Correct access to home signal

（47）Er.604 Motor rotation direction is wrong during self-learning

Fault generation conditions:

Motor rotation direction is wrong during self-learning.

Cause	Confirmation method	Processing method
1、Motor rotation direction is wrong during self-learning	➢ -	Check that the motor and encoder wiring are correct
2、Motor UVW phase sequence is wrong	➢ Confirm UVW phase sequence	Change the UVW phase sequence

（48）Er.605 Absolute encoder battery alarm

Fault generation conditions:

The absolute encoder operates in absolute mode and the battery voltage is too low.

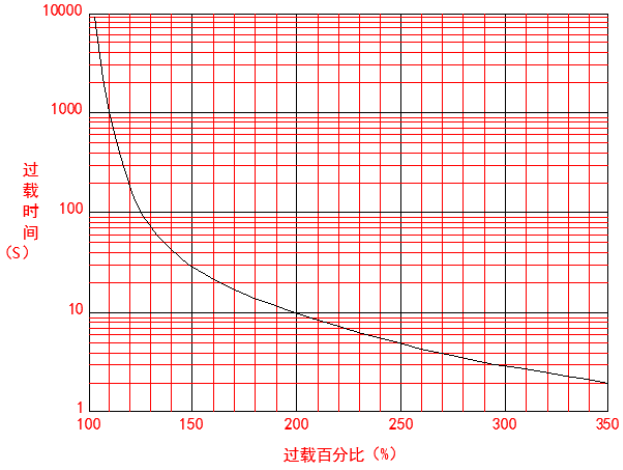
Cause	Confirmation method	Processing method
1、The absolute encoder operates in absolute mode and the battery voltage is too low.	➢ Check battery voltage	Replace the encoder battery

7.1.4 Motor overload protection

The motor load factor is defined as (torque output percentage Un013) / (overload value P10.02). The load rate of the motor output is related to the time that can be continuously operated. In other words, the higher the motor load factor, the smaller the sustainable operation time. Once the continuous run time is exceeded, a motor overload fault is reported.

$$\text{Motor load ratio} = \frac{\textit{Torque output percentage Un013}}{\textit{Motor overload threshold P10.02}}$$

$$\textit{Torque output percentage Un013} = \frac{\textit{Actual current}}{\textit{Servo rated current}} \times 100\%$$



Load ratio	Continuous running time (s)
1.1	1000
1.2	200
1.4	42
1.7	18
2.1	8.4
2.4	5.5
2.7	4.0
3.0	2.9

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P10.02	Overload value	0~3276.7	%	Set the overload protection point	anytime	immediately	100	RW

7.1.5 Brake resistor overload protection

The servo brakes at the rated power of the resistor based on the actual set resistance value and resistance power. For 220V drives, when the DC bus voltage is greater than 380VDC, the energy brake circuit can be activated by setting parameters. For 380V drives, when the DC bus voltage is greater than 680VDC, the energy brake circuit can be activated by setting parameters. It can brake for 33s continuously under the rated power and the heat dissipation coefficient is equal to zero. If the braking time is exceeded, the brake resistor overload fault is reported. When the braking resistor is not working, if the heat dissipation coefficient is not equal to zero, heat is dissipated according to the set heat dissipation coefficient. If the heat dissipation coefficient is set to 100%, 10s can dissipate heat from the maximum heat to zero. The actual resistance used needs to be calculated according to the field conditions. Refer to the table below for the selection of braking resistors under normal conditions.

Input power	Rated power（KW）	Rated current（A）	Recommended braking resistor	
			resistance（Ω）	Resistance power（W）
Three-phase 220V	0.4	3	180	400
	0.75	6	100	500
	1.5	9	50	1000
	2.2	15	35	1500
Three-phase 380V	1.5	3.7	150	1000
	2.2	6	100	1500
	4	10	60	2500
	5.5	13	40	3500
	7.5	16	35	4500
	11	25	25	6000
	15	32	15	10000

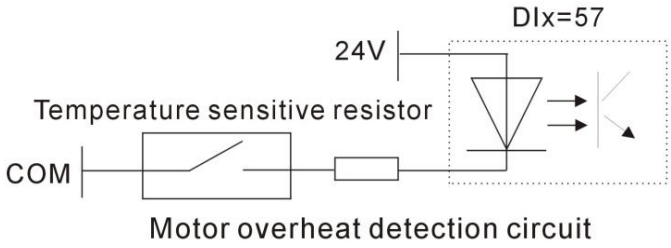
The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW

						ent		
P02.21	Brake resistor resistance	0~3276.7	Ω	Used to set the resistance of the drive brake resistor.	anyti me	imme diatel y	0	RW
P02.22	Braking resistor rated power	0~3276.7	KW	Power for setting the brake resistor of the drive	anyti me	imme diatel y	0	RW
P02.23	Braking resistor heat dissipation coefficient	0~100	%	The heat dissipation coefficient of the braking resistor. If 100% is set, 10s can fall from 0 to 0.	anyti me	imme diatel y	50	RW

7.1.6 Motor overheat protection

Set the DI function number to INFn.57, and external motor overheat detection circuit. The motor overheat detection circuit adopts PTC protection. The schematic diagram is as follows. When the output of the external motor overheat detection circuit pulls the DI to be valid, the driver reports the motor overheat fault Er.600.



Motor overheat detection circuit

7.1.7 Motor phase loss protection

The servo drive has input phase loss and output phase loss protection. Determined by P10.07 whether it is enabled. Input phase loss means that the servo input voltages R, S and T lack one of the phases. The lack of an output phase means that the motor wires U, V and W lack one of the phases. The parameter P10.07 has 16 bits from 0 to 15. When the 0th bit is 1, the output phase loss protection is enabled. When the first bit is 1, the input phase loss protection is enabled. That is to say, when P10.07 = 0, phase loss protection is not enabled; when P10.07 = 1, the output phase loss protection function is valid; when P10.07 = 2, the input phase loss protection function is valid; when P10 . When 07 = 3, the input and output phases are simultaneously disabled.

Num	Description	Range	unit	function	Set mom	active mome	def ault	RO/ RW

					ent	nt		
P10.07	Phase loss protection setting	0~32767	-	When the 0th bit is 1, the output phase loss protection is enabled. When the 1st bit is 1, the input phase loss protection is enabled.	anyti me	immedi ately	3	RW

7.2 Brake output function

The brake is a mechanism that prevents the servo motor from moving in the non-operating state when the servo drive is in the non-operating state, so that the motor is kept in position so that the moving part of the machine does not move due to its own weight or external force.

For a servo motor with a brake, if the brake output OUTFn.24 is assigned to a terminal, the brake function is automatically enabled. It should be noted that the effective level of the brake function terminal can only be set to low level, otherwise there will be a situation of loosening during power-on.

The relevant output function number is as follows.

num	Bit description
OUTFn.24	Brake output. When it is invalid, the brake power supply is disconnected, the brake is actuated, and the motor is in the position lock state; When it is valid, the brake power is turned on, the brake is released, and the motor can be rotated.

7.2.1 Brake process

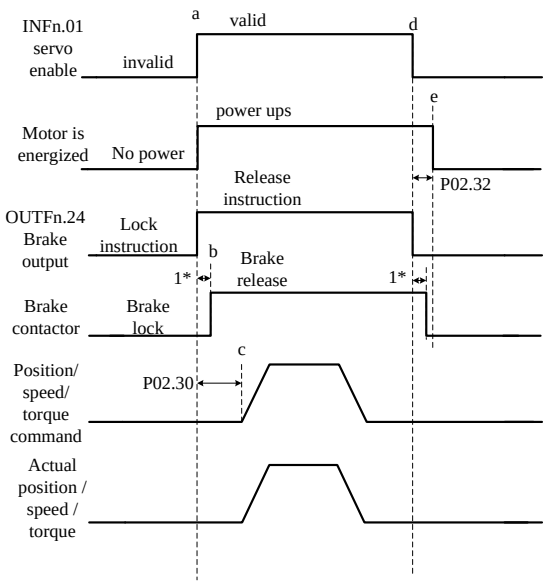
The brake is divided into two situations. The first is the brake process under static conditions, and the second is the brake process under dynamic conditions.

The brake sequence under static refers to the moment when the input break enable command (ie, INFn.01 is switched from ON to OFF) and the brake speed is lower than 20 rpm.

The dynamic brake timing refers to the moment when the input break enable command (ie, INFn.01 is switched from ON to OFF) and the motor speed is higher than 20 rpm.

Static brake process

When the INFn.01 is switched from ON to OFF, the brake process when the motor speed is lower than 20 rpm is as follows.



At the beginning, the brake is locked. At time a, the PLC gives the servo enable signal (INFn.01). When the servo receives the enable signal, it energizes the motor immediately. The motor locks and sends the brake release command (OUTFn.24), waiting for 1*. After the time b, the brake contactor is completed and the brake is released. The servo driver starts accepting the position/speed/torque command after the P02.30 millisecond to c time from the receipt of the enable signal, and the motor starts to rotate. After the motor rotates, when the motor reaches the time d, the PLC sends a break enable signal. When the servo detects that the motor speed is lower than 20 rpm, the static brake process is executed, and the brake lock signal is issued immediately. After 1* delay, the brake contactor acts. Finished, the brake is locked, and then arrives at e time, the motor is powered off.

Note: 1* is the time from when the servo sends the brake signal to the actual brake contactor action.

P02.32 is the power-on time of the driver after the lock is locked. After the servo is turned off, the mechanical movement moves due to its own weight or external force.

P02.30 is the delay from the enable of the drive to the input position/speed/torque command.

Note: After the drive is enabled, it is forbidden to input any torque or speed command within the time range of P02.30. Similarly, the position/speed/torque command must brake the motor when servo break is enabled.

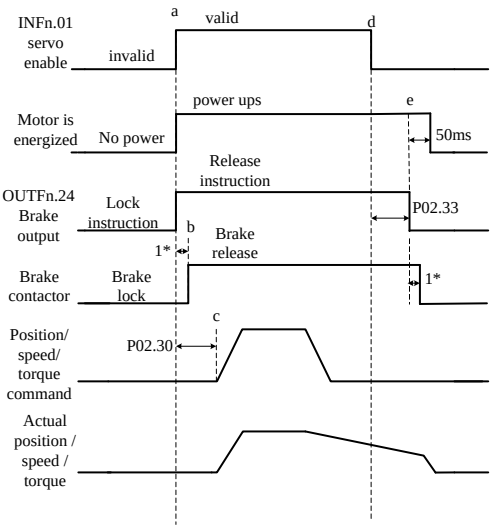
- Dynamic brake process

When the servo enable is turned from ON to OFF, if the current motor speed is greater than 20 rpm, the drive performs the dynamic brake process. After the servo enable is turned off, the servo always detects the following two conditions. When any one of the conditions is met, the brake lock signal is output.

a. The filtered motor speed (P04.21) is lower than the brake zero speed threshold (P02.31);

b. Start timing when the servo enable is turned from ON to OFF, and the time exceeds the maximum wait time for the brake (P02.33).

After the brake lock signal is output, the servo will remain energized for 50ms.



The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P02.30	Command input delay after brake release command output	0~32767	ms	The servo drive starts to receive the enable signal. After the time of P02.30, it starts to accept the position/speed/torque command and the motor starts to rotate.	anytime	immediately	250	RW
P02.31	Brake zero speed threshold	0~32767	rpm	The motor speed is lower than P02.31 and the brake lock signal is output.	anytime	immediately	30	RW
P02.32	Power-on hold time	0~32767	ms	After the brake lock signal is output, the servo will continue to maintain the power-on time P02.32. This parameter is only used when the brake output function is active.	anytime	immediately	150	RW
P02.33	Brake signal output maximum waiting time	0~32767	ms	The servo enable is turned from ON to OFF, and the timer is started. If the time	anytime	immediately	500	RW

				exceeds P02.33, the brake lock signal is output.				

7.3 Absolute encoder instructions

The absolute encoder not only detects the position of the motor within one week of rotation, but also counts the number of revolutions of the motor. It can memorize 16-bit multi-turn data, and the single-turn resolution is 17-bit and 24-bit. The single-turn 17-bit resolution rotates one week to produce 131072 code values, and the single-turn 24-bit resolution rotates one week to produce 16777216 code values. The absolute value system has an incremental usage mode and an absolute value usage mode, which are modified by P00.18. Incremental usage mode uses the absolute encoder as an incremental encoder. It can be used without a battery, without counting the number of turns, and requires zero return every time. Absolute value mode, you need to increase the battery, you will also remember the number of turns, you only need to perform return home to the origin, but the motor stroke is limited. Specifically, after the encoder is connected to the battery for the first time, the motor is used as the reference. The maximum can only be rotated 32767 laps, the maximum can only reverse 32767 laps, and otherwise the encoder overflow fault will be reported.

For the absolute value system of the absolute value system, when the battery is first powered on, the driver will report Er.227 (battery power failure), you need to re-power the drive, and then perform the return home operation. After homing, the servo will be Record the mechanical zero offset (ie the distance of the mechanical zero position relative to the encoder zero). At this point, the mechanical position and the encoder position have the following relationship:

Mechanical position = encoder position - mechanical zero offset

It should be noted that with the incremental encoder, the encoder position is automatically reset to zero after return home, that is, the mechanical position and encoder position are the same after return home. With the absolute encoder, after the return home, the encoder position does not return to zero, and the mechanical position and the encoder position are different from the mechanical zero offset. The command value in the multi-segment position command mode refers to the mechanical position, and the unit is the user position unit.

When the battery voltage is too low, the driver will report Er.605 (battery voltage is too low fault). At this time, the battery needs to be replaced when the drive is powered on.

The relevant parameters are as follows:

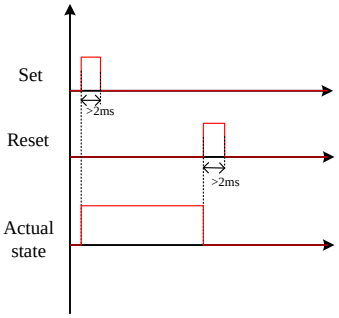
Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P00.08	Encoder type 0: incremental encoder 1:17-bit absolute encoder 2: 24-bit absolute encoder	0~5	ms		Disable to set	Reset takes effect	0	RW

	3: Magnetic encoder 4: Rotary encoder to incremental encoder 5: Provincial line incremental encoder 6:23-bit absolute encoder							
P00.18	Absolute value system usage mode 0: incremental mode 1: absolute value mode	0~1	-		anytime	immediately	0	RW
P00.37	Mechanical zero offset low 32 bits	0~ 4294967296	-		/	/	/	RO
P00.39	Mechanical zero offset is 32 bits high	0~ 4294967296	-		/	/	/	RO
P00.41	Absolute encoder battery fault alarm shielding BIT0: Shielded battery alarm BIT1: Shielded battery failure	0~ 3	-		/	/	/	RO
P03.90	Actual mechanical position	-2147483648~ 2147483648	customize position unit		/	/	0	RO

7.4 Other auxiliary functions

7.4.1 Internal trigger function

There is a software trigger inside the servo. The software trigger is realized by MCU software scanning. The trigger has a reset (clear) input function bit INFn.59, a set input function bit INFn.60, and a status output function bit. OUTFn.30. The timing of the three is shown in the figure below. It should be noted that the internal trigger is implemented by software scanning, therefore, the pulse width of all trigger signals must be greater than 2ms.



Related input function bits.。

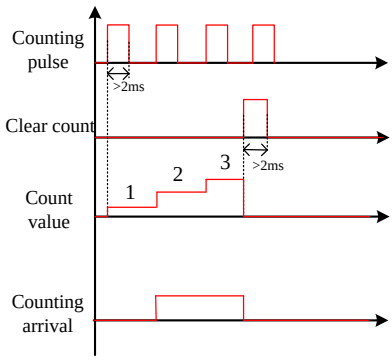
num	Bit description
INFn.59	The rising edge resets the output of the internal flip-flop OUTFn.30
INFn.60	The rising edge sets the output of the internal flip-flop OUTFn.30

Related output function bits.

num	Bit description
OUTFn.30	Internal trigger output

7.4.2 Software counter function

The servo implements a software counter internally. The software counter is implemented by MCU software scan. The counter has a count pulse input bit INFn.61, a count clear input function bit INFn.62, and a status output function bit OUTFn.31. The timing of the three is shown in the figure below, where the count arrival register P02.39 is set to 2. The count value P02.37 counts the pulse signal. When the count value P02.37 reaches the count arrival value P02.39, the count arrival signal OUTFn.31 is valid. The count value pulse INFn.62 clears the count value. It should be noted that the internal counter is implemented by software scanning, so the pulse width of all trigger signals must be greater than 2ms.



Related input function bits.

num	Bit description
INFn.61	Count pulse input of internal software counter
INFn.62	The rising edge clears the count value of the internal software counter

Related output function bits.

num	Bit description

OUTFn.31	Internal counter count reaches output

The relevant parameters are as follows.

Num	Description	Range	unit	function	Set moment	active moment	default	RO/RW
P02.37	Internal software counter count value	0~2147483647	-	This value is read-only. Double-byte parameter and power down	-	-	-	RO
P02.39	Internal software counter arrival value	0~2147483647	-	Double-byte parameter. When the count value P02.37 reaches the count arrival value P02.39, the count arrival signal OUTFn.31 is valid.	anytime	immediately	0	RW

7.4.3 U disk update / save parameter function

The servo can save all the parameters inside the servo to the USB flash drive through the USB interface, and can also update the parameters in the USB flash drive to the servo through the USB interface.

The steps for saving parameters to a USB flash drive are:

(1) Set the startup option P02.09=1 (save the servo parameters to the USB flash drive before starting),

(2) Insert a USB flash drive

(3) After restarting the servo again, the parameters will be saved to the U disk, and the saved file name will be fixed to PARA.CSV. If there is a PARA.CSV file in the U disk, it will be automatically replaced. The servo will enter the rdy state after the file is saved.

The steps to update parameters from a USB flash drive are:

(1) Set the startup option P02.09=2 (update the parameters in the USB flash drive to the servo before starting)

(2) Insert a USB flash drive

(3) After restarting the servo again, the parameters in the PARA.CSV file in the USB flash drive will be updated to the servo. After the completion, the servo will enter the rdy state.

Note: U disk must be in the format of FAT32 file system in order to operate

7.4.4 Record waveforms in real time and store them to the U disk's function

In order to facilitate fault diagnosis, the servo has a function to record waveforms in real time and store them in real time to the USB flash drive. The specific steps are:

(1) Prepare the U disk. It must be ensured that the USB flash drive has a capacity of 4GByte and is internally a FAT32 file system.

(2) Write a waveform configuration file. First store the waveform configuration file wavecfg in the USB flash drive and configure it as follows:

CCC,AAAA,B,AAAA,B,AAAA,B,....

Where CCC is the sampling period ms, AAAA is the address, B is the data type, 1 is S16, 2 is S32, 3 is U16, and 4 is U32. The servo can record up to 16 sets of address waveforms, that is, up to 16 waveforms can be recorded. For example, the sampling period is 1, you need to record P09.20, P09.21, P09.30, P09.31, P03.94, P03.17, P00.13, P02.01, P03.04, P01.08 Value. And P00.13 and P03.04 are U32 type numbers, and others are S16 type numbers. The content in the configuration file is:

001,0920,1,0921,1,0930,1,0931,1,0394,1,0317,1,0013,4,0201,1,0304,4,0108,1,

It should be noted that even if the number of address bits is less than 4 digits, it is necessary to fill in zero by the front to obtain 4 digits.

(3) The startup option P02.09=3 will be set.Note that you need to reset the value to 3 each time you need to save the waveform data. This means that the setting of this value can only be used once.

(4) Insert the USB flash drive, power it on again, and start recording the waveform.

(5) After power failure, copy the WAVEDATA.DAT file in the U disk to the computer, and read and display the waveform through UdiskWaveRead.exe.

Chapter 8 Gain Adjustment

8.1 Control loop gain adjustment

The control loop gain includes a speed loop proportional gain, a speed loop integral gain, and a position loop proportional gain. There are five types of control loop gain adjustment modes. You can choose one of the modes to adjust the gain. In the first type, the first set of gains is fixed. In the second type, the first set of gains and the second set of gains are switched. In the third type, a set of suitable gains for the normal mode is automatically calculated according to the set rigidity level. In the fourth type, a set of suitable gains for the positioning mode is automatically calculated according to the set rigidity level. In the fifth type, the gain is automatically calculated by setting the speed loop and the position loop bandwidth.

In the first type, the first set of gain is fixed: in this mode, the user can manually modify the three values of P07.03, P07.04, and P07.05 to optimize the control performance.

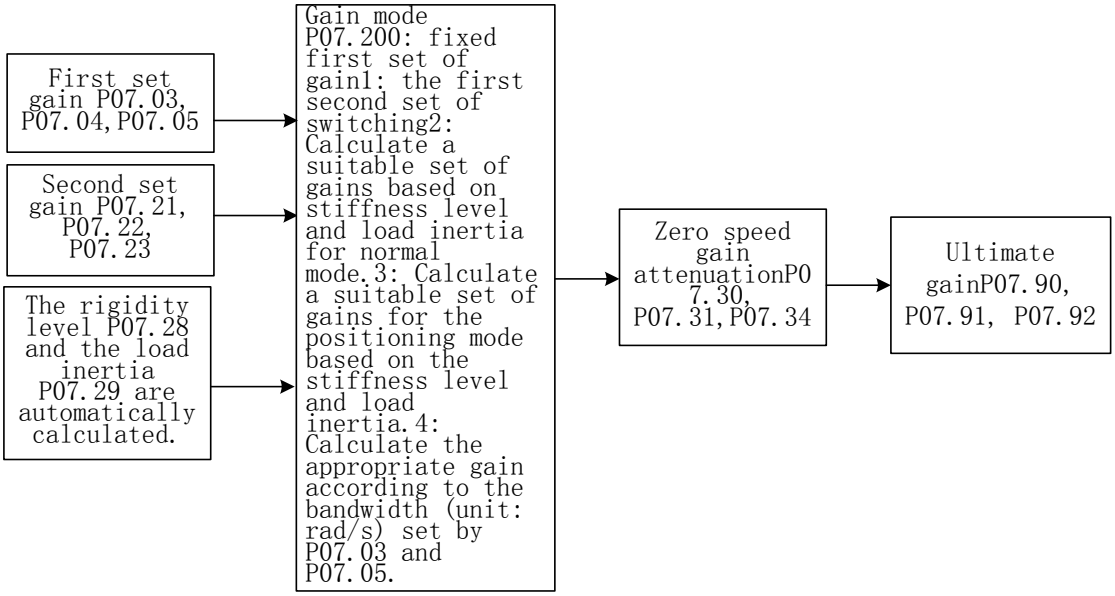
The second type, the first set or the second set of gain switching: switch the first set of gains or the second set of gains according to the switching condition P07.24 and other switching related parameters.

In the third and fourth modes, a set of suitable gains is automatically calculated according to the set stiffness level and the self-learned load inertia. The difference is that the gain calculated by the third mode is mainly used for ordinary Mode, the gain calculated by the fourth mode is mainly used for the positioning mode.

In the fifth type, the gain is automatically calculated by setting the speed loop and the position loop bandwidth.

When using the 3/4/5 gain adjustment method, the motor rated current P00.01, motor rated torque P00.25, motor rotor inertia P00.27, load inertia ratio 07.29, and drive rated current P01.03 must be set.

In addition, the servo driver has a zero-speed gain attenuation/amplification function, that is, when the motor speed is less than the zero-speed attenuation threshold P07.32, the speed loop proportional gain/integral gain, position loop proportional gain, current loop proportional/integral gain can be reduced or increased. High to a certain percentage. Zero-speed gain reduction can effectively avoid high-frequency vibration of the motor at zero speed. Zero-speed gain amplification can effectively speed up the positioning time at low speeds.



Gain switching example: When the gain switching condition P07.24=2, the gain switching level P07.25=2000, and the gain switching time lag P07.26=100, the gain switching condition is: the speed command is the basic switching condition, the speed command When rising, when the speed command is greater than 2100 (P07.25+P07.26), switch to the second set of gain; when the speed command is reduced, the speed command is less than 1900 (P07.25-P07.26), switch back to the first set Gain.

Remark: The units of parameters P07.25 and P07.26 vary according to the selection of P07.24 (gain switching condition).

The relevant parameters are as follows.

Num	Description	Range	unit	Set moment	active moment	default	RO/RW
P07.01	Current loop proportional gain	0~32767	-	anytime	immediately	100	RW
	Set the current loop proportional gain. This value is factory set and is not recommended for modification.						
P07.02	Current loop integral gain	0~32767	-	anytime	immediately	20	RW
	Set the current loop integral gain. This value is factory set and is not recommended for modification.						
P07.03	Speed loop proportional gain	0~32767	-	anytime	immediately	600	RW
	Set the proportional gain of the speed loop. This parameter determines the response of the speed loop. The larger the speed loop response is, the larger the setting may cause vibration. In position mode, if you want to increase the position						

	loop gain, you need to increase the speed loop gain at the same time.						
P07.04	Speed loop integral gain	0~32767	-	anytime	immediately	50	RW
P07.05	Position loop proportional gain	0~32767	-	anytime	immediately	200	RW
	Set the proportional gain of the position loop. This parameter determines the responsiveness of the position loop and sets a larger position loop gain to shorten the positioning time. However, it should be noted that vibration may be caused when the setting is too large.						
P07.06	Position loop maximum output speed percentage	0~100.0%	-	anytime	immediately	100%	RW
	Set the maximum speed percentage of the position loop output						
P07.07	Output voltage filtering time	0~32767	-	anytime	immediately	0	RW
	Set the filter time of the voltage output to the motor						
P07.08	Torque feedforward filter time constant	0-63		anytime	immediately	10	RW
	Set the torque feedforward filter time constant. The larger the inertia, the larger the value.						
P07.09	Speed feedforward filter time constant	0-63		anytime	immediately	10	RW
	Set the speed feedforward filter time constant. The larger the inertia, the larger the value.						
P07.10	Torque feed forward coefficient	0~32767	-	anytime	immediately	0	RW
	In the non-torque control mode, the torque feedforward signal is multiplied by P07.10, and the result is called torque feedforward as part of the torque command.						
P07.11	Speed feedforward coefficient	0~300.0	-	anytime	immediately	50.0	RW
	In the position control mode and full-closed function, the speed feedforward signal is multiplied by P07.11, and the result is called speed feedforward as part of the speed command.						
P07.12	Torque filter type 0-low pass filtering	0~2	-	anytime	immediatel	0	RW

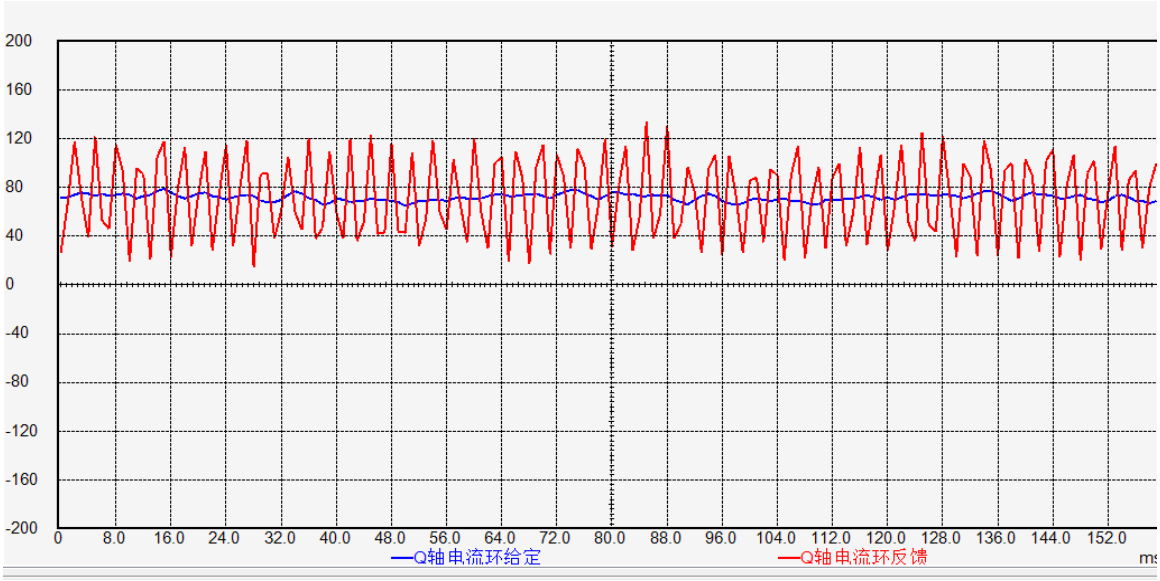
	1-notch filter 2- no filter				y		
P07.13	Torque low pass filter time constant	0~327.67	ms	anytime	immediately	0.80	RW
P07.20	Gain adjustment mode	0~3	-	anytime	immediately	0	RW
	0- fixed first set of gain: P07.03 to P07.05 1- first and second sets of gain switching 2- According to the rigidity level P07.28 and the load inertia P07.29, it is used in the normal mode. 3- Based on the stiffness class P07.28 and load inertia P07.29, used for positioning mode 4- Automatically calculate the gain based on the set bandwidth and inertia ratio						
P07.21	Second set of speed loop proportional gain	0~32767	-	anytime	immediately	800	RW
P07.22	Second set of speed loop integral gain	0~32767	-	anytime	immediately	10	RW
P07.23	Second set of position loop proportional gain	0~32767	-	anytime	immediately	200	RW
P07.24	Gain switching condition	0~6	-	anytime	immediately	0	RW
	0- IO switching; INFn.41 is valid with a second set of gain 1- When the torque command is large, switch to the second set of gains;When the torque command is greater than (gain switching level P07.25 + gain switching time delay P07.26), switch to the second set of gain; when the torque command is less than (P07.25-P07.26), switch back to the first set of gain . 2- Switch to the second set of gain when the speed command is large;When the speed command is greater than (P07.25+P07.26), switch to the second set of gain; the speed command is less than (P07.25-P07.26), switch back to the first set of gain. 3- When the acceleration command is large, switch to the second set of gains;When the acceleration command is greater than (P07.25+P07.26), switch to the second set of gain; if the acceleration command is less than (P07.25-P07.26), switch back to the first set of gain. 4- Switch to the second set of gain when the speed error is large;When the speed error is greater than (P07.25+P07.26), switch to the second set of gain; the speed error is less than (P07.25-P07.26), switch back to the first set of gain						

	5- Switch to the second set of gain when the position error is large after filtering;Switching to the second set of gain when the position error after filtering is greater than (P07.25+P07.26); the position error after filtering is less than (P07.25 -P07.26), switching back to the first set of gain 6- Positioning is completed and switched to the second set of gains. No positioning is completed to switch to the first set of gains. 7- Motor phase switching gain;When the motor phase is in the range of (gain switching level ± gain switching time lag), switch to the second set of gain, and the other phases switch to the first set of gain; the motor phase can be viewed through P09.39						
P07.25	Gain switching level	0~32767	-	anytime	immediately	0	RW
	Set the level that satisfies the gain switching condition. The generation of the actual switching action is affected by the two conditions of the level and the time lag. The unit of the switching level changes according to the difference of the gain switching conditions.						
P07.26	Gain switching time lag	0~32767	-	anytime	immediately	0	RW
	Set the time lag that satisfies the gain switching condition.The generation of the actual switching action is affected by the two conditions of the level and the time lag. According to the difference of the gain switching conditions, the unit for switching the time lag will change accordingly.						
P07.27	Gain switching time constant	0~32767	ms	anytime	immediately	10	RW
	In position control mode, if P07.23 (second position loop gain) is much larger than P07.05 (first position loop gain), set the time from P07.05 to P07.23 after the switching action is generated.						
P07.28	Rigid rating	1~31	-	anytime	immediately	10	RW
P07.29	Load inertia, obtained by inertia self-learning			anytime	immediately	400	RW
P07.30	Zero-speed speed gain attenuation / amplification	0~3276.7	%	anytime	immediately	50.0	RW
P07.31	Zero-speed position gain attenuation / amplification	0~3276.7	%	anytime	immediately	100.0	RW

P07.34	Zero speed current gain attenuation / amplification	0~3276.7	%	anytime	immediately	100.0	RW
P07.32	Zero speed decay threshold	0~32767	rpm	anytime	immediately	10	RW
	When the rotational speed is less than this value, the actual active speed loop proportional gain integral gain, position loop proportional gain, and current loop proportional gain integral gain are attenuated/amplified according to P07.30, P07.31, and P07.34, respectively.						
P07.33	Inertia self-learning acceleration and deceleration time	0~32767	ms	anytime	immediately	500	RW
P07.90	Actual speed loop proportional gain	-	-	-	-	-	RO
P07.91	Actual speed loop integral gain	-	-	-	-	-	RO
P07.92	Actual position loop proportional gain	-	-	-	-	-	RO

8.1.1 Current loop PI gain adjustment

When the current loop proportional gain is too large, the motor will beep, and the Q-axis current will have high-frequency oscillations, often reporting overcurrent faults. As shown below.



When the current loop proportional gain is too small, the motor current response is slow, and the output is insufficient during rapid acceleration and deceleration.

When the current loop integral gain is too large, the Q-axis current is prone to

low-frequency oscillation, and it is easy to report an overcurrent fault during acceleration and deceleration.

When the current loop integral gain is too small, the motor current response is slow, and the output is insufficient during rapid acceleration and deceleration.

8.1.2 Speed loop PI gain adjustment

When the speed loop proportional gain is too large, the motor is prone to howling, and the Q-axis current is given a high-frequency oscillation.

When the speed loop proportional gain is too small, the motor rigidity is weak and the speed cannot follow.

When the integral gain of the speed loop is too large, the rigidity of the motor is enhanced, and the speed is easy to generate low-frequency fluctuation. The specific phenomenon is that after the given position is 0, the motor is reversed back and forth.

When the speed loop integral gain is too small, the motor rigidity is weak and the speed cannot follow.

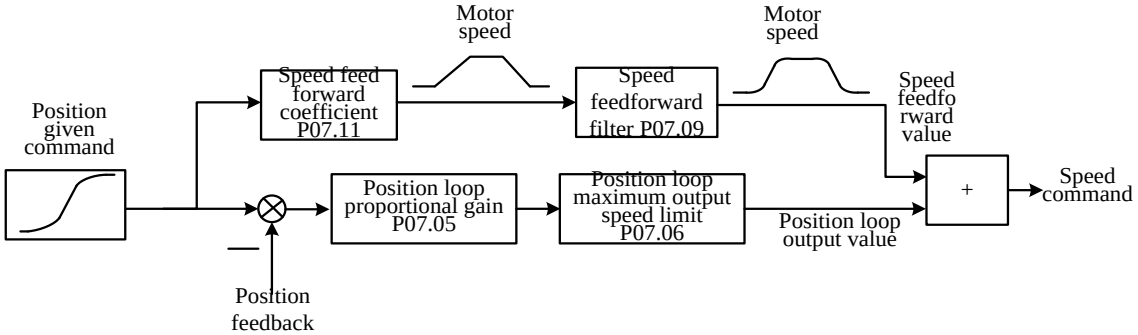
8.1.3 Position loop P gain adjustment

When the position loop proportional gain is too large, the motor speed is unstable and it is easy to shake.

The position loop proportional gain is too small and the position arrives very slowly.

8.2 Feed forward gain adjustment

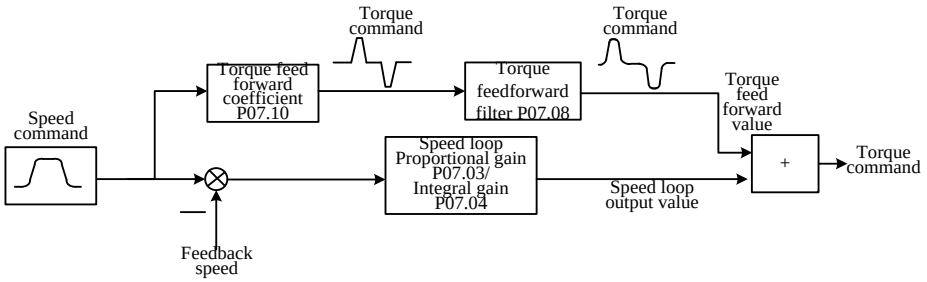
8.2.1 Speed feedforward



Speed feedforward refers to the mathematical operation of a given position command to obtain the required speed of the motor, which is directly given to the speed loop. As shown in the figure above, the position command is input to the servo and directly converted to the required speed of the motor. After filtering, it is superimposed on the speed command. Generally, the speed feedforward coefficient is directly set to 50%, and the speed

feedforward filter value is set according to the inertia size, and is generally set to 0-20 ms. The maximum output speed limit of the position loop means that the output of the position loop is limited to plus or minus P07.06.

8.2.2 Torque feedforward



Torque feedforward refers to the mathematical operation of a given speed command, combined with the load inertia, to obtain the torque that the motor needs to output, which is directly given to the torque loop. As shown in the figure above, the speed command is input to the servo and directly converted to the torque required by the motor according to the torque feedforward coefficient. After filtering, it is superimposed on the torque command. In general, the torque feedforward coefficient is determined by the load inertia. The larger the load inertia, the larger the value. This value can be obtained by Fn007. Torque feedforward filtering is also determined by the load inertia, which is generally set to 5-20ms.

8.3 Filter time adjustment

There are three filtering times related to loop control.

The first is the torque filtering time. Under normal circumstances, the torque filter is set to a low-pass filter (P07.12=0). At this time, the larger the torque filter time constant P07.13, the smoother the torque command, which can reduce the high-frequency noise of the motor and bring The side effect is that it is easy to produce low frequency vibration. Increase this value when the inertia is large.

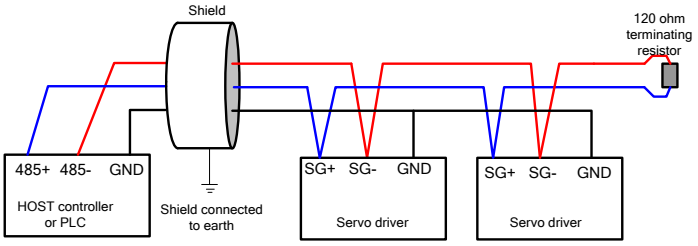
The second is the speed feedforward filter time. When in the position mode, if the position command pulse frequency is low, and the position command filter parameters P03.06 and P03.07 are both 0, speed feedforward filtering needs to be added. It can reduce the speed pulsation of the position command and reduce the motor noise. The speed feedforward filter time P07.09 is generally set at around 0-20.

The third is the torque feedforward filter time P07.08. When the torque command has too many high frequency components, it needs to be increased. It is generally set at 5-20.

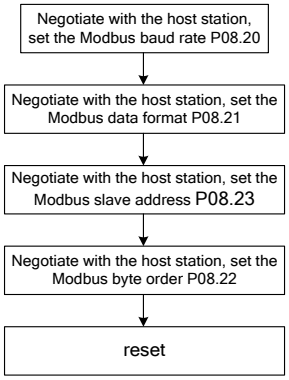
Chapter 9 MODBUS Communication

9.1 Modbus wiring requirements

Please see the figure below for wiring.



9.2 Modbus Parameter setting step



Related parameters are as follows。

Num	Description	Range	unit	Set moment	active moment	default	ACCESS
P08.20	Modbus baud rate 0- 4800 1- 9600 2- 19200 3- 38400	0~3	bps	anytime	immediately	1	RW
P08.21	Modbus data format 0- No parity, stop bits 2 1- No parity, stop bits 1 2- Even parity, 1 stop bit 3- Odd parity, 1 stop bit	0~3	-	anytime	reset takes effect	1	RW
P08.22	Byte order when 32-bit address is accessed 0- When a 32-bit address is accessed; the upper 16 bits are in front.	0~1	-	anytime	immediately	1	RW

	1- When a 32-bit address is accessed, the lower 16 bits are in front.						
P08.23	Modbus slave address	1~255	-	anytime	immediately	1	RW
P08.24	Modbus fault register	-	-	-	-	-	RO
P08.25	Number of bytes in the transmit FIFO buffer	-	-	-	-	-	RO
P08.27	MODBUS response delay	0~32767	-	anytime	immediately	0	RW
P08.28	MODBUS sampling period delay	0~32767	500us	anytime	immediately	0	RW

9.3 Modbus supported function code

The servo driver only supports communication in Modbus RTU format. The function codes of the Modbus protocol stack are shown in the following table.

Function code (decimal)	Function description
1	Read bit
2	Read bit
3	Read register
4	Read register
5	Write bit
6	Write 16-bit register
16	Write 32-bit register

9.3.1 Function code 1 or function code 2 (read bit)

The servo provides the following address for reading by the host computer. It should be noted that the bit address of most host controller should be set to “modus bit address+1”; if it is a macro definition communication mode, “modbus bit address” is generally set directly. The meaning of each modbus bit address is as follows.

Modbus bit address	Bit definition
12	Effective state of DO1
13	Effective state of DO2
14	Effective state of DO3
15	Effective state of DO4
16	Effective state of DO5
17	Effective state of DO6
141	OUTFn.001 driver is enabled

142	OUTFn.002 speed reaches the given value
143	OUTFn.003 slowdown
144	OUTFn.004 speed
145	OUTFn.005 in zero speed
146	OUTFn.006 speed overrun
147	OUTFn.007 Forward
148	OUTFn.008 Reverse
149	OUTFn.009 fault output
150	OUTFn.010 Positive speed limit in torque mode
151	OUTFn.011Negative speed limit in torque mode
152	OUTFn.012 speed limtting in torque mode
153	OUTFn.013 positioning complete output
154	OUTFn.014 positioning close to output
155	OUTFn.015 homing complete output
156	OUTFn.016 position error is too large output
157	OUTFn.017 interrupts the fixed length to complete the output
158	OUTFn.018 software position limit output
164	OUTFn.024 brake output
165	OUTFn.025 input command is valid
166	OUTFn.026 is always OFF
167	OUTFn.027 is always ON
168	OUTFn.028 torque limit output
169	OUTFn.029 torque arrives
170	OUTFn.030 internal trigger status
171	OUTFn.031 internal counter count arrives
172	OUTFn.032 is consistent in speed
173	OUTFn.033 pulse position command is zero output

The above bits can be read by the read-bit-function in MODBUS, that is, the function code of the MODBUS data frame is set to 1 or 2. The query information for the Modbus master to send the read bit is as follows. The query information specifies the slave address, bit address, and number of bits to read.。For example, the host station queries the 0x01 slave address and the 6 bits starting at address 0x01.

Query information contains the domain	example（Hexadecimal）
Slave address	0x01
function code	0x01
the upper 8 bits of the address	0x00
the lower 8 bits of the address	0x01
upper 8 bits of the number of bits	0x00
lower 8 bits of the number of bits	0x06
lower 8 bits of CRC16 check result	0xED
upper 8 bits of CRC16 check result	0XC8

The data field in the Modbus slave response message contains the status of the bit

corresponding to the query address. The data of the low address is placed in the low position, 1 means valid, 0 means invalid.

If the number of bits returned is not a multiple of 8, the remaining bits in the last data byte are all zero-padded, and the byte number field indicates the number of bytes of all data. The result of replying to the reading of the master station is as follows.

Response information contains the domain	Example (hexadecimal)
Slave address	0x01
function code	0x01
Number of bytes	0x01
Data (bits 5-0)	0x00
The lower 8 bits of the CRC16 check result	0x51
The upper 8 bits of the CRC16 check result	0X88

9.3.2 Function code 3 or function code 4 (read register)

All Pxx.yy parameters of the servo driver can be read, and the corresponding modbus register address is xx*100+yy. Most of the host computer's parameter address should be set to "parameter register address +1"; if it is a macro definition communication mode, generally set the "parameter register address". The query information for the Modbus master to send the read register is as follows. The query information specifies the slave address, register address, and number of registers to be read. For example, the master station queries the 0x01 slave address and the two registers whose parameter address starts from 0x01.

Query information contains the domain	Example (hexadecimal)
Slave address	0x01
function code	0x03
The upper 8 bits of the register address	0x00
The lower 8 bits of the register address	0x01
The upper 8 bits of the number of registers	0x00
The lower 8 bits of the number of registers	0x02
The lower 8 bits of the CRC16 check result	0x51
The upper 8 bits of the CRC16 check result	0x88

The servo driver responds to the master read register information as follows。

Response information contains the domain	Example (hexadecimal)
Slave address	0x01
function code	0x03
Number of bytes	0x04
Data (higher 8 bits of register 1)	0x00
Data (lower 8 bits of register 1)	0x1C
Data (high 8 bits of register 2)	0x0B
Data (lower 8 bits of register 2)	0xB8
The lower 8 bits of the CRC16 check result	0x3C

The upper 8 bits of the CRC16 check result	0xB7

9.3.3 Function code 5 (write bit)

The following bit address in the servo can be written by the host computer. The corresponding definitions are as follows.

MODBUS bit address	Function	Effective rule
0	Write 1 forced DI1 is valid	1 effective
1	Write 1 forced DI2 is valid	1 effective
2	Write 1 forced DI3 is valid	1 effective
3	Write 1 forced DI4 is valid	1 effective
4	Write 1 forced DI5 is valid	1 effective
5	Write 1 forced DI6 is valid	1 effective
6	Write 1 forced DI7 is valid	1 effective
7	Write 1 forced DI8 is valid	1 effective
8	Write 1 forced DI9 is valid	1 effective
9	Write 1 forced DI10 is valid	1 effective
41	INFn.01 enabled driver	1 effective
42	INFn.02 reset drive	0->1 effective
43	INFn.03 torque AB selector switch	1 effective
44	INFn.04 torque reverse switch	1 effective
45	INFn.05 forward torque limit selection	1 effective
46	INFn.06 reverse torque limit selection	1 effective
47	INFn.07 forward speed limit selection	1 effective
48	INFn.08 reverse speed limit selection	1 effective
49	INFn.09 jog forward	1 effective
50	INFn.10 jog reverse	1 effective
51	INFn.11 speed given reverse	1 effective
52	INFn.12 main speed AB selection	1 effective
53	INFn.13 speed stop input	1 effective
54	INFn.14 download ARM program reset	0->1 effective
55	INFn.15 clear encoder position counter	0->1 effective
56	INFn.16 Zero fixed in speed mode	1 effective
57	INFn.17 multi-speed speed selection switch 0	1 effective
58	INFn.18 multi-speed speed selector switch 1	1 effective
59	INFn.19 multi-speed speed selector switch 2	1 effective
60	INFn.20 multi-speed speed selector switch 3	1 effective
61	INFn.21 position instruction is forbidden	1 effective
62	INFn.22 position command reverse	1 effective

63	INFn.23 pulse command is forbidden	1 effective
64	INFn.24 electronic gear ratio switch 1	1 effective
65	INFn.25 position error clearing	Depend on P03.21
66	INFn.26 execult homing	0->1 effective
67	INFn.27 multi-segment position trigger start and stop signals	Depend on P13.92
68	INFn.28 multi-segment position selection switch 0	1 effective
69	INFn.29 multi- segment position selector switch 1	1 effective
70	INFn.30 multi- segment position selector switch 2	1 effective
71	INFn.31 multi- segment position selector switch 3	1 effective
72	Position direction in INFn.32 multi-segment position mode	1 effective
73	INFn.33 reserved	-
74	INFn.34 home switch input	Depend on homing method
75	XY pulse tracking and multi-segment position switching in INFn.35 position mode	1 effective
76	INFn.36 control mode switch 0	1 effective
77	INFn.37 control mode switch 1	1 effective
78	INFn.38 enables interrupt fixed length function	1 effective
79	INFn.39 lifts the fixed length	1 effective
80	INFn.40 triggers input signal with interrupted fixed length	0->1 effective
81	INFn.41 gain selector switch	1 effective
82	INFn.42 reset fault	1 effective
83	INFn.43 positive limit switch	1 effective
84	INFn.44 negative limit switch	1 effective
85	INFn.45 full closed loop mode open and closed loop switching	1 effective
86	INFn.46 FPGA download program reset	0->1 effective
96	INFn.56 electronic gear ratio switch 2	1 effective
97	INFn.57 motor overheated	1 effective
98	INFn.58 emergency stop input	1 effective
99	INFn.59 internal trigger reset	0->1 effective
100	INFn.60 internal trigger set	0->1 effective
101	INFn.61 internal counter count pulse	0->1 effective
102	INFn.62 internal counter clear	1 effective
103	INFn.63 UP signal in speed UPDOWN mode	1 effective
104	INFn.64 DOWN signal in speed UPDOWN mode	1 effective
107	INFn.67 corrects zero drift of all AI	1->0 effective

The information transmitted by the host station to write the bit data packet includes the slave address, the bit address, and the written data. For example, the master station writes the 0x01 slave address, the bit of the bit address 0x01, which is set to 1.

The host station sends the information contained the domain	Example (hexadecimal)
Slave address	0x01
function code	0x05
The upper 8 bits of the bit address	0x00
The lower 8 bits of the bit address	0x01
High 8 bits of data	0xFF
Lower 8 bits of the data	0x00
The lower 8 bits of the CRC16 check result	0xDD
The upper 8 bits of the CRC16 check result	0xFA

The reply message of the servo driver is as follows.

The domain contained in the servo reply message	Example (hexadecimal)
Slave address	0x01
function code	0x05
The upper 8 bits of the bit address	0x00
The lower 8 bits of the bit address	0x01
High 8 bits of data	0xFF
The lower 8 bits of the data	0x00
The lower 8 bits of the CRC16 check result	0xDD
The upper 8 bits of the CRC16 check result	0xFA

9.3.4 Function code 6 (write single word register)

All Pxx.yy readable and writable parameters of the servo driver can be written by Modbus, and the corresponding parameter register address is xx*100+yy. Most of the host computer's parameter address should be set to "parameter register address +1"; if it is a macro definition communication mode, generally set the "parameter register address". The information sent by the Modbus master to the write word register is as follows. The information specifies the slave address, register address, and register data to be written. For example, the master writes a register with the slave address 0x01 and the internal address 0x02, and the write value is 3000.

The host station sends the information contained the domain	Example (hexadecimal)
Slave address	0x01

function code	0x06
The upper 8 bits of the register address	0x00
The lower 8 bits of the register address	0x02
High 8 bits of data	0x0B
Lower 8 bits of the data	0Xb8
The lower 8 bits of the CRC16 check result	0x2F
The upper 8 bits of the CRC16 check result	0x48

The servo driver responds to the master writing a single register with the following information.

Response information contains fields	Example (hexadecimal)
Slave address	0x01
function code	0x06
The upper 8 bits of the register address	0x00
The lower 8 bits of the register address	0x02
High 8 bits of data	0x0B
The lower 8 bits of the data	0Xb8
The lower 8 bits of the CRC16 check result	0x2F
The upper 8 bits of the CRC16 check result	0x48

9.3.5 Function code 16 (writable double word register)

All Pxx.yy readable and writable double word parameters of the servo driver can be written by Modbus, and the corresponding parameter register address is xx*100+yy. Most of the host computer's parameter address should be set to "parameter register address +1"; if it is a macro definition communication mode, generally set the "parameter register address". The information sent by the Modbus master to the write double word register is as follows. The information specifies the slave address to be written, the register address, the number of registers, and the number of bytes of data. For example, the master writes a register with the slave address 0x01 and the internal address 0x0B, and the write value is 10000.

The host station sends the information contained the domain	Example (hexadecimal)
Slave address	0x01
function code	0x10
The upper 8 bits of the register address	0x00
The lower 8 bits of the register address	0x0B
The upper 8 bits of the register address number	0x00
The lower 8 bits of the register address number	0x02

Number of bytes of data	0x04
High 8 bits of data (high/low word)	0X00
The lower 8 bits of the data (high/low word)	0x00
High 8 bits of data (low/high word)	0x27
The lower 8 bits of the data (low/high word)	0x10
The lower 8 bits of the CRC16 check result	0Xa8
The upper 8 bits of the CRC16 check result	0x20

The servo driver responds to the host station writing the double word register as follows:

Response information contains fields	Example (hexadecimal)
Slave address	0x01
function code	0x10
The upper 8 bits of the register address	0x00
The lower 8 bits of the register address	0x0B
The upper 8 bits of the number of registers	0x00
The lower 8 bits of the number of registers	0x02
The lower 8 bits of the CRC16 check result	0X30
The upper 8 bits of the CRC16 check result	0x0A

Note: When writing a double word register, the data in the data field of the master station sending information can be either the high order first or the low order first, depending on the setting of P08.22.

Chapter 10 Parameter list

Parameter group	Function of parameter group
P00 group	Motor and encoder parameters

P01 group	Driver hardware parameters
P02 group	Basic control parameters
P03 group	Position mode parameter
P04 group	Speed mode related parameters
P05 group	Torque mode related parameters
P06 group	DIDO AIAO parameters
P07 group	Loop control parameter
P08 group	Communication parameter
P09 group	Advanced debugging parameters
P10 group	Fault protection parameter
P11 group	Multi-speed parameter
P12 group	Virtual DI DO parameter
P13 group	Multi-segment position parameter

●Set moment and active moment of the parameter

Disable to set：Indicates that the parameter is read-only when driver is enabled, and it can be modified when driver is disabling.

Immediately：Indicates that this parameter can be modified while the machine is running, that is, it can be modified in any state, and it will take effect immediately after the modification is completed.

reset takes effect： Indicates that the driver needs to be reset to take effect after the parameter is modified.

10.1 P00 group parameters - motor and encoder parameters

P00.01	Name	Motor rated current			Set moment	Disable to set	Access	RW
	Range	0~3276.7	unit	A	active moment	Immediately	default	6.0
This parameter is password protected。								

P00.02	Name	Motor rated speed			Set moment	Disable to set	Access	RW
	Range	1~32767	unit	rpm	active moment	Immediately	default	3000

P00.03	Name	Maximum motor speed			Set moment	Disable to set	Access	RW
	Range	1~32767	unit	rpm	active moment	Immediately	default	3000

P00.04	Name	Motor rotation direction	Set moment	Disable to set	Access	RW

	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	direction
0	The positive motor speed is defined as the direction in which the motor rotates clockwise (looking at the motor shaft)
1	The positive motor speed is defined as the direction in which the motor rotates counterclockwise (looking at the motor shaft)

After setting this parameter, you must relearn the encoder to enable it. Please wire the motor UVW power cable according to the manufacturer's standard, otherwise the motor rotation direction may be reversed.

P00.05	Name	Motor pole pair			Set moment	Disable to set	Access	RW
	Range	1~32767	unit	-	active moment	Immediately	default	4

P00.08	Name	Motor encoder type			Set moment	Disable to set	Access	RW
	Range	0~6	unit	-	active moment	Immediately	default	0

Setting	Motor encoder type
0	Incremental encoder
1	Tamagawa 17 -bit absolute encoder
2	Nikan 24 -bit absolute encoder
3	reserved
4	Rotary encoder to incremental encoder
5	Provincial line incremental encoder
6	Tamagawa 23 -bit absolute encoder

P00.09	Name	Motor encoder hardware filter settings			Set moment	Disable to set	Access	RW
	Range	1~32767	unit	20ns	active moment	Immediately	default	20

P00.10	Name	Motor encoder software filter time			Set moment	Disable to set	Access	RW
	Range	0~32767	unit	ms	active moment	reset takes effect	default	5

P00.11	Name	Motor encoder resolution			Set moment	Disable to set	Access	RW
	Range	100~ 2147483647	unit	-	active moment	Immediately	default	10000

P00.13	Name	Motor encoder position (encoder unit)			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P00.15	Name	Detected encoder resolution			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P00.17	Name	Motor encoder Hall code value			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P00.18	Name	Absolute value system mode			Set moment	Disable to set	Access	RW
	Range	0-incremental 1-absolute value	unit	-	active moment	reset takes effect	default	0

P00.19	Name	Motor encoder speed sampling period			Set moment	Disable to set	Access	RW
	Range	0-7	unit	-	active moment	reset takes effect	default	0
	0- incremental 250us , Tamagawa 300us , Nikon 200us; 1- incremental 500us , Tamagawa 360us , Nikon 240us; 2- incremental 750us , Tamagawa 420us , Nikon 280us; 3- incremental 1000us , Tamagawa 480us , Nikon 320us; 4- incremental 50us , Tamagawa 60us , Nikon 40us; 5- incremental 100us , Tamagawa 120us , Nikon 80us; 6- incremental 150us , Tamagawa 180us , Nikon 120us; 7- incremental 200us , Tamagawa 240us , Nikon 160us						

P00.20	Name	Stator resistance			Set moment	Disable to set	Access	RW
	Range	0~327.67	unit	Ω	active moment	reset takes effect	default	-

P00.21	Name	D- axis inductance			Set moment	Disable to set	Access	RW
	Range	0~327.67	unit	mH	active moment	reset takes effect	default	-

P00.22	Name	Q- axis inductance			Set moment	Disable to set	Access	RW
	Range	0~327.67	unit	mH	active moment	reset takes effect	default	-

P00.23	Name	Line back electromotive force			Set moment	Disable to set	Access	RW
	Range	0~3276.7	unit	V/krpm	active moment	reset takes effect	default	-

P00.24	Name	Motor peak current percentage			Set moment	Disable to set	Access	RW
	Range	0~3276.7	unit	%	active moment	reset takes effect	default	-
This parameter is password protected。								

P00.25	Name	Motor rated torque			Set moment	Disable to set	Access	RW
	Range	0~21474836.47	unit	NM	active moment	reset takes effect	default	-

P00.27	Name	Motor rotor inertia			Set moment	Disable to set	Access	RW
	Range	0~21474836.47	unit	Kgcm^2	active moment	reset takes effect	default	-

P00.30	Name	Second encoder type			Set moment	Disable to set	Access	RW
	Range	0~2	unit	-	active	Immediately	default	0

					moment			

Setting	Motor encoder type
0	Incremental encoder
1	Single-turn absolute encoder
2	Multi-turn absolute encoder

P00.31	Name	Second encoder hardware filter setting			Set moment	Disable to set	Access	RW
	Range	1~32767	unit	20ns	active moment	Immediately	default	20

P00.32	Name	Second encoder software filter time constant			Set moment	Disable to set	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	5

P00.33	Name	Second encoder resolution			Set moment	Disable to set	Access	RW
	Range	100~ 2147483647	unit	-	active moment	Immediately	default	10000

P00.35	Name	Second encoder position (encoder unit)			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P00.37	Name	Mechanical zero point offset low 32 bits			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P00.39	Name	Mechanical zero point offset high 32 bits			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P00.41	Name	Absolute value system fault mask			Set moment	Disable to set	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0
Bit 0 of the battery alarm mask; 1 mask bit cell failure								
P00.42	Name	Motor instantaneous			Set	-	Access	RO

		current percentage			moment			
	Range	-	unit	%	active moment	-	default	0

P00.43	Name	Motor instantaneous power percentage			Set moment	-	Access	RO
	Range	-	unit	%	active moment	-	default	0

P00.44	Name	Average load rate			Set moment	-	Access	RO
	Range	-	unit	%	active moment	-	default	0

P00.45	Name	Maximum motor current percentage in 1s			Set moment	-	Access	RO
	Range	-	unit	%	active moment	-	default	0

P00.46	Name	Maximum motor power percentage in 1s			Set moment	-	Access	RO
	Range	-	unit	%	active moment	-	default	0

P00.47	Name	Induction motor stator resistance			Set moment	-	Access	RW
	Range	0-327.67	unit	ohm	active moment	reset takes effect	default	0

P00.48	Name	Induction motor rotor resistance			Set moment	-	Access	RW
	Range	0-327.67	unit	ohm	active moment	reset takes effect	default	0

P00.49	Name	Total leakage inductance of induction motor			Set moment	-	Access	RW
	Range	0-3276.7	unit	mH	active moment	reset takes effect	default	0

P00.50	Name	Induction motor magnetizing inductance			Set moment	-	Access	RW
	Range	0-3276.7	unit	mH	active moment	reset takes effect	default	0

P00.51	Name	Induction motor rated frequency			Set moment	-	Access	RW
	Range	0-3276.7	unit	Hz	active moment	reset takes effect	default	0

P00.52	Name	Induction motor output torque			Set moment	-	Access	RO
	Range	0-3276.7	unit	NM	active moment	-	default	0

P00.53	Name	Induction motor output power			Set moment	-	Access	RO
	Range	0-327.67	unit	Kw	active moment	-	default	0

P00.54	Name	Induction motor percentage of magnetizing current, unit is the percentage of motor rated current			Set moment	-	Access	RW
	Range	0-3276.7	unit	%	active moment	immediately	default	0

P00.70	Name	Motor UVW phase sequence			Set moment	Disable to set	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Motor UVW phase sequence
0	Positive sequence
1	Reverse sequence

This parameter is password protected and can be obtained by self-learning.

P00.71	Name	Z point offset (encoder unit)	Set moment	Disable to set	Access	RW

	Range	0~32767	unit	-	active moment	Immediately	default	0
The offset of the Z point from the magnetic pole. This parameter is password protected.								

P00.72	Name	AB phase sequence of the encoder			Set moment	Disable to set	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	AB phase sequence of the encoder
0	Positive sequence
1	Reverse sequence

This parameter is password protected and can be obtained by self-learning.

P00.73	Name	When the Hall code value is 1 , the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	425
This parameter is password protected and can be obtained by self-learning.								

P00.74	Name	When the Hall code value is 2 , the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	85
This parameter is password protected and can be obtained by self-learning.								

P00.75	Name	When the Hall code value is 3, the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	255
This parameter is password protected and can be obtained by self-learning.								

P00.76	Name	When the Hall code value is 4 , the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	765
This parameter is password protected and can be obtained by self-learning.								

P00.77	Name	When the Hall code value is 5 , the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	595
This parameter is password protected and can be obtained by self-learning.								

P00.78	Name	When the Hall code value is 6 , the corresponding electrical angle			Set moment	Disable to set	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	935
This parameter is password protected and can be obtained by self-learning.								

10.2 P01 group parameters - driver hardware parameters

P01.01	Name	ARM software version			Set moment	-	Access	RO
	Range	0~65.535	unit	-	active moment	-	default	-

P01.02	Name	FPGA software version			Set moment	-	Access	RO
	Range	0~65535	unit	-	active moment	-	default	-

P01.03	Name	Driver rated current			Set moment	Disable to set	Access	RW
	Range	0~3276.7	unit	A	active moment	Immediately	default	6.0
This parameter is password protected。								

P01.04	Name	Driver rated current			Set moment	-	Access	RO
	Range	0~3276.7	unit	A	active moment	-	default	-

P01.05	Name	U phase current instantaneous value			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	A	active moment	-	default	-

P01.06	Name	V phase current instantaneous value			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	A	active moment	-	default	-

P01.07	Name	Driver rated voltage			Set moment	anytime	Access	RW
	Range	100~32767	unit	V	active moment	Immediately	default	220

P01.08	Name	Bus voltage monitoring value			Set moment	-	Access	RO
	Range	0~32767	unit	V	active moment	-	default	-

P01.09	Name	Bus voltage calibration factor			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	%	active moment	Immediately	default	100.0

P01.10	Name	Driver temperature			Set moment	-	Access	RO
	Range	0~3000	unit	0.1℃	active moment	-	default	-

P01.11	Name	PWM frequency setting register			Set moment	Disable to set	Access	RW
	Range	0~5	unit	-	active moment	Immediately	default	3

Setting	Frequency
0	1.5K
1	2K
2	4K
3	8K
4	10K

This register is password protected.

P01.12	Name	IGBT dead time			Set moment	Disable to set	Access	RW
	Range	3~10	unit	us	active	Immediately	default	3

					moment			
◦ This register is password protected								

P01.13	Name	Driver type			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	0
The first two digits represent the driver communication type and the last three digits represent the driver function type. Communication type is 0 , representing general-purpose servo, RS485-Modbus communication; The communication type is 1 , representing the CANopen bus servo with the CiA402 protocol ; The communication type is 2 , which represents a general-purpose servo with the CiA301 protocol; The communication type is 3 , which represents the EtherCAT bus servo with the CiA402 protocol ; The function type is 0 , which represents a general-purpose servo; Functions of type 1, the representative general-purpose servo control function with tension.								

P01.14	Name	Current sampling filter time			Set moment	Disable to set	Access	RW
	Range	0~327.67	unit	Ms	active moment	Immediately	default	0.00

P01.15	Name	Driver level number			Set moment	-	Access	RW
	Range	0~32767	unit	-	active moment	-	default	0

When the factory value is restored, the parameters related to the driver level will be restored. The number and corresponding level are as follows.

C structure servo driver class number		E structure servo driver class number	
101	400w 220V	1	3A 220V
102	750W 220V	2	6A 220V
103	1.5KW 220V	3	12A 220V
104	2.2KW 220V	4	7A 380V
105	1.5KW 380V	5	12A 380V
106	2.2KW 380V	6	16A 380V
107	4KW 380V	7	20A 380V
108	5.5KW 380V	8	27A 380V
109	7.5KW 380V		
110	11KW 380V		
111	15KW 380V		
112	18KW 380V		

113	22KW 380V		
114	30KW 380V		
115	37KW 380V		
116	45KW 380V		
117	55KW 380V		
118	75KW 380V		

P01.30	Name	Phase C current sampling offset			Set moment	-	Access	Ro
	Range	0~32767	unit	AD	active moment	-	default	0
The parameter is password protected and automatically calculated upon power-on.								

P01.31	Name	Phase B current sampling offset			Set moment	-	Access	Ro
	Range	0~32767	unit	AD	active moment	-	default	0
This parameter is password protected.								

P01.32	Name	C phase current AD sample value			Set moment	-	Access	RO
	Range	0~32767	unit	AD	active moment	-	default	-

P01.33	Name	B phase current AD sample value			Set moment	-	Access	RO
	Range	0~32767	unit	AD	active moment	-	default	-

P01.34	Name	Capacitor voltage AD sample value			Set moment	-	Access	RO
	Range	0~32767	unit	AD	active moment	-	default	-

P01.35	Name	Bus current AD sample value			Set moment	-	Access	RO
	Range	0~32767	unit	AD	active moment	-	default	-

P01.36	Name	Motor temperature AD sample value			Set moment	-	Access	RO
	Range	0~32767	unit	AD	active	-	default	-

					moment			

P01.37	Name	continuous run time from last restore factory value,			Set moment	-	Access	RO
	Range	-	unit	Ms	active moment	-	default	-

P01.39	Name	Driver ID			Set moment		Access	Ro
	Range		unit	-	active moment		default	0

10.3 P02 group parameters - basic control parameters

P02.01	Name	Driver control mode			Set moment	anytime	Access	RW
	Range	0~6	unit	-	active moment	Immediately	default	0

Setting	Control mode
0	Position mode
1	Speed mode
2	Torque mode
3	Position/torque mode IO switching, select Torque mode when INFn.36 is active
4	Position/speed mode IO switching, select speed mode when INFn.36 is active
5	Torque/speed mode IO switching, select torque mode when INFn.36 is active
6	

INFn.37	INFn.36	Control mode
active	inactive	speed mode
inactive	active	Torque mode
active	xx	position mode

P02.02	Name	Current Mode of operation display			Set moment	-	Access	RO
	Range	0~2	unit	-	active moment	-	default	-

Setting	Control mode
0	Position mode
1	Speed mode
2	Torque mode

P02.03	Name	Forward/Reverse prohibited	Set	anytime	Access	RW

					moment			
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Forward/Reverse prohibited
0	No prohibited
1	Forward prohibited
2	Reverse prohibited

P02.04	Name	Driver status			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

Setting	Driver status
1	Self test (rst)
8	Ready (rdy)
16	Emergency Stop (run)
32	Emergency Stop (run)
64	Response to Fault (run)
128	Fault (Er.xxx)

P02.05	Name	LED display content in running or rdy state			Set moment	anytime	Access	RW
	Range	0~10	unit	-	active moment	Immediately	default	0

Setting	Display content
0	Display state
1	Display speed
2	Display capacitor voltage
3	Display temperature
4	Display current
5	Display DI level value
6	Display DO level value
7	AI1 voltage value
8	AI2 voltage value
9	AI3 voltage value
10	Torque percentage

P02.07	Name	Parameter write protection			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Parameter write setting
0	Write disabled
1	Can be written

P02.08	Name	Parameter save selection			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Parameter save selection
0	Save parameters to EEPROM , save power down
1	Parameter saved to RAM , power loss lost
2	The parameters written by the communication are saved to the RAM , the power loss is lost, the parameters written by the panel are saved to the EEPROM , and the power is saved.

P02.09	Name	Startup option			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	reset takes effect	default	0

Setting	Startup option
0	Normal start
1	Save all parameters to the U disk before starting
1	Update the parameter file in the U disk to the servo before starting
3	Record waveform data according to the waveform profile in the USB flash drive

P02.10	Name	fault type 2 stop mode selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	fault type 2 stop mode selection
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver
3	rapid deceleration stop and keep enable driver
4	slow deceleration stop and keep enable driver

P02.11	Name	fault type 3 stop mode selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	fault type 3 stop mode selection
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver
3	rapid deceleration stop and keep enable driver
4	slow deceleration stop and keep enable driver

P02.12	Name	Over travel stop mode selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	Over travel stop mode selection
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver
3	rapid deceleration stop and keep enable driver
4	slow deceleration stop and keep enable driver

P02.13	Name	Disable driver stop mode selection			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Disable driver stop mode selection
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver

P02.14	Name	Emergency stop mode	Set	anytime	Access	RW

		selection		moment			
	Range	0~4	unit -	active moment	Immediately	default	0

Setting	Emergency stop mode selection
0	free to rotate
1	rapid deceleration stop and disable driver
2	slow deceleration stop and disable driver
3	rapid deceleration stop and keep enable driver
4	slow deceleration stop and keep enable driver

P02.16	Name	rapid stop time		Set moment	anytime	Access	RW
	Range	0~65535	unit ms	active moment	Immediately	default	500

P02.17	Name	slow stop time		Set moment	anytime	Access	RW
	Range	0~65535	unit ms	active moment	Immediately	default	1000

P02.20	Name	Servo braking option		Set moment	anytime	Access	RW
	Range	0~3	unit -	active moment	Immediately	default	2

Setting	braking option
0	Never start the brake
1	Start the brake when deceleration and DC bus capacitor voltage is too large
2	Start the brake at anytime when DC bus capacitor voltage is too large
3	Start the brake when regenerate energy and DC bus capacitor voltage is too large

For the 220V drive, when the DC bus voltage is greater than 380VDC, the energy brake circuit is activated;

For 380V drives, when the DC bus voltage is greater than 680VDC, the energy brake circuit is activated.

P02.21	Name	Brake resistor resistance		Set moment	anytime	Access	RW
	Range	0~3276.7	unit Ω	active moment	Immediately	default	0

P02.22	Name	Brake resistor maximum	Set	anytime	Access	RW

		power			moment			
	Range	0~3276.7	unit	KW	active moment	Immediately	default	0

P02.23	Name	Braking resistor heat dissipation coefficient			Set moment	anytime	Access	RW
	Range	0~100	unit	%	active moment	Immediately	default	50
If set to 100% , it means that the time from the maximum heat loss to 0 is 10s .								

P02.30	Name	Command input delay after brake release command output			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	250

P02.31	Name	zero speed threshold for Brake			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	30

P02.32	Name	Enable hold time after brake release			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	150

P02.33	Name	Max brake hold time after disable driver			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	500
Max brake hold time after disable driver								

P02.35	Name	Driver password			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P02.36	Name	Self-learning maximum current limit			Set moment	anytime	Access	RW
	Range	0~100	unit	-	active moment	Immediately	default	70
Set to about 70% of the ratio of the rated motor current to the rated current of the driver								

P02.37	Name	Internal software counter count value			Set moment	-	Access	RO
	Range	0~2147483647	unit	-	active moment	-	default	-
This parameter is a two-byte parameter; this value is keep even if power down.								

P02.39	Name	Internal software counter arrival value			Set moment	anytime	Access	RW
	Range	0~2147483647	unit	-	active moment	Immediately	default	0
This parameter is a double-byte parameter								

P02.50	Name	Instruction reversal			Set moment	anytime	Access	RW
	Range	0-7	unit	-	active moment	Immediately	default	0
When the 0th bit is valid, the position command is reversed; When the 1th bit is valid, the speed command is reversed; When the 2th bit is valid, the torque command is reversed;								

10.4 P03 Group parameter - position mode parameter

P03.01	Name	Source of position cmd			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Source of position cmd
0	pulse command
1	multi-segment position plan
2	through an IO switching pulse and an internal multi-segment position planning command
3	pulse command add second encoder pulse count
4	pulse command add internal multi-segment position planning command

P03.02	Name	pulse pattern			Set moment	Disable to set	Access	RW
	Range	0~4	unit	-	active	Immediately	default	2

					moment			

Setting	pulse pattern
0	0- pulse count & pulse direction positive
1	1- pulse count & pulse direction negative
2	2- AB pulse
3	3- CW+CCW positive
4	4- CW+CCW negative

P03.03	Name	Command pulse hardware filter			Set moment	Disable to set	Access	RW
	Range	0~32767	unit	20ns	active moment	Immediately	default	50

P03.04	Name	Command pulse count value			Set moment	-	Access	RO
	Range	-2147483647~ 2147483647	unit	-	active moment	-	default	-

P03.06	Name	Position command given median filter time constant			Set moment	set when stop	Access	RW
	Range	0~128	unit	ms	active moment	Immediat ely	default	0

P03.07	Name	Position command given low-pass filter time constant			Set moment	set when stop	Access	RW
	Range	0~32767	unit	ms	active moment	Immediat ely	default	20

P03.08	Name	Electronic gear ratio 1 numerator			Set moment	anytime	Access	RW
	Range	1~2147483647	unit	-	active moment	Immediat ely	default	1000

P03.10	Name	Electronic gear ratio 1 denominator			Set moment	anytime	Access	RW
	Range	1~2147483647	unit	-	active moment	Immediat ely	default	1000

P03.12	Name	Electronic gear ratio 2 numerator			Set moment	anytime	Access	RW
	Range	1~2147483647	unit	-	active moment	Immediat ely	default	1000

P03.14	Name	Electronic gear ratio 2 denominator			Set moment	anytime	Access	RW
	Range	1~2147483647	unit	-	active moment	Immediately	default	1000

P03.16	Name	electronic gear ratio switching filter time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	0

P03.17	Name	Position error （0.0001round）			Set moment	-	Access	RO
	Range	-	unit	0.0001round	active moment	-	default	-

P03.19	Name	Maximum position error threshold（0.0001round）			Set moment	anytime	Access	RW
	Range	0~2147483647	unit	-	active moment	Immediately	default	30000
When set to 0, position error protection is not performed.								

P03.21	Name	Position error clear signal INFn.25 pattern			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Position error clear signal INFn.25 pattern
0	clear position error when INFn.25 is active
1	clear postion error when INFn.25 from deactive to active
2	clear position error when INFn.25 is deactive
3	clear postion error when INFn.25 from active to deactive

P03.22	Name	Position error clear option			Set moment	anytime	Access	RW
	Range	0~6	unit	-	active moment	Immediately	default	0

Setting	Position error clear option
0	clear postion error and speed cmd fored to zero
1	Reserved
2	reserved
3	Reserved
4	Clear the position error while the speed drops to zero in a straight line, and the falling time is set by P02.16.
5	Reserved
6	Clear the position error, and the speed will drop to zero with the quadratic curve. The fall time is set by P02.16

P03.23	Name	The time to confirme The position command speed is 0			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	0
This parameter is used with OUTFn.33。								

P03.31	Name	Enable full closed loop			Set moment	Disable to set	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Enable full closed loop
0	does not enable full closed loop
1	Enable full closed loop

P03.32	Name	Full closed loop mode			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Full closed loop mode
0	semi-closed loop
1	full closed loop;
2	Switch full-closed and semi-closed according to IO

IO is invalid, servo runs in semi-closed loop, adopts electronic gear ratio 1; IO is valid, servo runs in full closed loop, adopts electronic gear ratio 2。

P03.33	Name	Full closed loop feedback polarity			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active	Immediat	default	0

					moment	ely		

Setting	Full closed loop feedback polarity
0	0- The values of the motor encoder counter and the second encoder counter are incremented or decremented simultaneously
1	1- The value of the motor encoder counter are incremented and the second encoder counter are decremented simultaneously

P03.34	Name	The number of pulses of the second encoder corresponding to one revolution of the motor			Set moment	anytime	Access	RW
	Range	1~2147483647	unit	-	active moment	Immediat ely	default	10000

P03.36	Name	Full closed loop position error excessive threshold （unit is 0.0001round）			Set moment	anytime	Access	RW
	Range	0~2147483647	unit	-	active moment	Immediat ely	default	10000
The full closed loop position error refers to (the count value of the motor encoder - converted to the second encoder value of the motor encoder), which represents the relative slip between the material and the motor. When this parameter is set to 0, full-closed position error over-protection is not performed.								

P03.38	Name	Full closed loop position error			Set moment	-	Access	RO
	Range	-	unit	0.0001 周	active moment	-	default	-

P03.40	Name	Full closed loop position error clearing revolution			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediat ely	default	20
This value is valid when in the fully closed loop state. When set to 0, the full closed loop position error is not cleared; when set to n, when the motor rotates every n revolutions, if the absolute value of the full closed loop position error is less than P03.36, the full closed loop position error will be cleared.								

P03.41	Name	motor encoder speed for Full closed loop control	Set moment	-	Access	RO

	Range	-	unit	clk/5ms	active moment	-	default	-

P03.42	Name	Second encoder speed for Full closed loop control			Set moment	-	Access	RO
	Range	-	unit	clk/5ms	active moment	-	default	-

P03.45	Name	Positioning completion signal output condition			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Positioning completion signal output condition
0	Output when the position error is less than the positioning completion threshold, otherwise clear the output;
1	Output whenThe position error is smaller than the positioning completion threshold and the speed command in position mode P03.95 is zero, otherwise the output is cleared;
2	Output when The position error is less than the positioning completion threshold and the filtered speed command in position mode P03.96 is zero, otherwise the output is cleared;
3	Output when the position error is less than the positioning completion threshold and the speed command in position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero

P03.46	Name	positioning completion threshold （unit is 0.0001 round）			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10

P03.47	Name	Positioning close signal output condition			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Positioning close signal output condition
0	Output when the position error is less than the positioning close threshold, otherwise clear the output;
1	Output whenThe position error is smaller than the positioning close threshold and the speed command in position mode P03.95 is zero, otherwise the output is cleared;

	2	Output when The position error is less than the positioning close threshold and the filtered speed command in position mode P03.96 is zero, otherwise the output is cleared;	
	3	Output when the position error is less than the positioning close threshold and the speed command in position mode P03.95 is zero. Clear output when speed command in position mode P03.95 is not zero	

P03.48	Name	positioning close threshold （unit is 0.0001round）			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	100

P03.49	Name	positioning completion/close threshold time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	10
In the position control mode, when the servo is running, the absolute value of the position error P03.17 is within the positioning completion/close threshold, and after P03.49 (positioning completion/close time threshold) is maintained, the servo will be Output positioning completion/close signal								

P03.51	Name	Homing method			Set moment	Disable to set	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	1

P03.52	Name	Homing acceleration and deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P03.53	Name	First homing speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P03.54	Name	Second homing speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	100

P03.55	Name	Homing offset			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	0

P03.57	Name	Zero point range			Set moment	anytime	Access	RW
	Range	0~32767	unit	0.0001 周	active moment	Immediately	default	5

P03.73	Name	Enable software over travel limit			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Enable software travel limit
0	does not enable software over travel limit
1	enable software travel limit when power on
2	Enable software travel limit after homing complete

P03.74	Name	Software travel limit lower limit			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	-	active moment	Immediately	default	-10000000

P03.76	Name	Software travel limit upper limit			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	-	active moment	Immediately	default	10000000

P03.78	Name	Servo pulse output source selection			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Output pulse type
0	0-output motor encoder pulse;
1	1-output pulse command;
2	2-do not output,as input port

P03.79	Name	division factor			Set moment	anytime	Access	RW
	Range	1~65535	unit	-	active moment	Immediately	default	-

If the motor type is incremental, this value indicates the number of motor encoder output pulses when the pulse output terminal outputs 1 pulse. If the motor is an absolute value of the encoder type, this value indicates the number of pulses output from the pulse output terminal when the motor rotates one revolution, and the Z-point output port outputs a Z-point pulse. This value is only valid for the motor pulse division, invalid for the command pulse, the incremental encoder defaults to 1; the absolute encoder defaults to 10。

P03.80	Name	Pulse output direction			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Pulse output direction
0	0-normal output,
1	1-inverted output.

P03.81	Name	Z pulse polarity selection			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Z pulse polarity selection
0	0- postive
1	1- negtive

P03.82	Name	Enale Cubic speed curve			Set moment	Disable to set	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Enale Cubic speed curve
0	0- use trapezoidal velocity curve
1	1- use Cubic speed curve

P03.90	Name	Actual Position (customize unit)			Set moment	-	Access	RO
	Range	-2147483647 ~ 2147483647	unit	-	active moment	-	default	-

P03.94	Name	Position error after filter			Set moment	-	Access	RO
	Range	-32767~32767	unit	clk	active moment	-	default	-

P03.95	Name	Speed command display in position mode			Set moment	-	Access	RO
	Range	-	unit	rpm	active moment	-	default	-
Speed command monitoring in position mode								

P03.96	Name	Speed command display after filter in position mode			Set moment	-	Access	RO
	Range	-	unit	rpm	active moment	-	default	-
Speed command display after filter in position mode								

10.5 P04 group parameter - speed mode related parameters

P04.01	Name	Speed command source			Set moment	anytime	Access	RW
	Range	0~7	unit	-	active moment	Immediately	default	0

Setting	Speed command source
0	main speed A
1	auxiliary speed B
2	INFn.12 switch A/B
3	A+B
4	P08.17
5	mulit speed
6	UP/DOWN speed mode
7	sin wave

P04.02	Name	main speed A source	Set	anytime	Access	RW

					moment			
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	main speed A source
0	from P04.03
1	from AI1
2	from AI2
3	from AI3
4	from pulse frequency

P04.03	Name	Digit setting of main speed A			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	500

P04.04	Name	auxiliary speed B source			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	auxiliary speed B source
0	from P04.05
1	from AI1
2	from AI2
3	from AI3
4	from pulse frequency

P04.05	Name	Digital setting of auxiliary speed B			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	500

P04.06	Name	source of postive speed limiting			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	source of postive speed limiting
0	main postive speed limiter A

1	auxiliary reverse speed limiter B	
2	A/B switch	
3	both A and B are limiter	

P04.07	Name	Soure of main postive speed limiter A			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Soure of main postive speed limiter A
0	from P04.08
1	fromAI1
2	fromAI2
3	fromAI3

P04.08	Name	Digital value of postive speed limiter A			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediatel y	default	3000

P04.09	Name	Soure of auxiliary postive speed limiter B			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Soure of auxiliary postive speed limiter B
0	fromP04.10
1	fromAI1
2	fromAI2
3	fromAI3

P04.10	Name	Digital value of postive speed limiter B			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediatel y	default	3000

P04.11	Name	source of negative speed limiting			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	source of negative speed limiting
0	main negative speed limiter A

1	auxiliary negative speed limiter B	
2	A/B switch	
3	both A and B are limiter	

P04.12	Name	Source of main negative speed limiter A,			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of main negative speed limiter A,
0	from P04.13
1	from AI1
2	from AI2
3	from AI3

P04.13	Name	Digital value of main negative speed limiter A			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	3000

P04.14	Name	Source of auxiliary negative speed limiter B			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of auxiliary negative speed limiter B
0	from P04.15
1	from AI1
2	from AI2
3	from AI3

P04.15	Name	Digital value of auxiliary negative speed limiter B			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	3000

P04.16	Name	JOG speed	Set moment	anytime	Access	RW

	Range	0~32767	unit	rpm	active moment	Immediately	default	20
Note that this value will be modified when the test run is jogged, but will not be saved.								

P04.17	Name	acceleration time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	500

P04.18	Name	deceleration time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	500

P04.20	Name	Speed command first-order filtering time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	20

P04.21	Name	Filtered speed value			Set moment	-	Access	RO
	Range	0~32767	unit	rpm	active moment	-	default	-

P04.22	Name	Speed display filter time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	300

P04.23	Name	Speed arrival threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	1000

P04.24	Name	Speed consistent threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	10

P04.25	Name	Zero speed threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active	Immediatel	default	5

					moment	y		

P04.26	Name	Zero speed threshold for position lock			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	5

P04.27	Name	Lifting speed threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm/s	active moment	Immediately	default	375
When the acceleration/deceleration is greater than the threshold, the output speed/deceleration signal is output, unit: rpm per second.								

10.6 P05 group parameter - torque mode related parameters

P05.01	Name	Torque command source			Set moment	anytime	Access	RW
	Range	0~5	unit	-	active moment	Immediately	default	0

Setting	Torque command source
0	main torque command A
1	auxiliary torque command B
2	INFn.03 switching A/B
3	A+B
4	from P08.16

P05.02	Name	Source of main torque command A			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of main torque command A
0	from P05.03
1	from AI1
2	from AI2
3	from AI3

P05.03	Name	Digital value of main torque command A	Set moment	anytime	Access	RW

	Range	-300.0~300.0	unit	%	active moment	Immediately	default	0.0

P05.04	Name	Source of auxiliary torque command B			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of auxiliary torque command B
0	from P05.05
1	from AI1
2	from AI2
3	from AI3

P05.05	Name	Digital value of auxiliary torque command B			Set moment	anytime	Access	RW
	Range	-300.0~300.0	unit	%	active moment	Immediately	default	0.0

P05.10	Name	Torque limit method			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Torque limit method
0	Forward and reverse limit are from positive limiting
1	Forward and reverse limit separately

P05.11	Name	Positive torque limiting source			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Positive torque limiting source
0	Forward Limit A
1	Forward limiter B
2	A/B switching
3	A and B are simultaneously limit

P05.12	Name	Source of positive torque limit A			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of forward torque limit A
0	from P05.13
1	from AI1
2	from AI2
3	from AI3

P05.13	Name	Set value of positive torque limiter A			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	150.0

P05.14	Name	Positive Torque Limit B Source			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Forward Torque Limit B Source
0	from P05.15
1	from AI1
2	from AI2
3	from AI3

P05.15	Name	Set value of positive torque limiter B			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	150.0

P05.16	Name	Reverse torque limiting source			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Reverse torque limiting source
0	Reverse Limit A
1	Reverse limit B
2	A/B switching
3	A and B are simultaneously limit

P05.17	Name	Source of reverse torque limit A			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Source of reverse torque limit A
0	from P05.18
1	from AI1
2	from AI2
3	from AI3

P05.18	Name	Set value of reverse torque limiter A			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	150.0

P05.19	Name	Reverse Torque Limit B Source			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

Setting	Reverse Torque Limit B Source
0	from P05.20
1	from AI1
2	from AI2
3	from AI3

P05.20	Name	Set value of reverse torque limiter B			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	150.0

P05.25	Name	Time threshold for torque mode switching to speed mode			Set moment	anytime	Access	RW
	Range	0~32767	unit	0.25ms	active moment	Immediately	default	10

When the magnitude of the speed exceeds the speed limit plus the speed limit speed threshold (P05.26) and lasts (P05.25) ms, the speed loop is constructed to converge the speed within the limit.

P05.26	Name	Speed limit speed threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	30

When the magnitude of the speed exceeds the speed limit plus the speed limit speed threshold (P05.26) and lasts (P05.25) ms, the speed loop is constructed to converge the speed within the

limit.

P05.27	Name	Time threshold for speed mode switching to torque mode			Set moment	anytime	Access	RW
	Range	0~32767	unit	0.25ms	active moment	Immediately	default	200
When the servo is running in the torque mode, but due to the speed limit, after constructing the speed loop, the time threshold for switching from the speed mode to the torque mode is determined by P05.27.								

P05.28	Name	Speed limit low pass filter time parameter			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	reset takes effect	default	500
When the speed limit is changed, the speed limit value is low-pass filtered. The filter time is determined by P05.28. The larger the filter time, the slower the speed limit value changes.								

P05.31	Name	Base value for torque arrival			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	50.0

P05.32	Name	Valid value for torque arrival			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	10.0

P05.33	Name	Invalid value for torque arrival			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	0.0

P05.35	Name	Maximum output limit of torque that suppresses jitter			Set moment	anytime	Access	RW
	Range	0~10.0	unit	%	active moment	Immediately	default	0.0

P05.36	Name	Percentage of gain that suppresses jitter			Set moment	anytime	Access	RW
	Range	0~10.0	unit	%	active	Immediatel	default	0.0

					moment	y		

P05.37	Name	time constant for detect Jitter speed			Set moment	anytime	Access	RW
	Range	0~10.0	unit	%	active moment	Immediatel y	default	0.0
	Jitter with a period less than this time will be suppressed							

P05.38	Name	detected Jitter speed			Set moment	anytime	Access	RO
	Range	-	unit	Rpm	active moment	Immediatel y	default	-

P05.39	Name	Torque output that suppresses jitter			Set moment	anytime	Access	RO
	Range	-	unit	%	active moment	Immediatel y	default	-

10.7 P06 group parameter -Inputs and Outputs Function

P06.01	Name	DI1 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	1

setting	DI function
0	None
1	Enable servo
2	Reset servo
3	Torque AB selector
4	Torque reverse selector
5	Forward torque limit selector
6	Reverse torque limit selector
7	Forward speed limit selector
8	Reverse speed limit selector
9	Positive jog
10	Reverse jog
11	Speed given reverse
12	Main speed AB selector
13	Speed stop input
14	Download ARM program reset

	15	Clear encoder position counter	
	16	Zero position fixed in speed mode	
	17	Multi-speed selector 0	
	18	Multi-speed selector 1	
	19	Multi-speed selector 2	
	20	Multi-speed selector 3	
	21	Position instruction prohibited	
	22	Position command reversal	
	23	Pulse command prohibition	
	24	Electronic gear ratio selector 1	
	25	Position error clear	
	26	Trigger position mode homing	
	27	Multi-segment position trigger signal	
	28	Multi-segment position selector 0	
	29	Multi-segment position selector 1	
	30	Multi-segment position selector 2	
	31	Multi-segment position selector 3	
	32	Position direction in multi-segment position mode	
	33	Reserved	
	34	Return home signal input	
	35	XY pulse tracking and multi-segment position switching in position mode	
	36	Control mode selector 0	
	37	Control mode selector 1	
	38	Enable detection trigger interrupt fixed length signal INFn.40	
	39	Uninterrupted fixed length	
	40	Trigger an input signal that interrupts the fixed length	
	41	First or second set of gain switch	
	42	Reset fault	
	43	Position mode positive limit switch	
	44	Position mode reverse limit switch	
	45	Open-closed switching in full-closed mode	
	46	FPGA download program reset	
	47	Tension compensation direction	
	48	Tension tracking direction	
	49	Forced to limit at maximum compensation speed	
	50	Prohibit roll diameter calculation	
	51	Change volume	
	52	Initial roll diameter switch	
	53	Clear feed length	

	54	Forced fast tightening	
	55	No tension compensation in closed loop speed mode	
	56	Electronic gear ratio selector 2	
	57	Motor overheating	
	58	Emergency stop input	
	59	Internal trigger reset	
	60	Internal trigger set	
	61	Internal counter count pulse	
	62	Internal counter clear	
	63	UPDOWN mode UP signal in speed mode	
	64	UPDOWN mode DOWN signal in speed mode	
	65	UPDOWN mode speed hold signal in speed mode	
	66	Speed stack enable	
	67	Correct all zero drift of AI	
	68	Tension closed loop speed / torque mode switching	

P06.02	Name	DI2 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	42
For details on the DI configuration, see P06.01.								

P06.03	Name	DI3 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.04	Name	DI4 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.05	Name	DI5 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.06	Name	DI6 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.07	Name	DI7 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.08	Name	DI8 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.09	Name	DI9 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.								

P06.10	Name	DI10 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the DI configuration, see P06.01.。This DI is a high speed input DI.								

P06.13	Name	DI terminal valid status			Set moment	-	Access	RO
	Range	0~1023	unit	-	active moment	-	default	-
Displayed in decimal format, converted to binary format, containing 0-9 digits, low to high indicates the state of digital output terminals DI1~DI10, 0=OFF, 1=ON, the 0th bit corresponds to DI1,..., 9 bits correspond to DI10.								

P06.14	Name	DI forced input			Set moment	anytime	Access	RW
	Range	0~1023	unit	-	active moment	Immediately	default	0

Input in decimal (BCD) format, converted to binary (Binary) is the corresponding DIx input signal. For example: P06.14=42 (BCD)=0000101010 (Binary), indicating DI2, DI4 and DI6 terminals are ON.

P06.15	Name	DI Actual terminal level			Set moment	-	Access	RO
	Range	0~1023	unit	-	active moment	-	default	-
Displayed in decimal format, converted to binary format, containing 0-9 digits, low to high indicates the state of digital output terminals DI1~DI10, 0=OFF, 1=ON, the 0th bit corresponds to DI1,..., 9 bits correspond to DI10.								

P06.16	Name	High speed DI filter configuration			Set moment	anytime	Access	RW
	Range	1~32767	unit	us	active moment	Immediately	default	10
When the high-speed pulse input terminal is in the peak interference, the spike interference can be filtered out by setting P06.16. INFn.34 and INFn.40 are high-speed DI signals whose filtering time is determined by P06.16; other input signals are low-speed DI signals, and the filtering time is determined by P06.17.								

P06.17	Name	Low speed DI filter configuration			Set moment	anytime	Access	RW
	Range	1~32767	unit	us	active moment	Immediately	default	1000

P06.21	Name	DI1 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.22	Name	DI2 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.23	Name	DI3 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.24	Name	DI4 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.25	Name	DI5 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.26	Name	DI6 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.27	Name	DI7 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.28	Name	DI8 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.29	Name	DI9 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.30	Name	DI9 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Active low
1	Active high

P06.40	Name	DO1 and DO2 function configuration registers			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

setting	Function type
0	DO1, DO2 function output configured with P06.41, P06.42 respectively
1	DO1, DO2 output A, B pulse respectively
2	DO1 outputs Z point signal, DO2 functions output with P06.42 configuration

P06.41	Name	DO1 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	9

setting	DO function
0	None
1	Drive is enabling
2	Speed has arrived
3	Speed is falling
4	Speed is rising
5	Speed is at zero speed
6	Speed overrun
7	Speed forward
8	Speed reversal
9	Fault output
10	Forward speed limit in torque mode
11	Negative speed limit in torque mode
12	Speed limit in torque mode
13	Positioning completion output
14	Positioning close to the output
15	return home completed output
16	Position error too large output
17	Interrupt fixed length output
18	Software limit output
24	Brake output
25	Input command is valid
26	Often OFF
27	Always ON
28	Torque limit output
29	Torque arrival
30	Internal trigger status
31	Internal counter count arrives
32	Consistent speed
33	Pulse position command is zero output

P06.42	Name	DO2 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	13
For details on the configuration of the DO, see P06.41.								

P06.43	Name	DO3 function control	Set	anytime	Access	RW

		register			moment			
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the configuration of the DO, see P06.41.								

P06.44	Name	DO4 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the configuration of the DO, see P06.41.								

P06.45	Name	DO5 function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the configuration of the DO, see P06.41.								

P06.46	Name	DO function control register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
For details on the configuration of the DO, see P06.41.								

P06.49	Name	DO terminal valid status			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-
Displayed in decimal format, after conversion to binary format, it contains 0-5 digits. The low to high digits indicate the state of digital output terminals DO1~DO6, 0=OFF, 1=ON, and the 0th bit corresponds to DO1,..., 5 bits correspond to DO6.								

P06.50	Name	DO forced output			Set moment	anytime	Access	RW
	Range	0~63	unit	-	active moment	Immediately	default	0
When the DO forced output is valid, this parameter is used to set whether the DO function is valid. Input in decimal (BCD) format, converted to binary (Binary) is the corresponding DOx input signal. For example: P06.50=42 (BCD)=101010 (Binary), indicating that DO2, DO4 and DO6 output are ON.								

P06.51	Name	DO1 active level	Set moment	anytime	Access	RW

	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.52	Name	DO2 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.53	Name	DO3 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.54	Name	DO4 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.55	Name	DO5 active level			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.56	Name	DO6 active level	Set	anytime	Access	RW

					moment			
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Level validity
0	Active low
1	Active high

P06.61	Name	AI1 input voltage			Set moment	-	Access	RO
	Range	0~10000	unit	mV	active moment	-	default	-

P06.62	Name	AI2 input voltage			Set moment	-	Access	RO
	Range	0~10000	unit	mV	active moment	-	default	-

P06.63	Name	AI3 input voltage			Set moment	-	Access	RO
	Range	0~10000	unit	mV	active moment	-	default	-

P06.64	Name	AI1 bias			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.65	Name	AI1 dead zone			Set moment	anytime	Access	RW
	Range	-5000~5000	unit	mV	active moment	Immediately	default	0

P06.66	Name	AI1 magnification			Set moment	anytime	Access	RW
	Range	-3276.7~3276.7	unit	%	active moment	Immediately	default	100.0

P06.67	Name	AI1 low pass filter time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	2

P06.68	Name	AI1 zero drift			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.69	Name	AI2 bias			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.70	Name	AI2 dead zone			Set moment	anytime	Access	RW
	Range	0~5000	unit	mV	active moment	Immediately	default	0

P06.71	Name	AI2 magnification			Set moment	anytime	Access	RW
	Range	-3276.7~3276.7	unit	%	active moment	Immediately	default	100.0

P06.72	Name	AI2 low pass filter time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	2

P06.73	Name	AI2 zero drift			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.74	Name	AI3 bias			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.75	Name	AI3 dead zone			Set moment	anytime	Access	RW
	Range	0~5000	unit	mV	active moment	Immediately	default	0

P06.76	Name	AI3 magnification	Set moment	anytime	Access	RW

	Range	-3276.7~3276.7	unit	%	active moment	Immediately	default	100.0

P06.77	Name	AI3 low pass filter time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	2

P06.78	Name	AI3 zero drift			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.79	Name	Automatic zero drift correction			Set moment	anytime	Access	RW
	Range	0~6	unit	-	active moment	Immediately	default	0

Setting	AI automatically corrects zero drift mode
0	Reserved
1	Automatically correct AI1 zero drift once
2	Automatically correct AI2 zero drift once
3	Automatically correct AI3 zero drift once
4	Immediately correct AI1 AI2 AI3 zero drift once
5	Automatically correct current sensor zero drift once
6	Clear the correction current sensor immediately

P06.80	Name	AO1 offset			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	0

P06.81	Name	AO1 magnification			Set moment	anytime	Access	RW
	Range	-1000.0~1000.0	unit	%	active moment	Immediately	default	100

P06.82	Name	AO2 bias			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	mV	active moment	Immediately	default	100

P06.83	Name	AO2 magnification			Set moment	anytime	Access	RW
	Range	-1000.0~1000.0	unit	%	active moment	Immediately	default	100

P06.84	Name	AO1 configuration register value			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	-	active moment	Immediately	default	0

setting	Configuration type
0	Actual speed, 1mv corresponds to 1rpm
1	Speed loop speed command, 1mv corresponds to 1rpm
2	Torque command, 1mv corresponds to 0.1% rated torque
3	Position error before filtering, 1mv corresponds to 1 motor encoder pulse
4	Position error after filtering, 1mv corresponds to 1 motor encoder pulse
5	Feed forward speed, 1mv corresponds to 0.1% rated speed
6	Position command speed, 1mv corresponds to 1rpm
7	Filtered position command speed, 1mv corresponds to 1rpm
8	Instantaneous value of phase A current, 1mV corresponds to 0.1A
9	Instantaneous value of phase B current, 1mV corresponds to 0.1A
10	Torque feedback, 1mv corresponds to 0.1% rated torque
10000	Direct output 10V
-10000	Direct output -10V

P06.85	Name	AO2 configuration register value			Set moment	anytime	Access	RW
	Range	-10000~10000	unit	-	active moment	Immediately	default	0

setting	Configuration type
0	Actual speed, 1mv corresponds to 1rpm
1	Speed loop speed command, 1mv corresponds to 1rpm
2	Torque command, 1mv corresponds to 0.1% rated torque
3	Position error before filtering, 1mv corresponds to 1 motor encoder pulse

	4	Position error after filtering, 1mv corresponds to 1 motor encoder pulse
	5	Feed forward speed, 1mv corresponds to 0.1% rated speed
	6	Position command speed, 1mv corresponds to 1rpm
	7	Filtered position command speed, 1mv corresponds to 1rpm
	8	Instantaneous value of phase A current, 1mV corresponds to 0.1A
	9	Instantaneous value of phase B current, 1mV corresponds to 0.1A
	10	Torque feedback, 1mv corresponds to 0.1% rated torque
	10000	Direct output 10V
	-10000	Direct output -10V

P06.86	Name	AD minimum of internal amplifier tension input			Set moment	anytime	Access	RW
	Range	0~4095	unit	-	active moment	Immediately	default	0

P06.87	Name	Internal amplifier tension input AD maximum			Set moment	anytime	Access	RW
	Range	0~4095	unit	-	active moment	Immediately	default	4095

P06.88	Name	Internal amplifier tension input filter time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	20

P06.89	Name	AD value of internal amplifier tension input			Set moment	-	Access	RO
	Range	0~4095	unit	-	active moment	-	default	-

P06.91	Name	Final AI1 input value percentage			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	%	active moment	-	default	-

P06.92	Name	Final AI2 input value percentage	Set moment	-	Access	RO

	Range	-3276.7~3276.7	unit	%	active moment	-	default	-

P06.93	Name	Final AI3 input value percentage			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	%	active moment	-	default	-

10.8 P07 group parameters - loop control parameters

P07.01	Name	Current loop proportional gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	100
This value is factory set and is not recommended for modification.								

P07.02	Name	Current loop integral gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	20
This value is factory set and is not recommended for modification.								

P07.03	Name	Speed loop proportional gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	600

P07.04	Name	Speed loop integral gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	50

P07.05	Name	Position loop proportional gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	200

P07.06	Name	Position loop maximum output speed percentag			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	100.0

P07.07	Name	Output voltage filtering time			Set moment	anytime	Access	RW
	Range	0~300.0	unit	ms	active moment	Immediately	default	0

P07.08	Name	Torque feedforward filter time constant			Set moment	anytime	Access	RW
	Range	0~63	unit	ms	active moment	Immediately	default	10
This value is the angular acceleration filtering time for torque feedforward.								

P07.09	Name	Speed feedforward filter time constant			Set moment	anytime	Access	RW
	Range	0~63	unit	-	active moment	Immediately	default	10

P07.10	Name	Torque feed forward coefficient			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P07.11	Name	Speed feedforward coefficient			Set moment	anytime	Access	RW
	Range	0~300.0	unit	-	active moment	Immediately	default	50.0

P07.12	Name	Torque filter type			Set moment	anytime	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Torque filter type
0	low pass filtering
1	notch filter
2	no filter

P07.13	Name	Torque low pass filter time constant			Set moment	anytime	Access	RW
	Range	0~327.67	unit	ms	active moment	Immediately	default	0.80

P07.14	Name	Notch filter 1 notch	Set	anytime	Access	RW

		frequency			moment			
	Range	0~1000	unit	Hz	active moment	Immediately	default	200

P07.15	Name	Notch filter 1 notch depth			Set moment	anytime	Access	RW
	Range	0~100.0	unit	%	active moment	Immediately	default	10.0

P07.16	Name	Notch filter 1 notch width			Set moment	anytime	Access	RW
	Range	0~100.0	unit	%	active moment	Immediately	default	50.0

P07.17	Name	Notch filter 2 notch frequency			Set moment	anytime	Access	RW
	Range	0~1000	unit	ms	active moment	Immediately	default	0

P07.18	Name	Notch filter 2 notch depth			Set moment	anytime	Access	RW
	Range	0~100.0	unit	%	active moment	Immediately	default	50.0

P07.19	Name	Notch filter 2 notch width			Set moment	anytime	Access	RW
	Range	0~100.0	unit	%	active moment	Immediately	default	50.0

P07.20	Name	Gain adjustment mode			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	Immediately	default	0

setting	Gain adjustment mode
0	fixed first set of gain: P07.03 to P07.05
1	First or second set of gain switching
2	Automatic calculation of a set of gains based on stiffness level and load inertia (normal mode)
3	Automatic calculation of a set of gains based on stiffness level and load inertia (positioning mode)

P07.21	Name	Second set of speed loop	Set	anytime	Access	RW

		proportional gain			moment			
	Range	0~32767	unit	-	active moment	Immediately	default	800

P07.22	Name	Second set of speed loop integral gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10

P07.23	Name	Second set of position loop proportional gain			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	200

P07.24	Name	Gain switching condition			Set moment	anytime	Access	RW
	Range	0~6	unit	-	active moment	Immediately	default	0

设定值	增益切换条件
0	IO switching; INFn.41 is valid with a second set of gain
1	When the torque command is large, switch to the second set of gains; When the torque command is greater than (gain switching level P07.25 + gain switching time delay P07.26), switch to the second set of gain; when the torque command is less than (P07.25-P07.26), switch back to the first set of gain .
2	Switch to the second set of gain when the speed command is large; When the speed command is greater than (P07.25+P07.26), switch to the second set of gain; the speed command is less than (P07.25-P07.26), switch back to the first set of gain.
3	When the acceleration command is large, switch to the second set of gains; When the acceleration command is greater than (P07.25+P07.26), switch to the second set of gain; if the acceleration command is less than (P07.25-P07.26), switch back to the first set of gain.
4	Switch to the second set of gain when the speed error is large; When the speed error is greater than (P07.25+P07.26), switch to the second set of gain; the speed error is less than (P07.25-P07.26), switch back to the first set of gain
5	Switch to the second set of gain when the position error is large after filtering;Switching to the second set of gain when the position error after filtering is greater than (P07.25+P07.26); the position error after filtering is less than (P07.25 -P07.26), switching back to the first set of

	gain	
6	Positioning is completed and switched to the second set of gains. No positioning is completed to switch to the first set of gains.	
7	Motor phase switching gain;When the motor phase is in the range of (gain switching level ± gain switching time lag), switch to the second set of gain, and the other phases switch to the first set of gain; the motor phase can be viewed through P09.39	

P07.25	Name	Gain switching level			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P07.26	Name	Gain switching time lag			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P07.27	Name	Gain switching time constant			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	10
The two gain switches are smooth switching. This parameter is the smoothing time parameter.								

P07.28	Name	Rigid rating			Set moment	anytime	Access	RW
	Range	1~31	unit	-	active moment	Immediately	default	10
Set rigid rating.								

P07.29	Name	Load inertia coefficient			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	400
Load inertia coefficient								

P07.30	Name	Zero speed speed gain attenuation / amplification			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	%	active moment	Immediately	default	50.0

P07.31	Name	Zero speed position gain attenuation / amplification			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	%	active moment	Immediately	default	100.0

P07.32	Name	Zero speed decay threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm		Immediately	default	10
When the rotational speed rpm is less than this value, the speed loop, position loop, and current loop gain are attenuated/amplified according to P07.30, P07.31, and P07.34, respectively.								

P07.33	Name	Inertia self-learning acceleration and deceleration time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	500

P07.34	Name	Zero speed current gain attenuation / amplification			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	%	active moment	Immediately	default	0.0

P07.35	Name	Inertia self-learning option			Set moment	anytime	Access	RW
	Range	0~1	unit	%	active moment	Immediately	default	0

setting	Inertia self-learning option
0	After learning the inertia, only learn the torque feed forward coefficient
1	After learning the inertia, a set of gains is automatically calculated based on the stiffness setting and the learned inertia coefficient. P07.03 P07.04 P07.05

P07.38	Name	Self-tuning vibration threshold percentage			Set moment	anytime	Access	RW
	Range	0~32767	unit	%	active moment	Immediately	default	100

P07.39	Name	Self-tuning vibration amplitude			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active	Immediately	default	0

					moment			

P07.50	Name	Torque compensation mode			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	立即有效	default	0

setting	Torque compensation mode
0	Compensate for a fixed value P07.53
1	Compensation by AI1
2	Compensation by AI2
3	Compensation by AI3
4	Automatically compensated by the compensation coefficient

P07.51	Name	Torque compensation filter time			Set moment	anytime	Access	RW
	Range	0~32767	unit	ms	active moment	Immediately	default	10

P07.52	Name	Torque compensation inertia coefficient			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P07.53	Name	Torque compensation fixed value			Set moment	anytime	Access	RW
	Range	-32767~ 32767	unit	-	active moment	Immediately	default	0

P07.54	Name	Torque compensation gain			Set moment	anytime	Access	RW
	Range	-32767~ 32767	unit	%	active moment	Immediately	default	100

P07.90	Name	Actual speed loop proportional gain			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P07.91	Name	Actual speed loop integral gain			Set moment	-	Access	RO
	Range	0~32767	unit	-	active	-	default	-

					moment			

P07.92	Name	Actual position loop proportional gain			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P07.93	Name	Torque compensation final value			Set moment	-	Access	RO
	Range	0~3276.7	unit	-	active moment	-	default	-

P07.95	Name	Recommended current loop proportional gain			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P07.96	Name	Recommended current loop integral gain			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

10.9 P08 group parameters - communication parameters

P08.16	Name	Torque communication given			Set moment	anytime	Access	RW
	Range	-3276.7~3276.7	unit	-	active moment	Immediately	default	0.0

P08.17	Name	speed communication given			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	-	active moment	Immediately	default	0

P08.18	Name	position communication given			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	-	active moment	Immediately	default	0

P08.20	Name	Modbus baud rate	Set	anytime	Access	RW

					moment			
	Range	0~3	unit	bps	active moment	Immediately	default	1

Setting	Modbus 波特率
0	4800
1	9600
2	19200
3	38400

P08.21	Name	Modbus data format			Set moment	anytime	Access	RW
	Range	0~3	unit	-	active moment	reset takes effect	default	1

Setting	Modbus data format
0	No parity, stop bits 2
1	No parity, stop bits 1
2	Even parity, 1 stop bit
3	Odd parity, 1 stop bit

This parameter is valid after reset。

P08.22	Name	Byte order when 32-bit address is accessed			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Byte order when 32-bit address is accessed
0	When a 32-bit address is accessed, the upper 16 bits are in front.
1	When a 32-bit address is accessed, the lower 16 bits are in front.

P08.23	Name	Modbus slave address			Set moment	anytime	Access	RW
	Range	1~255	unit	-	active moment	Immediately	default	1

P08.24	Name	Modbus fault register			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P08.25	Name	Number of bytes in the transmit FIFO buffer			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P08.26	Name	Rs232 baud rate			Set moment	anytime	Access	RW
	Range	0~2	unit	bps	active moment	Immediately	default	2

Setting	Rs232 baud rate
0	9600
1	38400
2	115200

P08.27	Name	MODBUS response delay			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	0

P08.28	Name	MODBUS sampling period delay			Set moment	anytime	Access	RW
	Range	0~5000	unit	500us	active moment	Immediately	default	0

P08.29	Name	RS232 monitor port sends the curve or sends the text			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	RS232 monitor port sends the curve or sends the text
0	sends the curve
1	sends the text

P08.40	Name	CAN baud rate			Set moment	anytime	Access	RW
	Range	125~1000	unit	Kbps	active moment	Immediately	default	500

P08.41	Name	CAN node id	Set moment	anytime	Access	RW

	Range	0~127	unit	-	active moment	Immediately	default	0

10.10 P09 group parameters - advanced debugging parameters

P09.09	Name	Motor speed			Set moment	-	Access	RO
	Range	-	unit	rpm	active moment	-	default	-

P09.16	Name	Z point index counter			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P09.20	Name	Speed loop given			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.21	Name	Speed loop feedback			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.25	Name	D-axis current loop given			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.26	Name	D-axis current loop feedback			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.30	Name	Q-axis current loop given			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.31	Name	Q-axis current loop feedback			Set moment	-	Access	RO
	Range	-	unit	‰	active moment	-	default	-

P09.39	Name	RAW PHASE			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

10.11 P10 group parameters - fault protection parameters

P10.01	Name	Software overcurrent threshold			Set moment	anytime	Access	RW
	Range	0~800.0	unit	%	active moment	Immediately	default	400.0
When the detected current percentage P09.31 is greater than this value, the software overcurrent fault is reported.								

P10.02	Name	Motor overload value			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	%	active moment	Immediately	default	100.0
Set the overload protection point, which is generally set to the motor rated current / drive rated current * 100%.								

P10.03	Name	Stall protection current threshold			Set moment	anytime	Access	RW
	Range	0~300.0	unit	%	active moment	Immediately	default	100
When the driver current percentage P09.31 exceeds this value and the time of P10.04 continues, and the speed is less than 5 rpm, the jam is faulty. This value is recommended to be set to the motor rated current / drive rated current * 100%.								

P10.04	Name	Motor Blocked protection time threshold			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	800

P10.05	Name	Percentage of speed	Set	anytime	Access	RW

					moment			
	Range	0~3276.7	unit	%	active moment	Immediately	default	150.0
When the percentage of the actual speed/rated speed is greater than the overspeed percentage, the overspeed fault is reported.								

P10.06	Name	Drive overheat threshold			Set moment	anytime	Access	RW
	Range	0~3276.7	unit	℃	active moment	Immediately	default	80.0

P10.07	Name	Phase loss protection setting			Set moment	anytime	Access	RW
	Range	0~32767	unit		active moment	Immediately	default	0
When the 0th bit is 1, the output phase loss protection is enabled. When the 1st bit is 1, the input phase loss protection is enabled.								

P10.08	Name	Homing timeout			Set moment	anytime	Access	RW
	Range	0~32767	unit	s	active moment	Immediately	default	0

P10.09	Name	Power-off motor encoder position memory function			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

Setting	Power-off motor encoder position memory selection
0	Power failure does not remember the position of the motor encoder
1	Power-off memory motor encoder position

P10.10	Name	AI zero drift threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	mV	active moment	Immediately	default	500

P10.11	Name	Overload curve selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

P10.20	Name	Current fault code			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

error code	Fault description
Er.100	Software over-current, when the percentage of current detected by software P09.31 is greater than the value set by P10.01, the software over-current fault is reported, and the fault can be shielded by BIT1 of P10.33.
Er.101	Hardware overcurrent
Er.102	Overvoltage, for 220V driver, overvoltage when bus voltage P01.08 is greater than 420V.For 380V drivers, overvoltage is reported when the bus voltage P01.08 is greater than 750V.
Er.103	Undervoltage, undervoltage when the bus voltage P01.08 is less than the rated voltage P01.07*1.414*0.7.
Er.104	The current sensor is faulty. It is detected that the current is not 0 before the relay is turned on for the first time.
Er.105	If the encoder fails and the encoder is not connected, the fault is reported.
Er.106	The EEPROM verify fault, and the fault is reported when the value written to the EEPROM and the value of the read EEPROM are inconsistent.
Er.107	The phase sampling fault is reported when the phase obtained by the HALL switch and the phase obtained by the encoder differ too much.
Er.108	When the FPGA and ARM communication are faulty, the fault is reported when the values written and read by the ARM are inconsistent.
Er.109	If the current changes greatly, the fault is reported when the two samples are separated by 50%.
Er.110	Magnetic encoder failure
Er.111	Current phase sequence learning failure
Er.112	The output is out of phase.
Er.113	Did not scan to Z point during self-learning
Er.114	Z point offset not found
Er.115	Hall code value learning error
Er.117	The driver overheats and reports a driver overheat fault when it detects that the driver temperature P01.10 is greater than the driver overheat threshold P10.06.
Er.118	The line-saving encoder does not have a feedback threshold value at power-on.
Er.119	Motor encoder type does not match
Er.121	RST input phase loss
Er.200	When returns to home, the home signal INFn.34 is not assigned.
Er.201	INFn.xx repeated allocation, one input function bit is assigned to two or more DI
Er.202	Overspeed, when the speed percentage (actual speed / rated speed) exceeds P10.05, the overspeed is reported.
Er.203	The position error is too large. When the position error P03.17 is greater than P03.19 and

	P03.19 is not equal to 0, the fault is reported. Note that it is easy to report this fault if the position is set to a large filter time.
Er.204	Unassigned interrupt fixed length trigger signal INFn.40
Er.205	No return to home before absolute point motion
Er.206	Motor overload
Er.207	Software limit, after enabling the software limit P03.73, when the encoder position value is less than the software limit limit or greater than the software limit limit, report this fault.
Er.208	Hardware limit
Er.209	Curve planning failed
Er.210	Excessive tension
Er.211	Breakage failure
Er.212	XY pulse type selection error in tension control mode
Er.213	Full closed loop position error is too large
Er.214	Prohibit positive (reverse) turn
Er.216	Z point signal is unstable
Er.217	RPDO receive timeout
Er.218	Reserved
Er.219	Motor stall
Er.220	Braking resistor overload
Er.221	The forward stroke switch input function bit INFn.43 is not assigned to the entity DI
Er.222	Reverse stroke switch input function bit INFn.44 is not assigned to entity DI
Er.223	Search home error
Er.224	CAN bus state switching error, switching CiA402 state machine when the bus is in non-Operation state
Er.225	Unsupported CANopen control mode
Er.226	Absolute value mode lap overflow
Er.227	Absolute encoder battery failure
Er.228	Inertia learning failed, need to reset P07.03 and P07.04
Er.229	When learning the full closed loop parameter, the position value detected by the second encoder is too small
Er.231	Bus error
Er.232	Second encoder battery failure
Er.600	Motor overheating
Er.601	DIfunction code is not assigned
Er.602	The AI zero drift is too large. When the AIx zero drift P06.68/P06.73/P06.78 is greater than the threshold P10.10, the zero drift is too large.
Er.603	return home timeout, when the zero return time is greater than P10.08, the fault is reported.
Er.604	When the absolute encoder is self-learning, the motor rotates in the wrong direction and needs to change the UVW wiring.
Er.605	Absolute encoder battery voltage is too low, need to replace the new battery when the

	drive is powered on
Er.606	The second encoder battery voltage is too low, you need to replace the new battery when the drive is powered on.
Er.607	Inertia learning fails, need to increase P07.33 and then learn

P10.21	Name	Fault code for selected x times of failure			Set moment	anytime	Access	RW
	Range	1~5	unit	-	active moment	Immediately	default	5

P10.22	Name	Fault code for selected x times of failure			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P10.23	Name	Time of selected x times of failure			Set moment	-	Access	RO
	Range	0~32767	unit	min	active moment	-	default	-

P10.24	Name	Motor speed of x times selected			Set moment	-	Access	RO
	Range	-32767~32767	unit	rpm	active moment	-	default	-

P10.25	Name	Motor current rms value at selected fault			Set moment	-	Access	RO
	Range	0~3276.7	unit	A	active moment	-	default	-

P10.26	Name	Motor V-phase current at selected fault			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	A	active moment	-	default	-

P10.27	Name	Instantaneous value of W-phase motor current for selected x faults			Set moment	-	Access	RO
	Range	-3276.7~3276.7	unit	A	active moment	-	default	-

P10.28	Name	Bus voltage for selected x faults	Set	-	Access	RO

					moment			
	Range	0~32767	unit	V	active moment	-	default	-

P10.29	Name	Drive temperature for selected x faults			Set moment	-	Access	RO
	Range	0~3276.7	unit	℃	active moment	-	default	-

P10.30	Name	Entity DI status of selected x times of failure			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P10.31	Name	Entity DO status of selected x times of failure			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P10.32	Name	Hardware fault count value			Set moment	-	Access	RO
	Range	0~32767	unit	-	active moment	-	default	-

P10.33	Name	Fault shielding			Set moment	anytime	Access	RW
	Range	0~65535	unit	-	active moment	Immediately	default	12
BIT0 Shield Overload BIT1 Shield Software Overcurrent BIT2 Shield Phase Fault BIT3 Shield Current Change Large BIT4 Shield Hardware Overcurrent BIT5 Shield Speed Change Large BIT6 Shield Z Point Unstable BIT7 Shield SYNC Loss BIT8 Shield Current Sensor Fault BIT9 Shield Undervoltage BIT10 Shield Encoder malfunction								

P10.34	Name	Hardware failure time threshold			Set moment	anytime	Access	RW
	Range	0~32767	unit	20ns	active moment	Immediately	default	250
After the IGBT fault exceeds this time, the fault is reported.								

10.12 P11 group parameters - multi-speed parameters

P11.01	Name	Multi-speed mode			Set moment	Disable to set	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Multi-speed mode
0	0- single-run stop
1	1-cycle run
2	2- IO switch run

P11.02	Name	the total number of speed segments			Set moment	anytime	Access	RW
	Range	1~16	unit	-	active moment	Immediately	default	16

P11.03	Name	Running time unit			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Running time unit
0	ms
1	s

P11.04	Name	Acceleration time 1			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.05	Name	Deceleration time 1			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.06	Name	Acceleration time 2			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.07	Name	Deceleration time 2	Set moment	anytime	Access	RW

	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.08	Name	Acceleration time 3			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.09	Name	Deceleration time 3			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.10	Name	Acceleration time 4			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.11	Name	Deceleration time 4			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P11.12	Name	The 1st speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.13	Name	The 1st speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.								

P11.14	Name	The first speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Using acceleration/deceleration time 2
3	Using acceleration/deceleration time 3
4	Using acceleration/deceleration time 4

P11.15	Name	The 2nd speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.16	Name	The 2nd speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.								

P11.17	Name	The second speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	The second speed acceleration and deceleration time selection
0	0-Use acceleration/deceleration time P04.17 P04.18
1	1- Use acceleration/deceleration time 1
2	2- Using acceleration/deceleration time 2
3	3- Using acceleration/deceleration time 3
4	4- Using acceleration/deceleration time 4

P11.18	Name	The 3rd speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.19	Name	Third speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.								

P11.20	Name	The Third speed acceleration	Set	anytime	Access	RW

		and deceleration time selection			moment			
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Using acceleration/deceleration time 2
3	Using acceleration/deceleration time 3
4	Using acceleration/deceleration time 4

P11.21	Name	The 4th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.22	Name	The 4th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.								

P11.23	Name	The 4th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.24	Name	The 5th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.25	Name	The5th speed command run time	Set moment	anytime	Access	RW

	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.26	Name	The5th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.27	Name	The6th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.28	Name	The 6th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.29	Name	The 6th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.30	Name	The 7th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.31	Name	The 7th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.32	Name	The 7th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.33	Name	The 8th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.34	Name	The 8th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.35	Name	The 8th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.36	Name	The 9th speed command	Set	anytime	Access	RW

					moment			
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.37	Name	The 9th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.38	Name	The 9th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.39	Name	The 10th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.40	Name	The 10th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.41	Name	The 10th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3

4	Use acceleration/deceleration time 4

P11.42	Name	The 11th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.43	Name	The 11th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.44	Name	The 11th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.45	Name	The 12th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.46	Name	The 12th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.47	Name	The 12th speed acceleration and	Set	anytime	Access	RW

		deceleration time selection			moment			
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.48	Name	The 13th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.49	Name	The 13th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.50	Name	The 13th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.51	Name	The 14th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.52	Name	The 14th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10

This parameter unit is set by P11.03.。

P11.53	Name	The 14th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.54	Name	The 15th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.55	Name	The 15th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.56	Name	The 15th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

P11.57	Name	The 16th speed command			Set moment	anytime	Access	RW
	Range	-32767~32767	unit	rpm	active moment	Immediately	default	0

P11.58	Name	The 16th speed command run time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	10
This parameter unit is set by P11.03.。								

P11.59	Name	The 16th speed acceleration and deceleration time selection			Set moment	anytime	Access	RW
	Range	0~4	unit	-	active moment	Immediately	default	0

Setting	acceleration and deceleration time selection
0	Use acceleration/deceleration time P04.17 P04.18
1	Use acceleration/deceleration time 1
2	Use acceleration/deceleration time 2
3	Use acceleration/deceleration time 3
4	Use acceleration/deceleration time 4

10.13 P12 group parameters - virtual DI DO parameters

P12.01	Name	VDI1 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.02	Name	VDI2 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.03	Name	VDI3 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.04	Name	VDI4 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0

The specific function of the VDI port is the same as the DI port function. See P06.01 for details.

P12.05	Name	VDI5 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.06	Name	VDI6 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.07	Name	VDI7 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.08	Name	VDI8 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.09	Name	VDI9 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.10	Name	VDI10 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.11	Name	VDI11 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0

The specific function of the VDI port is the same as the DI port function. See P06.01 for details.

P12.12	Name	VDI12 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.13	Name	VDI13 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.14	Name	VDI14 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.15	Name	VDI15 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.16	Name	VDI16 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.17	Name	VDI20 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
The specific function of the VDI port is the same as the DI port function. See P06.01 for details.								

P12.18	Name	VDI21 function configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0

The specific function of the VDI port is the same as the DI port function. See P06.01 for details.

P12.19	Name	Monitor value of virtual DI20 and virtual DI21.			Set moment	-	Access	RO
	Range	-	unit	-	active moment	-	default	-

P12.20	Name	Virtual DI1-virtual DI16 input value setting register			Set moment	anytime	Access	RW
	Range	0~65535	unit	-	active moment	Immediately	default	0

P12.21	Name	VDI1 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.22	Name	Virtual DI2 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.23	Name	Virtual DI3 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.24	Name	Virtual DI4 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.25	Name	Virtual DI5 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.26	Name	Virtual DI6 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.27	Name	Virtual DI7 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.28	Name	Virtual DI8 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.29	Name	Virtual DI9 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active	Immediately	default	0

					moment			

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.30	Name	Virtual DI10 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.31	Name	Virtual DI11 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.32	Name	Virtual DI12 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.33	Name	Virtual DI13 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.34	Name	Virtual DI14 level type	Set	anytime	Access	RW

					moment			
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.35	Name	Virtual DI15 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.36	Name	Virtual DI16 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.37	Name	Virtual DI20 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.38	Name	Virtual DI21 level type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Write 1 is always valid
1	Valid on rising edge

P12.41	Name	VDO1 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.42	Name	VDO2 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.43	Name	VDO3 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.44	Name	VDO4 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.45	Name	VDO5 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.46	Name	VDO6 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.47	Name	VDO7 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.48	Name	VDO8 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.49	Name	VDO9 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.50	Name	VDO10 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.51	Name	VDO11 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.52	Name	VDO12 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.53	Name	VDO13 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.54	Name	VDO14 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.55	Name	VDO15 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.56	Name	VDO16 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.57	Name	VDO20 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.58	Name	VDO21 configuration register			Set moment	anytime	Access	RW
	Range	0~99	unit	-	active moment	Immediately	default	0
Set the DO function corresponding to VDO1. The VDO specific function is the same as the physical DO function.								

P12.59	Name	Output level of virtual DO20 D021			Set moment	-	Access	RO
	Range	0~3	unit	-	active moment	-	default	-

P12.60	Name	Virtual DO1-DO16 output level			Set moment	anytime	Access	RW
	Range	0~65535	unit	-	active moment	Immediately	default	0

P12.61	Name	Active level of virtual DO1			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.62	Name	Active level of virtual DO2			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.63	Name	Active level of virtual DO3			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.64	Name	Active level of virtual DO4			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.65	Name	Active level of virtual DO5			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.66	Name	Active level of virtual DO6			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.67	Name	Active level of virtual DO7			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.68	Name	Active level of virtual DO8			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.69	Name	Active level of virtual DO9			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active	Immediately	default	0

					moment			

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.70	Name	Active level of virtual DO10			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.71	Name	Active level of virtual DO11			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.72	Name	Active level of virtual DO12			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.73	Name	Active level of virtual DO13			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.74	Name	Active level of virtual DO14			Set moment	anytime	Access	RW

	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.75	Name	Active level of virtual DO15			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.76	Name	Active level of virtual DO16			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.77	Name	Active level of virtual DO20			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.78	Name	Active level of virtual DO21			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	0

setting	Level type
0	Output 1 when valid
1	Output 0 when valid

P12.79	Name	Whether the virtual	Set	anytime	Access	RW

		DI1-DI16 input value register P12.20 is powered on is cleared.			moment			
	Range	0~1	unit	-	active moment	Immediately	default	1

setting	Clear type
0	Virtual DI input value P12.20, not cleared when power is turned on
1	Virtual DI input value P12.20, clear at power-on

10.14 P13 group parameters - multi-segment position parameters

P13.01	Name	Multi-segment position mode			Set moment	Disable to set	Access	RW
	Range	0~2	unit	-	active moment	Immediately	default	0

Setting	Multi-segment position working mode
0	Stop after a single run
1	Cycle operation
2	DI switching operation, read the values of INFn.31, INFn.30, INFn.29, INFn.28 as the segment number.

P13.02	Name	Total number of segments			Set moment	anytime	Access	RW
	Range	1~16	unit	-	active moment	Immediately	default	16

P13.03	Name	Idle waiting time unit			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Idle waiting time unit
0	ms
1	s

P13.04	Name	remainder processing method			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active	Immediately	default	0

					moment			

Setting	remainder processing method
0	Re-jump to the first position command to run
1	From the last stop section

When the multi-segment position function is resumed, the segment number of the start segment is set

P13.05	Name	Absolute or relative position command setting			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	Absolute or relative position command setting
0	Absolute command
1	relative command

P13.10	Name	Number of position commands in the first position segment			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.12	Name	Speed of first position segment			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.13	Name	acceleration time of first position segment			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.14	Name	idle time of first position segment			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.15	Name	Number of position commands in the second position segment	Set moment	anytime	Access	RW

	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.17	Name	Speed of second position segment			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.18	Name	acceleration time of second position segment			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.19	Name	idle time of second position segment			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.20	Name	The 3rd position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.22	Name	The 3th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.23	Name	The 3th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.24	Name	The 3th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.25	Name	The 4th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.27	Name	The 4th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.28	Name	The 4th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.29	Name	The 4th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.30	Name	The 5th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.32	Name	The 5th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.33	Name	The 5th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.34	Name	The 5th idle time	Set	anytime	Access	RW

					moment			
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.35	Name	The 6th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.37	Name	The 6th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.38	Name	The 6th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.39	Name	The 6th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.40	Name	The 7th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.42	Name	The 7th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.43	Name	The 7th acceleration/deceleration time	Set moment	anytime	Access	RW

	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.44	Name	The 7th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.45	Name	The 8th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.47	Name	The 8th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.48	Name	The 8th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.49	Name	The 8th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.50	Name	The 9th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.52	Name	The 9th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.53	Name	The 9th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.54	Name	The 9th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.55	Name	The 10th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.57	Name	The 10th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.58	Name	The 10th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.59	Name	The 10th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.60	Name	The 11th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.62	Name	The 11th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.63	Name	The 11th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.64	Name	The 11th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.65	Name	The 12th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.67	Name	The 12th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.68	Name	The 12th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.69	Name	The 12th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.70	Name	The 13th position commands	Set moment	anytime	Access	RW

	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.72	Name	The 13th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.73	Name	The 13th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.74	Name	The 13th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.75	Name	The 14th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.77	Name	The 14th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.78	Name	The 14th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.79	Name	The 14th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1

unit of this parameter depend on P13.03。

P13.80	Name	The 15th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.82	Name	The 15th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.83	Name	The 15th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.84	Name	The 15th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.85	Name	The 16th position commands			Set moment	anytime	Access	RW
	Range	-2147483647 ~ 2147483647	unit	customize unit	active moment	Immediately	default	10000

P13.87	Name	The 16th speed			Set moment	anytime	Access	RW
	Range	0~32767	unit	rpm	active moment	Immediately	default	500

P13.88	Name	The 16th acceleration/deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.89	Name	The 16th idle time			Set moment	anytime	Access	RW
	Range	0~32767	unit	-	active moment	Immediately	default	1
unit of this parameter depend on P13.03。								

P13.90	Name	The 1st Deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.91	Name	The 2nd Deceleration time			Set moment	anytime	Access	RW
	Range	0~65535	unit	ms	active moment	Immediately	default	500

P13.92	Name	Multi-segment position command trigger signal type			Set moment	anytime	Access	RW
	Range	0~1	unit	-	active moment	Immediately	default	1

Setting	acceleration and deceleration time selection
0	INFn.27 rising edge triggers start multi-segment position; falling edge triggers stop running multi-segment position
1	INFn.27 rising edge trigger start multi-segment position, falling edge does not work