FRECON

SD300P Series Servo Driver User Manual V1.0

Preface

Thank you for using SD300P series servo drive products.

SD300P is an AC servo product with rich functions and powerful performance capable of medium and small power. The power range of this series of products is 0.05kW~7.5kW, and it supports communication protocols such as Modbus. It adopts the corresponding communication interface and cooperates with the host computer to realize the network operation of multiple servo drives.

The product provides functions such as self-adaptive adjustment of rigid table settings, inertia identification, and vibration suppression, making the servo driver easy to use. Cooperating with MS1 series high-response servo motors including small inertia and medium inertia (the motor is equipped with a 23-bit single /multi-turn absolute value photoelectric encoder or 17-bit single /multi-turn absolute value magnetic encoder), the operation is quieter and more stable, and the positioning control is more accurate.

It is suitable for automation equipment in electronics manufacturing, manipulators, packaging, machine tools, and other industries, and realizes fast and accurate position control, speed control, and torque control with a cost-effective solution.

The SD300P driver is designed through overall electromagnetic compatibility, which not only meets the strong anti-electromagnetic interference ability but also meets the user's environmental protection requirements for low noise and low electromagnetic interference in the application place.

This manual provides users with precautions related to installation and wiring, parameter setting, fault diagnosis and elimination, and daily maintenance. In order to ensure the correct installation and operation of the SV-DA200 drive, and to exert its superior performance, please read this manual carefully before installing the driver.

The company reserves the right to continuously improve the product without prior notice.

Note: Unless otherwise specified, it refers to the standard model.

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Safety precautions

Before product storage, installation, wiring, operation, inspection, or maintenance, users must be familiar with and abide by the following important items to ensure the safe use of this product.

Warning Be sure to follow the steps after reading the instruction manual

DANGER Mishandling can be dangerous and result in personal injury or death.

overheated Do not touch the heat sink, otherwise, there is a risk of burns

Grounding contact current can reach 0.5mA, must be reliably grounded before use

	When wiring	●Non-professionals are strictly prohibited from installing, wiring, maintaining, inspecting, or replacing parts!
		●Before wiring, please cut off the power of all equipment. After the power is cut off, there is residual voltage in the internal capacitor of the device. Please wait at least the time specified on the warning label on the product before wiring and other operations. Measure the DC voltage of the main circuit to confirm that it is under a safe voltage, otherwise, there will be a risk of electric shock.
		●Please cut off the power supply when doing wiring work, removing the product cover or touching the circuit board, etc. otherwise there will be a risk of electric shock
		●Please be sure to ensure that the equipment and products are well grounded, otherwise, there will be a risk of electric shock.
	when power on	●Before powering on, please confirm that the product is installed in good condition, the wiring is firm, and the motor device is allowed to restart.
		●Before powering on, please confirm that the power supply meets the product requirements to avoid product damage or fire!
		●It is strictly forbidden to open the product cabinet door or product protective cover, touch any terminal of the product, or disassemble any

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		device or parts of the product while the power is on, otherwise there is a danger of electric shock!
	during installation	●Only professionals who have received relevant training on electrical equipment and have electrical knowledge can operate it. Non-professional operation is strictly prohibited!

	When wiring	●Please follow the steps specified in the electrostatic prevention measures (ESD), and wear an electrostatic wrist strap for wiring and other operations to avoid damage to the equipment or internal circuits of the product.
		●When wiring the control circuit, please use twisted-pair shielded wires, and connect the shielding layer to the grounding terminal of the product for grounding, otherwise, it will cause abnormal operation of the product.
	when power on	●When wiring the control circuit, please use twisted-pair shielded wires, and connect the shielding layer to the grounding terminal of the product for grounding, otherwise, it will cause abnormal operation of the product.
		●Before powering on, please make sure that the rated voltage of the product is consistent with the power supply voltage. There is a risk of fire if the power supply voltage is incorrectly used.
		●Before powering on, please make sure that there are no people around the product, motor, and machinery, otherwise, it may cause personal injury or death.
	during installation	●When installing, please cover the top of the product with cloth or paper to prevent foreign matter such as metal shavings, oil, and water from entering the product during drilling, which may cause product failure. After the operation is finished, please remove the cover to prevent the cover from blocking the ventilation holes and affecting heat dissipation, resulting in abnormal heating of the product.
		●Resonance may occur when performing variable speed operation on a machine operating at a constant speed. At this time, installing anti-vibration rubber under the motor frame or using the vibration suppression function caneffectively reduce the resonance.
		●When you need to install equipment with strong electromagnetic wave interference such as transformers, please install a shielding protection device to avoid malfunction of this product!
		●Before installation, please ensure that the mechanical strength of the installation location is sufficient to support the weight of the equipment, otherwise, it will cause mechanical danger.
		●Do not install this product in places with a strong electric field or strong electromagnetic wave interference!
		●It is strictly forbidden to twist the fixing bolts and red-marked bolts of product parts and components!

		●Refit of this product is strictly prohibited!
		●Please install the product on flame-retardant objects such as metal, and do not let flammable objects touch the product or attach flammable objects to the product, otherwise, there will be a fire hazard.

Precautions

Pay attention to the following safety precautions during installation, wiring, operation, maintenance and inspection:

●Please confirm whether the AC power supply voltage is consistent with the rated voltage of the servo drive, otherwise, there is a risk of injury, fire, or damage to the drive.

●Please fasten the power supply and motor output terminals, otherwise, it may cause a fire.

●It is forbidden to use the product in places exposed to moisture, corrosive gas, and flammable gas. Otherwise, it may cause electric shock or fire

●It is forbidden to connect the input power line to the output terminal, otherwise the driver will be damaged.

●Do not use the product in places exposed to direct sunlight, dust, salt, and metal powder.

●The drive and motor must be connected in the correct phase sequence, otherwise, it will cause drive failure or damage to the drive.

●Before the mechanical equipment starts to operate, it must cooperate with the appropriate parameter setting value. Failure to adjust to proper settings could result in loss of control or failure of mechanical equipment.

●Before starting the operation, please confirm whether the emergency switch can be activated at any time to stop.

●Please test whether the servo motor is running normally under no-load conditions, and then connect the load to avoid unnecessary loss.

●When the motor is running, it is forbidden to touch any rotating parts, otherwise, it will cause casualties.

●Do not touch conductive parts directly. All external cables of the driver, Especially the cables related to strong electricity, must not be connected to the shell or short-circuited with each other, otherwise, there is a risk of electric shock or short circuit.

●During operation, please do not touch the radiator or the external braking resistor, otherwise it may cause burns due to high temperature.

●Be sure to install an overcurrent protector, a leakage current protector, and an emergency stop device, and make sure they are effective after the wiring is completed.

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Content

Chapter 1 Product overview

1.1 Servo drive

1.1.1 Driver overview

SD 300 series servo driver (100W -750W)				
Specification			Description	
power supply	220V system input voltage		AC220V(-15%)~240V(+10%) 50Hz~60Hz AC220V(-15%)~240V(+10%) 50Hz~60Hz	
port	control signal	input	7 inputs	
		output	5 outputs	
	Analogsignal	input	2 inputs	
	Pulse signal	input	1 group (differential input or NPN , PNP input)	
		output	1 group (mode: differential output (A+/A-, B+/B-, Z+/Z-) or open collector output (A, B, Z))	
	Encoder	input	17bit, 23bit absolute encoder, 1394 interface	
	communication function	RS485	standard modbus	
		USB	Communication , connected to host computer (standard configuration)	
control mode			position control	
			speed control	
			torque control	
			Position/speed mode switching	
			Speed /torque mode switching	
			Position/torque mode switching	
function	position control	control input	detention pulse clearing	
			Command pulse input prohibited;	
			Electronic gear ratio switching	
			Vibration control switching, etc.	
		control output	positioning completion output etc.	
		Pulse input	Maximum pulse input frequency	Low speed: 500KHz High speed: 2MHz
			Pulse input method	pulse +direction
				CW+CCW
				Orthogonal coding
			electronic gear	1/10000~1000

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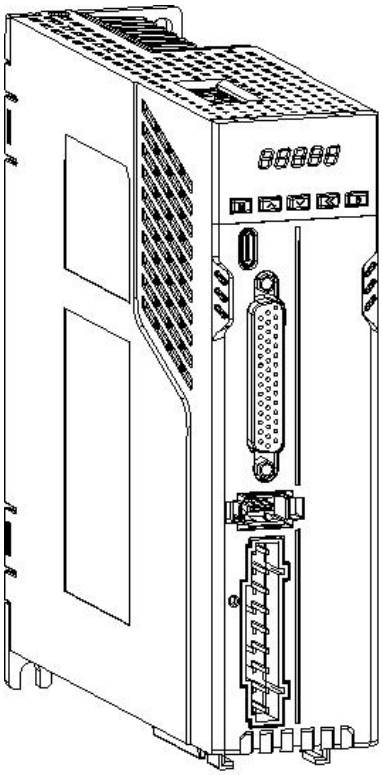
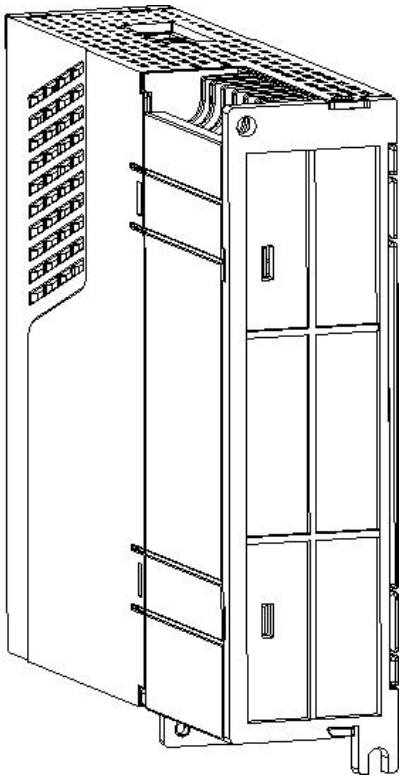
			filter	command smoothing filter
		analog input	Torque limit command input	Torque limitation in clockwise/counterclockwise direction can be performed independently
		Vibration control	Capable of suppressing 5~2000Hz front-end vibration and vibration of the whole machine	
		Pulse output	Arbitrary frequency division settings below the encoder resolution can be performed	
			With A B phase exchange function	
	speed control	control input	Internal command speed selection 1	
			Internal command speed selection 2	
			Internal command speed selection 3	
			zero speed clamp	
		control output	speed arrival	
		Internal speed command	It can switch internal 4 speeds according to external control input	
		Acceleration and deceleration adjustment of speed command	Acceleration and deceleration time can be set individually	
		zero speed clamp	Zero speed clamp function in speed mode, can be set to work in speed mode or position mode	
		Speed command filter	Time-delay filter for analog input speed command	
		Speed command zero drift suppression	Can carry out zero drift suppression on peripheral interference, etc.	
	torque control	analog input	Torque command input	Analog torque command input, gain and polarity can be set according to the analog voltage, up to 16bit resolution
			Speedlimit input	It can perform analog speed limit
		speed limit	Speed limit can be set by parameter	
		Torque command filter	Time-delay filter for analog input torque command	
		Torque command zero drift	Can carry out zero drift suppression on peripheral interference, etc.	

		suppression	
Protect	hardware protection	Overvoltage, undervoltage, overcurrent, overspeed, overload, encoder failure, etc.	
	software protection	Memory failure, initialization failure, excessive position deviation , braking resistor overload, driver overheating , etc.	

1.1.2 Drive outline drawing





1.1.3 Drive front panel

(Figure 1) Applicable models: SD300P-2S, SD300N-2S series

(Figure 2) Applicable models: SD300P-2T, SD300N-2T series

SD300P-4T, SD300N-4T series

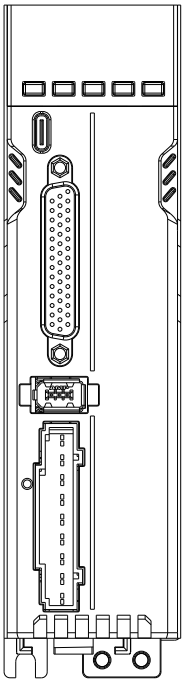


Figure 1

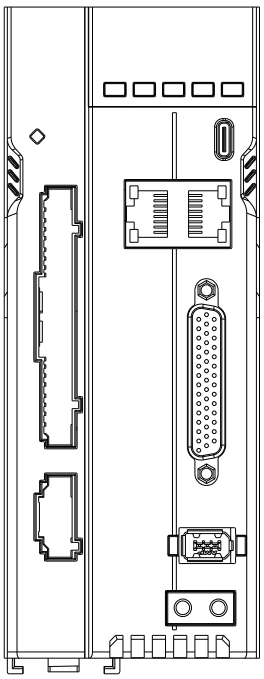


Figure 2

1.1.4 Driver Naming

Pulse type				EtherCat type			
structure	Specifications	Optional motor power KW	rated current	structure	Specifications	Optional motor power KW	rated current
A	SD300P-2S-3R0	0.4	3	A	SD300N-2S-3R0	0.4	3
	SD300P-2S-5R5	0.75	5.5		SD300N-2S-5R5	0.75	5.5
B	SD300P-2T-7R6	1	7.6	B	SD300N-2T-7R6	1	7.6
	SD300P-4T-5R4	1.5	5.4		SD300N-4T-5R4	1.5	5.4
C	SD300P-2T-012	1.5	12	C	SD300N-2T-012	1.5	12
	SD300P-4T-8R5	2	8.5		SD300N-4T-8R5	2	8.5
	SD300P-4T-012	3	12		SD300N-4T-012	3	12
D	SD300P-4T-017	5	17	D	SD300N-4T-017	5	17
	SD300P-4T-021	6	21		SD300N-4T-021	6	21

Model Description:

SD300 P - 2 S - 3R0

① ②③ ④

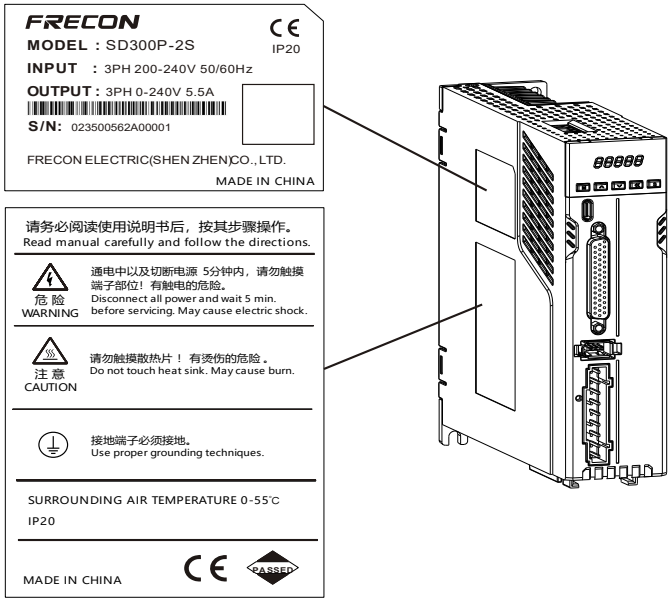
①product series
SD300: SD300 series servo driver
SD100: SD100 series servo driver

②product type
P: pluse type
N: EtherCat network type

③voltage level
2S: 2 phase 220V input
2T: 3 phase 220V input
4T: 3 phase 380V input

④reted output current
3R0: 3.0A
5R5: 5.5A
7R6: 7.6A
5R4: 5.4A
8R5: 8.5A
012: 12A
017: 17A

1.1.5 Drive nameplate



serial number description

02350056 1 C 0001

① ② ③ ④

①internal encoding
Whole machine material code

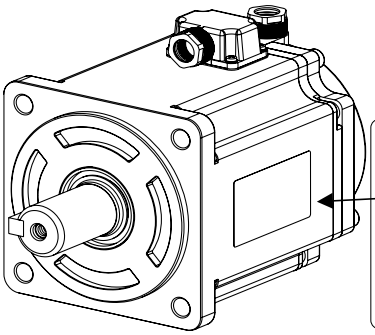
②year of production
1: 2022
2: 2023
3: 2024
.....
A: 2031
B: 2032
.....

③production month
1: January
2: February
3: March
.....
A: October
B: November
C: December

④production quantity of current month
0001 first device
0002 second device device

1.2 Servo motor

Motor nameplate



FRECON AC SERVO MOTOR
MODEL : G3M-06040F25WGAE-S001
Tn : 1.27N.m Pn：0.4kw
In : 2.5A nN：3000rpm
FRECON ELECTRIC(SHENZHEN)CO.,LTD.

⇦ motor model

⇦ motor parameters

Nameplate Description:

F1 M - 40A 30 L 1 00 - A3 60

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

①product series

F1:The first generation of servo motors

F2:The second generation servo motor

②Rotor inertia

H: high inertia

M: Medium inertia

S: small inertia

③Reted power（W）

A: X10

B: X100

For example:40A=400W

……

④Rated speed（W）

15 =1500

20 =2000

25 =2500

30 =3000

……

⑤AC input voltage

L: 220V

H: 380V

⑥brake, oil seal

1: Without brake, without oil seal

2: Without brake, with oil seal

3: With brake, without oil seal

4: With brake, with oil seal

⑦Encoder type

A: Magnetoelectric encoder

B: Photoelectric encoder

1: 17-bit absolute valuesingle-circle

2: 17-bit absolutevaluemultiturn

3: 23-bit absolute value single-circle

4: 23-bit absolute value multiturn

⑧Motor flange

40: 40flange

60: 60flange

80: 80flange

13: 130flange

1.3 Cable

1.3.1 Naming rules for power lines

FM-1 - 0 075 0 3.0 - F

① ② ③ ④ ⑤ ⑥

① Servo drive motor power cable

FM-1: without brake power line

②Driver portplug type

0: U-shaped wire lug

1: needle type lug

③Wire diameter

075: 0.75mm2

100: 1.0mm2

150: 1.5mm2

250: 2.5mm2

400: 4.0mm2

600: 6.0mm2

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④Motor port plug type

0: 4-core aviation plug-in cable

1: 4-core amp plug cable

⑤cable length

3.0: 3m

5.0: 5m

8.0: 8m

10.0 10.0m

20.0 20.0m

⑥cable type

U: common cable

US: Ordinary shielded cable

F: General flexible cable

FS: General flexible shielded cable

H: Highly flexible cable

HS: Highly flexible shielded cable

1.3.2 Encoder line naming rules

FE1 - 0 0 0 - 3.0 - U

① ② ③ ④ ⑤ ⑥

①Servo drive encoder cable

FE1: Without battery encoder cable

②Drive port plug type

0: 1394plug

1: DB15plug

2: DB9plug

③encoder type

0: 4-wire AMP plug line

1: 4-wire aviation plug line

④Motor plug type

0: 6 core amp plug

1: 9core aviation plug

3: 4core aviation plug

4: 4core amp plug

⑤cable length

3.0: 3m

5.0: 5m

8.0: 8m

10.0 10.0m

20.0 20.0m

⑥cable type

U: common cable

US: Ordinary shielded cable

F: General Flex Cable

FS: General flexible shielded cable

H: Highly flexible cable

HS: Highly flexible shielded cable

1.3.3 Brake line naming rules

FB1 - 000 - 3.0 - U

① ② ③ ④

①Servo drive brake cable

FB-1: brake cable

②Motor port plug type

000: aviation plug

③cable length

3.0: 3m

5.0: 5m

8.0: 8m

10.0 10.0m

20.0 20.0m

④cable type

U: common cable

US: Ordinary shielded cable

F: General Flex Cable

FS: General flexible shielded cable

H: Highly flexible cable

HS: Highly flexible shielded cable

1.4 Wiring Instructions

Wiring precautions:

◆Wiring materials are used according to wire specifications.

◆The cable length is within 3m for command cables and within 20m for encoder cables.

◆Check whether the power supply and wiring of L1, L2, and L3 are correct. Do not connect the low-voltage servo driver (2T, 2S series) to the 380V power supply.

◆The phase sequence of the U, V, and W terminals of the motor output must correspond to the corresponding terminals of the drive, and the motor may not turn if it is connected incorrectly. The motor cannot be reversed by exchanging the three-phase terminals, which is completely different from the asynchronous motor.

◆It must be reliably grounded and single-point grounded.

◆For the relay installed in the output signal, the direction of the absorbing diode must be connected correctly, otherwise it will cause failure and fail to output the signal.

◆In order to prevent wrong action caused by noise, please add insulation transformer and noise filter to the power supply.

◆Please arrange the power line (power line, motor line, etc. strong current circuit) and the signal line at a distance of more than 30cm, and do not place them in the same wiring duct.

◆Please install a non-fuse circuit breaker so that the external power supply can be cut off in time when the drive fails.

1.4.1 Wire specifications

connection terminal	symbol	Wire Specifications	
Main circuit power	L1、L2、L3	400W ~ 1.5kW	0.75 ~ 1.5mm2
		1.5kW ~ 3.5kW	1.5 ~ 2.5mm2
		3.5kW ~ 5.5kW	2.5 ~ 4mm2
		5.5kW ~ 7.5kW	4 ~ 6mm2
Motor connection terminal	U、V、W	400W ~ 1.5kW	0.75 ~ 1.5mm2
		1.5kW ~ 3.5kW	1.5 ~ 2.5mm2
		3.5kW ~ 5.5kW	2.5 ~ 4mm2
		5.5kW ~ 7.5kW	4 ~ 6mm2
Ground terminal	⏚	1.5 ~ 4mm2	
Control signal terminal	X1	≥0.14mm2(AWG26)including shielded wire	
Encoder signal terminal	X2	≥0.14mm2(AWG26)including shielded wire	
USB communication terminal	X4	≥0.14mm2(AWG26)	
RJ45 communication terminal	X5、X6	≥0.14mm2(AWG26)	
Brake resistor terminal	P、B、B1、B2	1.5 ~ 4mm2	

Encoder cables must use twisted pairs with shielded wires. If the encoder cable is too long (>20m), the encoder power supply will be insufficient, and its power and ground wires can be connected with multiple wires or use thick wires.

1.4.2 Description of strong current terminals

name	Terminal symbol	model	Detailed description
The main circuit power terminal	L1、L2	SD300P-2S，SD300N-2S	To connect external ACpower: Single phase 220VAC -15% ~ +10%50/60Hz
	L1、L2、L3	SD300P-2T,SD300N-2T	To connect external AC power: three phase 220VAC -15% ~ +10% 50/60Hz
	L1、L2、L3	SD300P-4T,SD300N-4T	To connect external AC power: three phase 380VAC -15% ~ +10% 50/60Hz
Brake resistor terminal	P、B1、B2	SD300P-2S，SD300N-2S SD300P-2T, SD300N-2T SD300P-4T,SD300N-4T	When an external braking resistor is required, disconnect B1 and B2 [Note 2], connect the external braking resistor across P and B1, and keep B2 floating .
Motor connection terminal	U	SD300 all series	Output to motor U-phase power supply
	V		Output to motor V-phase power supply

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	W		Output to motor W-phase power supply
Ground terminal	⏚	SD300 all series	Motor housing ground terminal
	⏚		Drive ground terminal

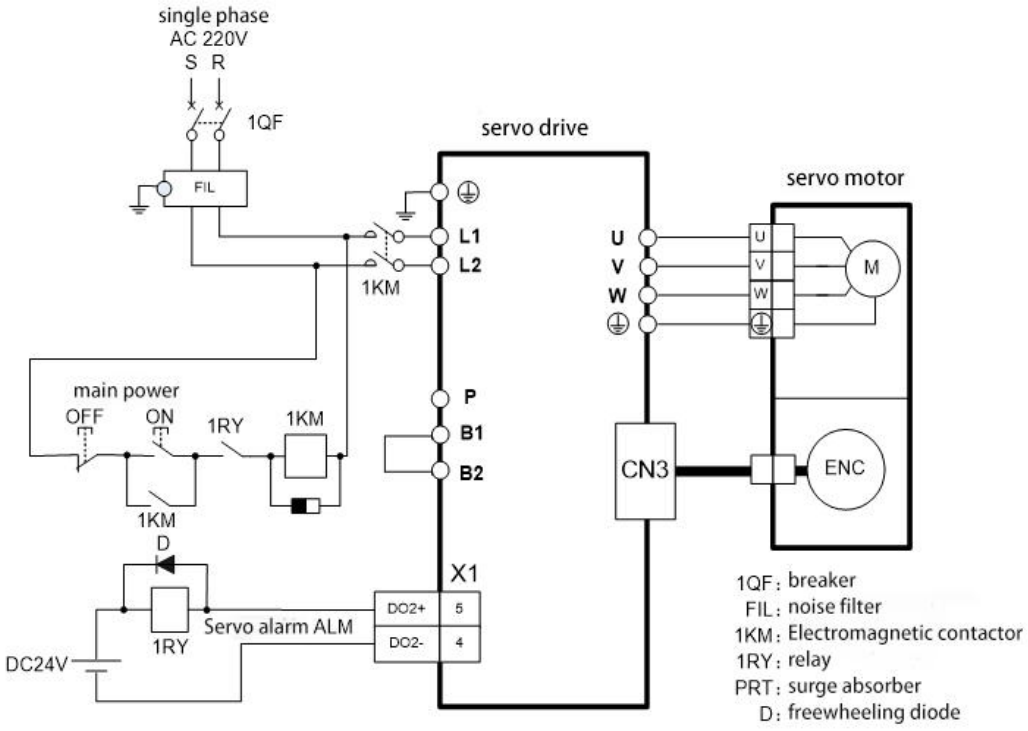
1.4.3 Motor and power wiring diagram

◆SD300P-2S, SD300N-2S series use single-phase 220V .

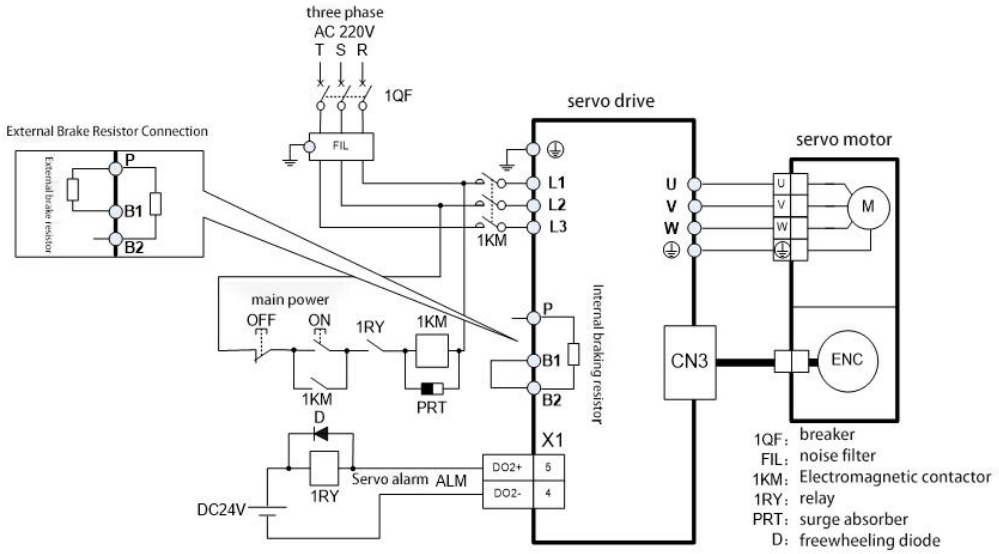
◆SD300P-2T, SD300N-2T servo drive power supply adopts three-phase AC 220V , generally obtained from three-phase AC 380V through a transformer.

◆SD300P-4T, SD300N-4T series servo drive power supply adopts three-phase AC 380V.

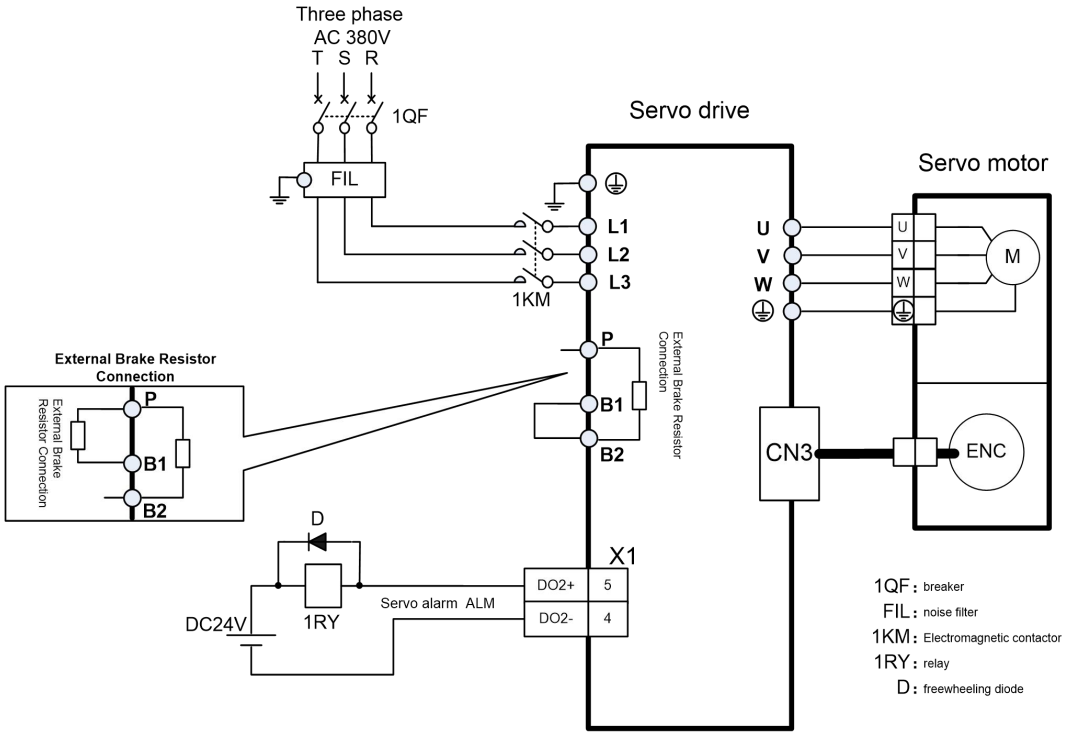
Applicable models:SD300P-2S,SD300N-2S



Applicable models:SD300P-2T, SD300N-2T



Applicable models:SD300P-4T, SD300N-4T



1.5 Adaptation of braking resistor

Driver series	internal brake Resistance specification	Recommended Specifications of External Brake Resistor	Minimum resistance value of external braking resistor

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Single-phas	2S-3R0B	47Ω/50W	36Ω/200W	25Ω
e AC220V	2S-5R5B	47Ω/50W	36Ω/200W	25Ω
Three-phase	2T-7R6B	47Ω/100W	25Ω/200W	20Ω
220V	4T-5R4B	47Ω/100W	25Ω/200W	20Ω
	2T-012B	47Ω/100W	20Ω/500W	12Ω
Three-phase	4T-8R5B	47Ω/100W	25Ω/200W	20Ω
380V	4T-012B	47Ω/100W	25Ω/200W	20Ω

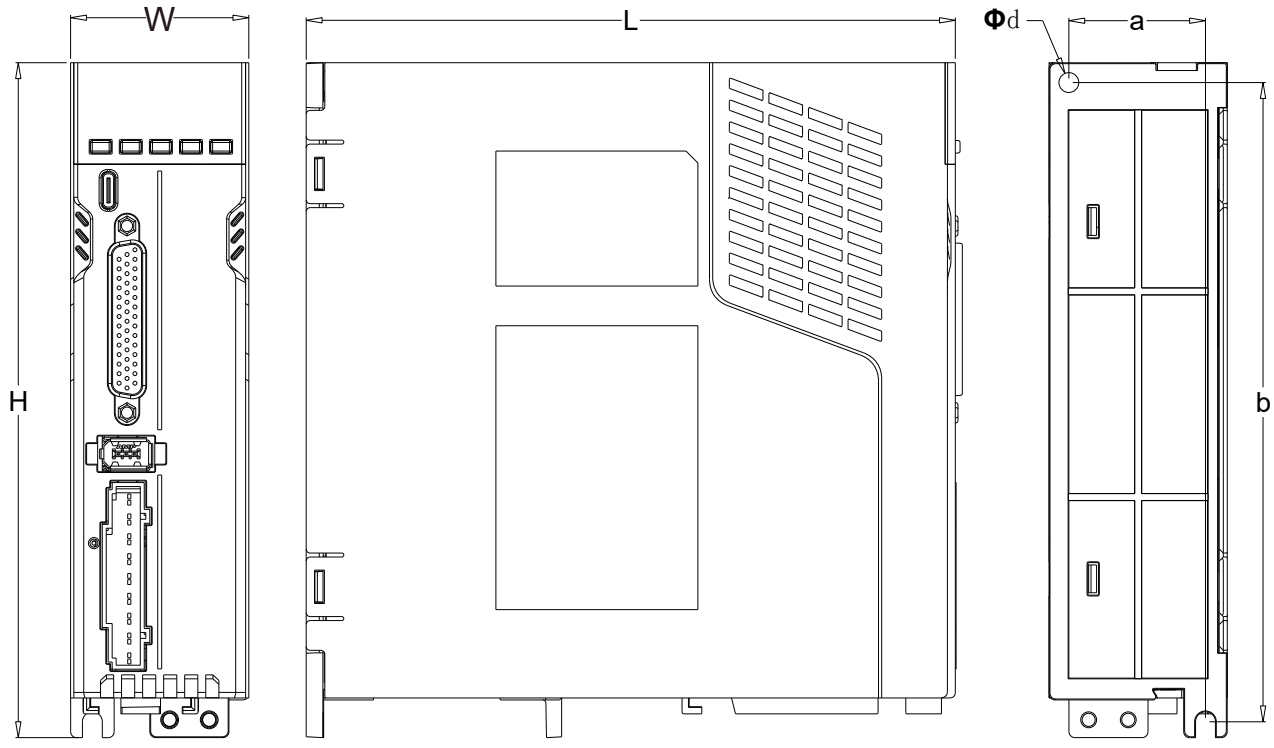
Note 1: The resistance recommended in the table can meet the application of most occasions. In actual application, if the requirements cannot be met, please contact the manufacturer.

Note 2: When all the drives are changed to external braking resistors, parameters F02.25, F02.26, and F02.27 need to be modified accordingly. Refer to the corresponding parameter descriptions in chapter 9.3.

Chapter 2 Installation instructions

2.1 Driver size

2.1.1 Schematic diagram of volume size



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2.1.2 Installation dimension table

model / Dimensions (mm)	SD300P-2S-3R0B SD300P-2S-5R5B	SD300P-2T-7R6B SD300P-4T-5R4B	SD300P-2T-012B SD300P-4T-8R5B SD300P-4T-012B
L	166	172	172
W	45	66	79
H	170	171	171
a	34.5	54.5	67.5
b	161	157.2	157.2
d	5	5	5

2.2 Driver installation

Please install the servo drive vertically and keep enough space around it for ventilation; if necessary, please install a fan to keep the temperature in the control cabinet below 45°C

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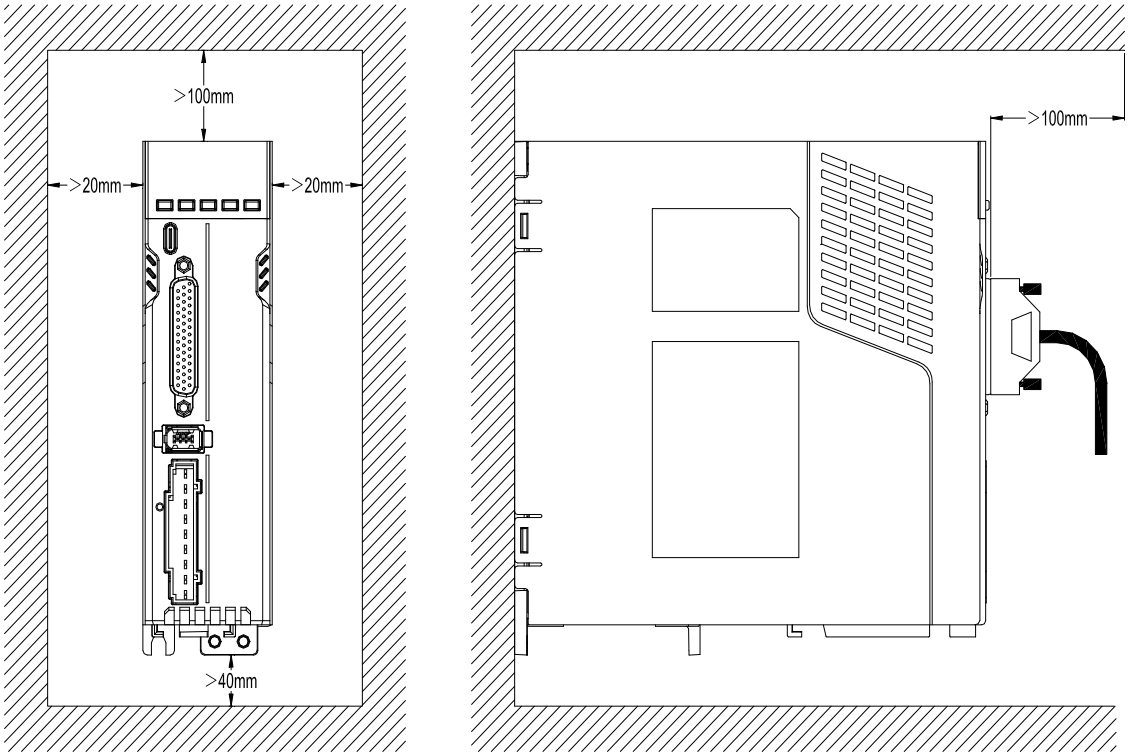
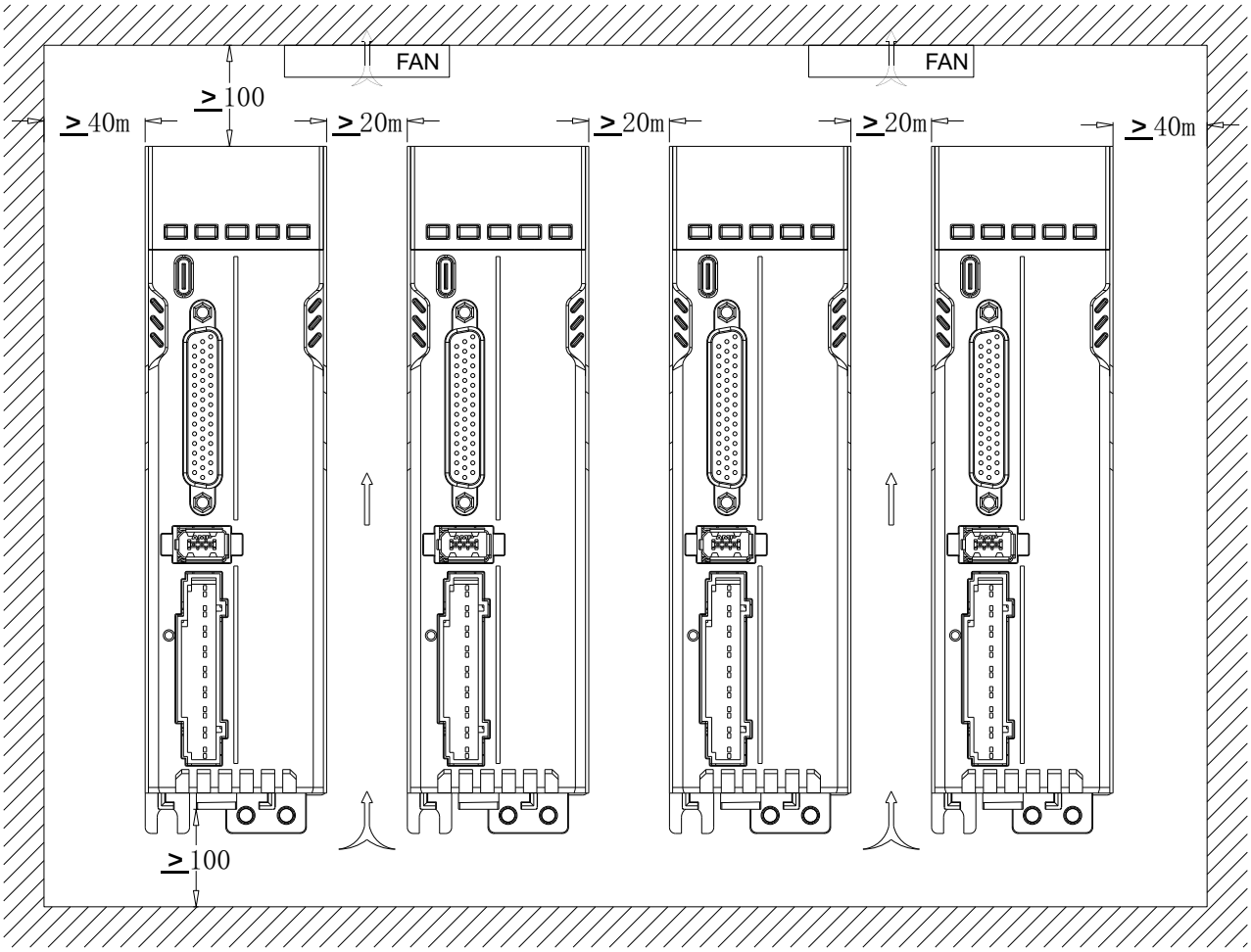
2.2.1 Install one



2.2.2 Install multiple



Note: Design changes may lead to local changes in the motor structure and size. Customers who are sensitive to the installation length of the motor, please contact our sales staff for confirmation before ordering.

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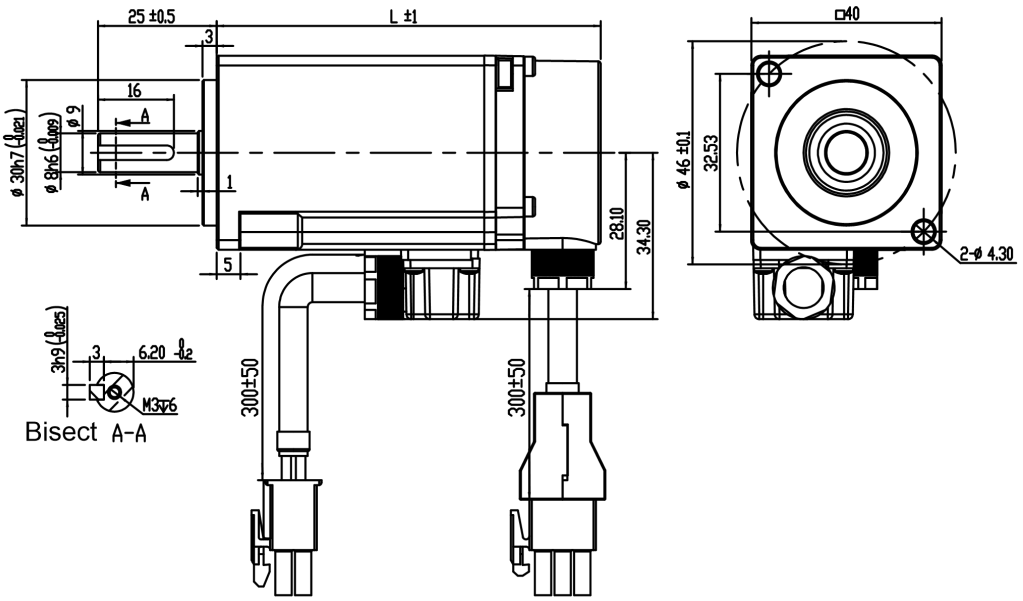
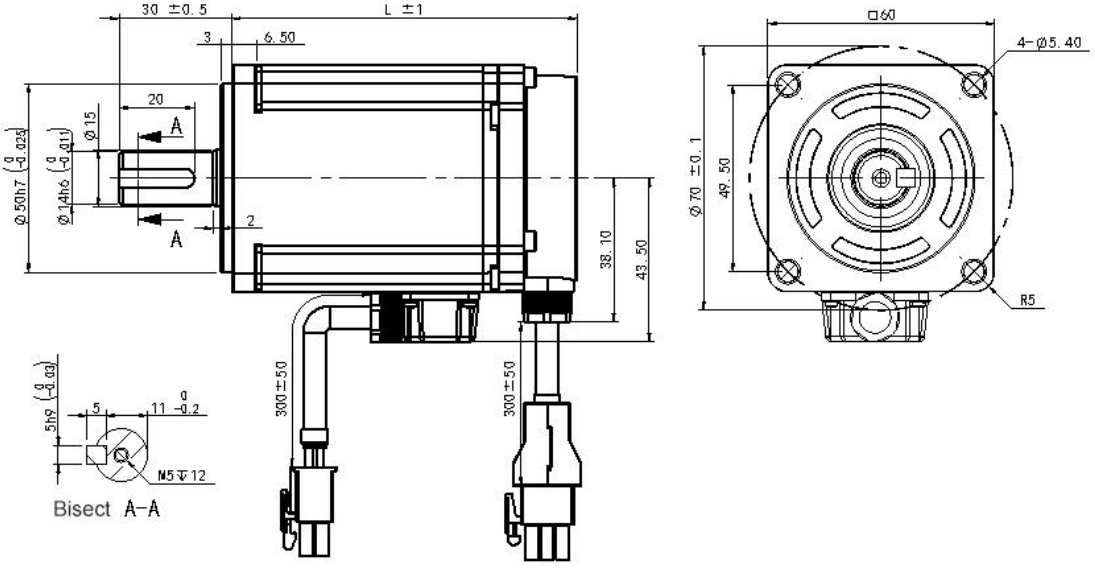
2.3 Motor size

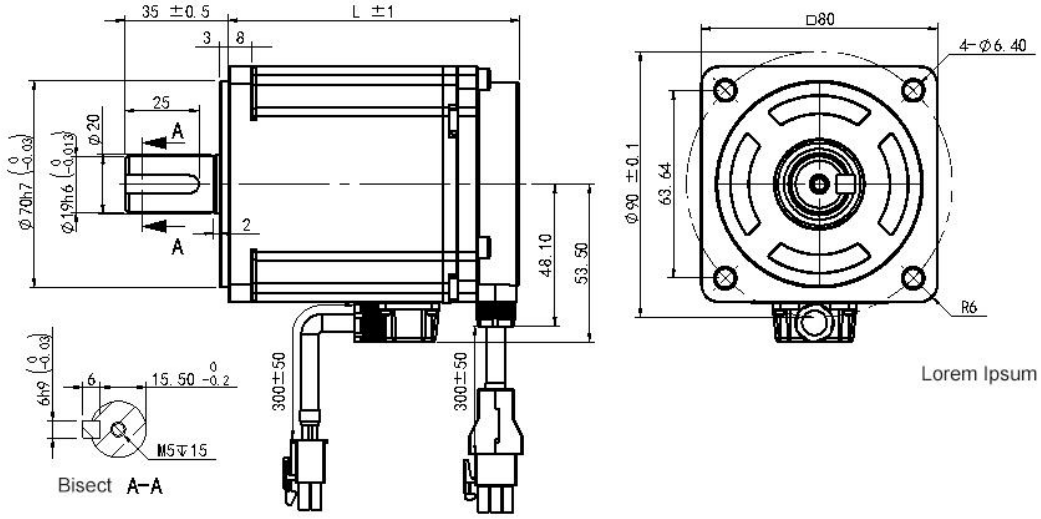
2.3.1 Outline drawing and installation dimensions of 40 machine base (mm)



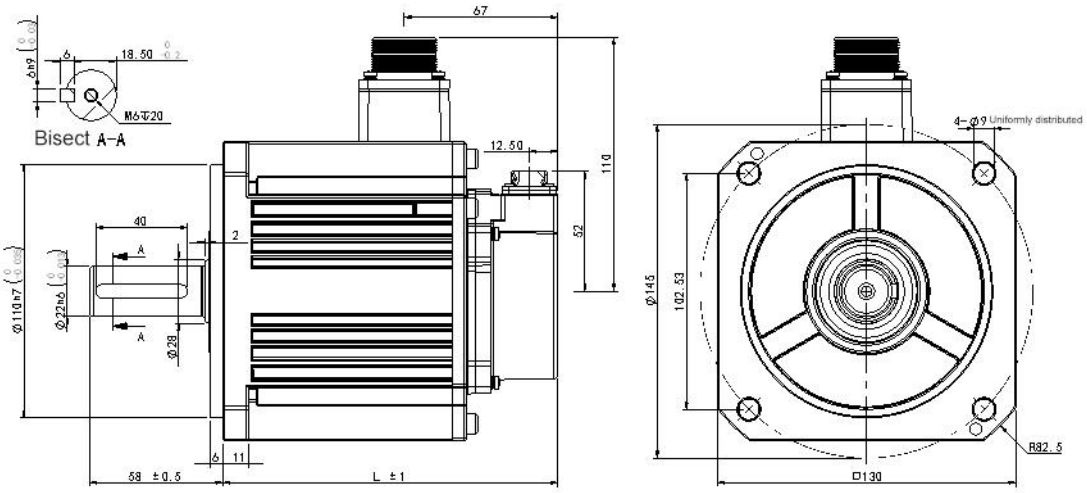
2.3.2 Outline drawing and installation dimensions of 60 machine base (mm)



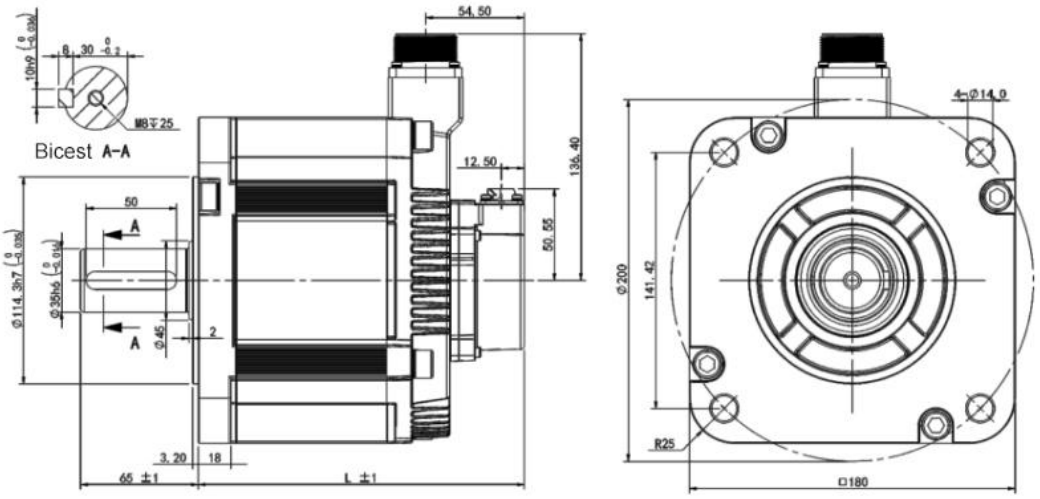
2.3.3 Outline drawing and installation dimensions of 80 machine base (mm)



2.3.4 Outline drawing and installation dimensions of 130 base (mm)



2.3.5 Outline drawing and installation dimensions of 180 base (mm)



2.4 Motor installation

◆Horizontal installation: In order to prevent liquids such as water and oil from flowing into the motor from the outlet end of the motor, please place the cable outlet at the bottom.

◆Vertical installation: If the motor shaft is facing upwards and a reducer is attached, attention should be paid to prevent the oil in the reducer from penetrating into the motor through the motor shaft.

◆The extension of the motor shaft must be sufficient, if the extension is insufficient, it will easily cause the motor to vibrate when it moves.

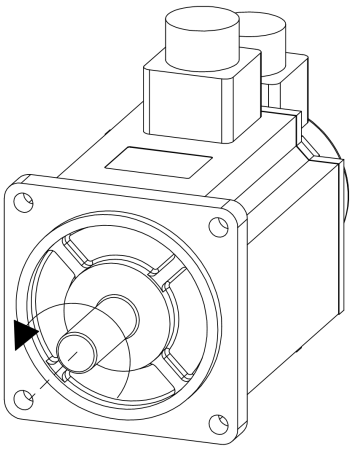
◆During the assembly process of the motor, do not knock or hammer it, so as not to damage the encoder or bearing;

◆ The shaft surface of the motor is coated with anti-rust oil, please wipe it before use.

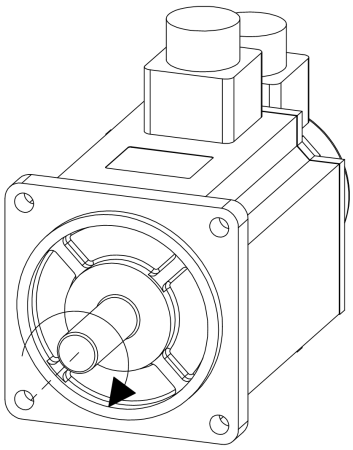
2.5 Definition of motor rotation direction

The definition of the motor rotation direction described in this manual: Facing the motor shaft extension, the rotating shaft rotates counterclockwise (CCW) for forward rotation, and the rotating shaft rotates clockwise (CW) for reverse rotation.

`



foreward
counterclockwise(CCW)

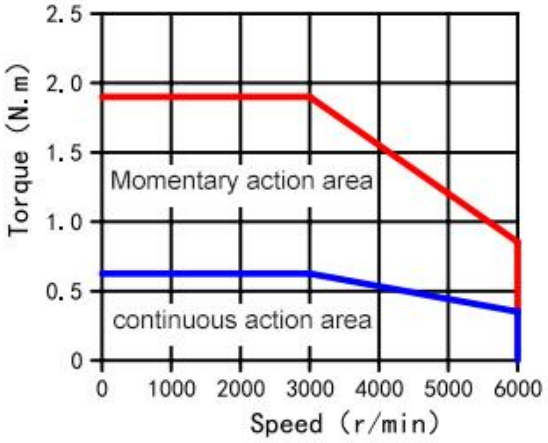


reverse
clockwise(CW)

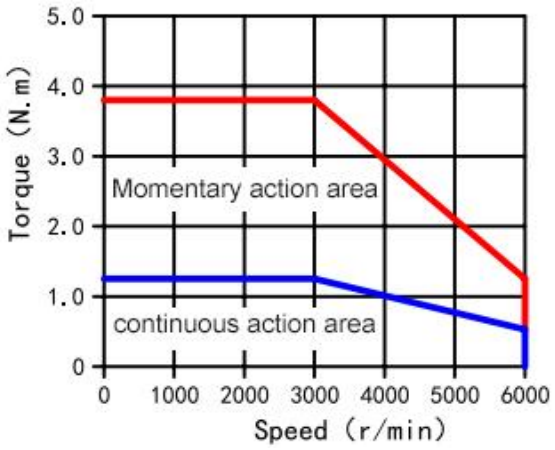
2.6 Servo motor technical parameters

2.6.1 F1M-20130222000-A360

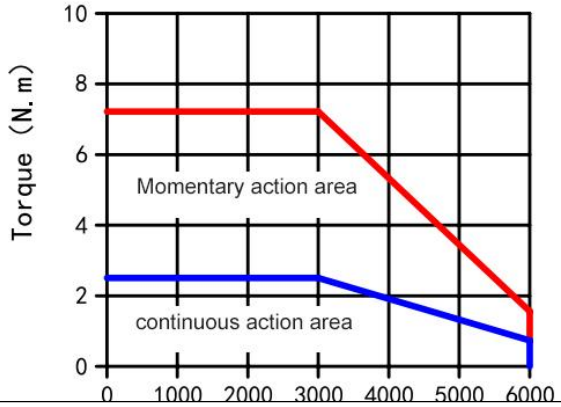
Specification		Torque Speed Characteristics
Rated power (W)	200	
Rated voltage (V)	220	
Rated current (Arms)	1.7	
Maximum current (Arms)	5.7	
Rated torque (N.m)	0.64	
Maximum torque (N.m)	1.92	
Rated speed	3000	
Maximum speed(rmp)	6000	
Back EMF(V/Krmp)	23	
Torque constant (N.m/A)	0.38	
Line resistance (Ω)	4.57	
Daxis inductance (mH)	3.7	
Qaxis inductance (mH)	4.3	
Electrical time constant (ms)	1.62	
Rotor inertia (X10 -4 kg.m 2)	0.28	
weight (kg)	0.8	
Motor Body length (mm)	75	
Number of poles (P)	10	
Use environment (°C)	-20~40	



2.6.2 F1M-40130222000-A360

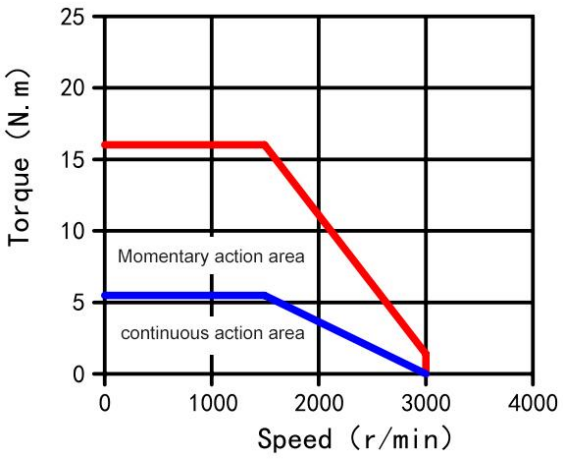
Specification		Torque Speed Characteristics
Rated power (W)	400	
Rated voltage (V)	220	
Rated current (Arms)	2.5	
Maximum current (Arms)	8.4	
Rated torque (N.m)	1.27	
Maximum torque (N.m)	3.81	
Rated speed	3000	
Maximum speed(rmp)	6000	
Back EMF(V/Krmp)	31	
Torque constant (N.m/A)	0.51	
Line resistance (Ω)	3.24	
Daxis inductance (mH)	2.9	
Qaxis inductance (mH)	3.4	
Electrical time constant (ms)	1.79	
Rotor inertia (X10-4kg.m2)	0.52	
weight (kg)	1.1	
Motor Body length (mm)	92	
Number of poles (P)	10	
Use environment (°C)	-20~40	

2.6.3 F1M-75130222000-A380

Specification		Torque Speed Characteristics
Rated power (W)	750	
Rated voltage (V)	220	
Rated current (Arms)	4.4	
Maximum current (Arms)	13.8	
Rated torque (N.m)	2.39	
Maximum torque (N.m)	7.17	
Rated speed	3000	
Maximum speed(rmp)	6000	
Back EMF(V/Krmp)	34	
Torque constant (N.m/A)	0.54	

Line resistance (Ω)	1.08	
D axis inductance (mH)	2.1	
Q axis inductance (mH)	2.5	
Electrical time constant (ms)	3.89	
Rotor inertia (X10-4kg.m2)	1.48	
weight (kg)	2.1	
Motor Body length (mm)	98.5	
Number of poles (P)	10	
Use environment (°C)	-20~40	

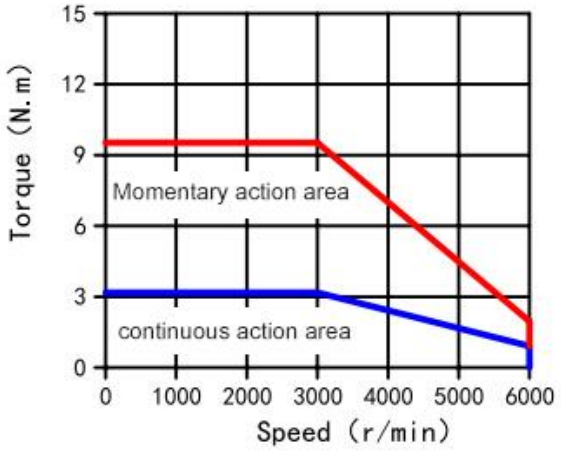
2.6.3 F1M-85115222000-A3130

Specification		Torque Speed Characteristics
Rated power (W)	850	
Rated voltage (V)	220	
Rated current (Arms)	4.9	
Maximum current (Arms)	15.5	
Rated torque (N.m)	5.41	
Maximum torque (N.m)	16.23	
Rated speed	1500	
Maximum speed(rmp)	3000	
Back EMF(V/Krmp)	69	
Torque constant (N.m/A)	1.1	
Line resistance (Ω)	1.55	
Line inductance (mH)	13	
Electrical time constant (ms)	8.39	
Rotor inertia (X10 -4 kg.m 2)	13.2	
Weight (kg)	5.4	
Motor Body length (mm)	133	
Number of poles (P)	10	
Use environment (°C)	-20~40	

2.6.4 F1M-10215222000-A380

Specification		Torque Speed Characteristics
Rated power (W)	1000	
Rated voltage (V)	220	
Rated current (Arms)	5.8	

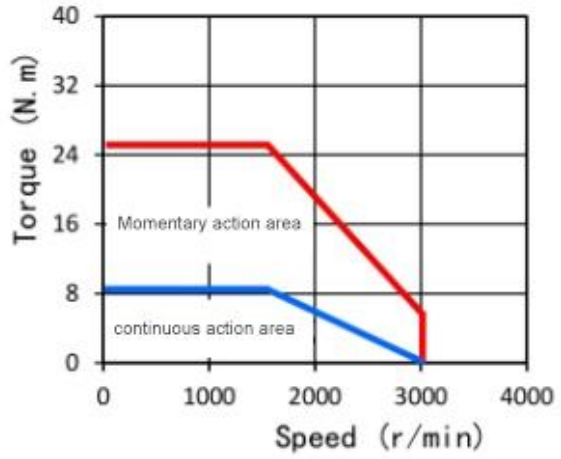
Maximum current (Arms)	18.1
Rated torque (N.m)	3.18
Maximum torque (N.m)	9.54
Rated speed	3000
Maximum speed(rmp)	6000
Back EMF(V/Krmp)	34
Torque constant (N.m/A)	0.55
Line resistance (Ω)	0.73
D axis inductance (mH)	1.4
Q axis inductance (mH)	1.7
Electrical time constant (ms)	3.8
Rotor inertia (X10 -4 kg.m 2)	1.97
Weight (kg)	2.5
Motor Body length (mm)	111.5
Number of poles (P)	10
Use environment (°C)	-20~40



2.6.5 F1M-13215222000-A3130

Specification	
Rated power (W)	1300
Rated voltage (V)	220
Rated current (Arms)	7.8
Maximum current (Arms)	24.4
Rated torque (N.m)	8.28
Maximum torque (N.m)	24.84
Rated speed	1500
Maximum speed(rmp)	3000
Back EMF(V/Krmp)	67
Torque constant (N.m/A)	1.06
Line resistance (Ω)	0.83
Line inductance (mH)	8.1
Electrical time constant (ms)	9.76
Rotor inertia (X10 -4 kg.m 2)	18.8
Weight (kg)	6.8
Motor Body length (mm)	149
Number of poles (P)	10
Use environment (°C)	-20~40

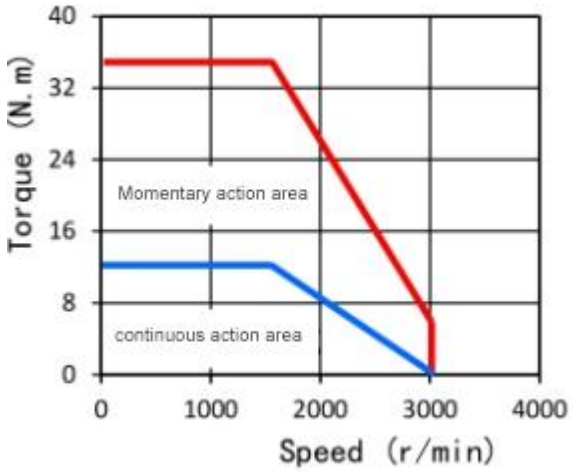
Torque Speed Characteristics



2.6.6 F1M-18215222000-A3130

Specification	
Rated power (W)	1800
Rated voltage (V)	220
Rated current (Arms)	10.0
Maximum current (Arms)	31.2
Rated torque (N.m)	11.46
Maximum torque (N.m)	34.38
Rated speed	1500
Maximum speed(rmp)	3000
Back EMF(V/Krmp)	71
Torque constant (N.m/A)	1.15
Line resistance (Ω)	0.65
Line inductance (mH)	6.2
Electrical time constant (ms)	9.54
Rotor inertia (X10 -4 kg.m 2)	25.1
Weight (kg)	8.3
Motor Body length (mm)	167
Number of poles (P)	10
Use environment (°C)	-20~40

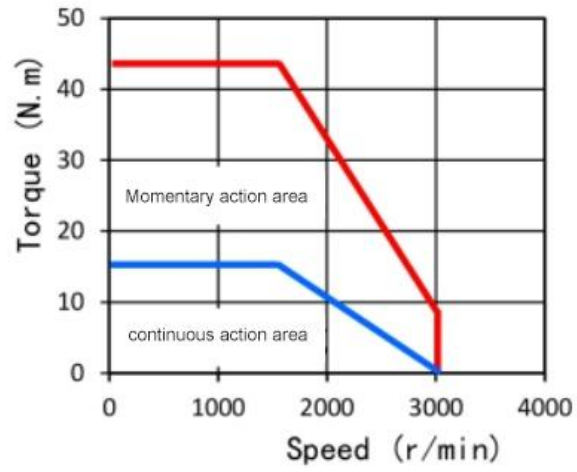
Torque Speed Characteristics



2.6.7 F1M-23215222000-A3130

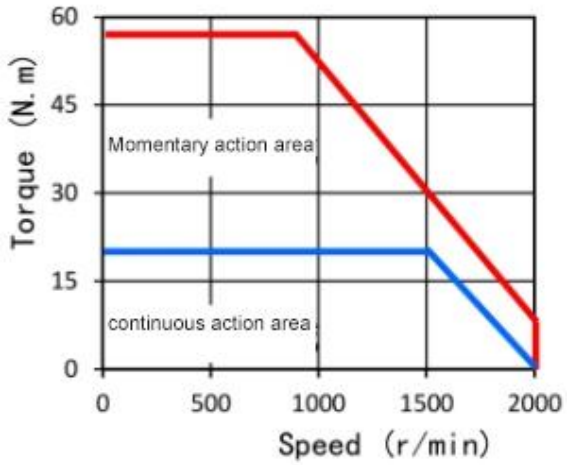
Specification	
Rated power (W)	2300
Rated voltage (V)	220
Rated current (Arms)	13.5
Maximum current (Arms)	40.3
Rated torque (N.m)	14.64
Maximum torque (N.m)	43.92
Rated speed	1500
Maximum speed(rmp)	3000
Back EMF(V/Krmp)	69
Torque constant (N.m/A)	1.08
Line resistance (Ω)	0.44
Line inductance (mH)	4.3
Electrical time constant (ms)	9.77
Rotor inertia (X10 -4 kg.m 2)	32.7
Weight (kg)	10.2
Motor Body length (mm)	189

Torque Speed Characteristics

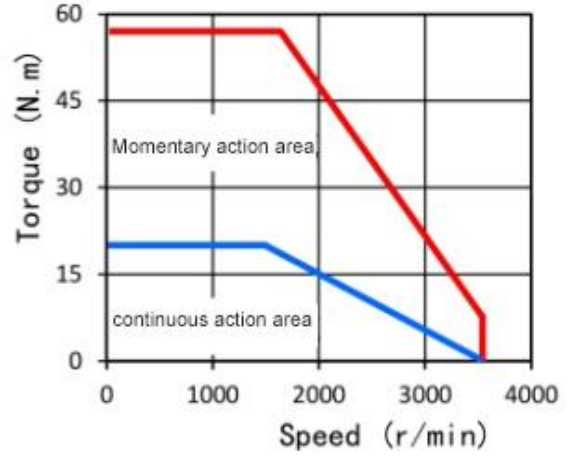


Number of poles (P)	10	
Use environment (°C)	-20~40	

2.6.8 F1M-30215222000-A3180

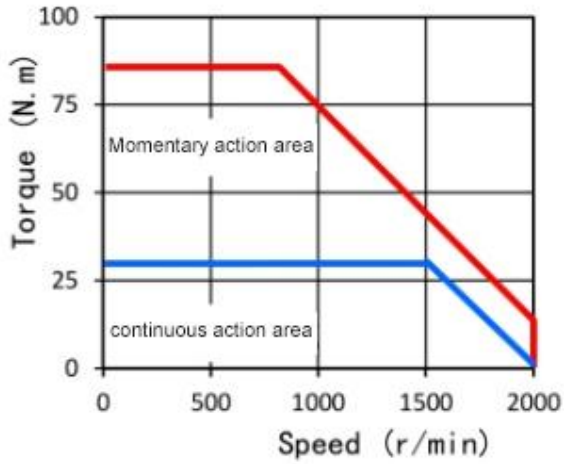
Specification		Torque Speed Characteristics
Rated power (W)	3000	
Rated voltage (V)	220	
Rated current (Arms)	11.0	
Maximum current (Arms)	37.4	
Rated torque (N.m)	19.1	
Maximum torque (N.m)	57.3	
Rated speed	1500	
Maximum speed(rmp)	2000	
Back EMF(V/Krmp)	103	
Torque constant (N.m/A)	1.74	
Line resistance (Ω)	0.67	
Line inductance (mH)	10.2	
Electrical time constant (ms)	15.22	
Rotor inertia (X10 -4 kg.m 2)	47.2	
Weight (kg)	12.9	
Motor Body length (mm)	156	
Number of poles (P)	10	
Use environment (°C)	-20~40	

2.6.9 F1M-30215238000-A3180

Specification		Torque Speed Characteristics
Rated power (W)	3000	
Rated voltage (V)	380	
Rated current (Arms)	11.6	
Maximum current (Arms)	38.2	
Rated torque (N.m)	19.1	
Maximum torque (N.m)	57.3	
Rated speed	1500	
Maximum speed(rmp)	3500	
Back EMF(V/Krmp)	103	
Torque constant (N.m/A)	1.65	
Line resistance (Ω)	0.67	
Line inductance (mH)	10.2	
Electrical time constant (ms)	15.22	

Rotor inertia (X10 -4 kg.m 2)	47.2	
Weight (kg)	12.9	
Motor Body length (mm)	156	
Number of poles (P)	10	
Use environment (°C)	-20~40	

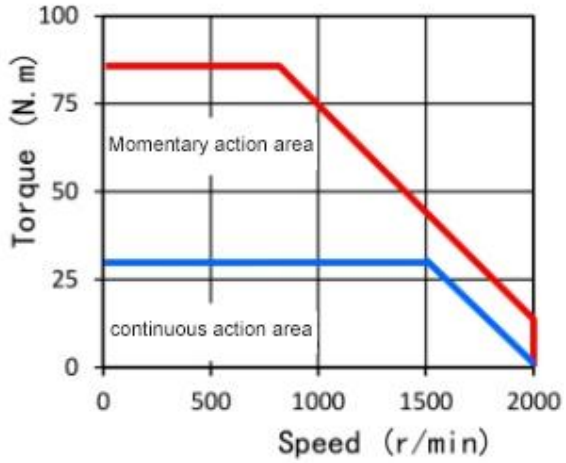
2.6.10 F1M-45215222000-A3180

Specification		Torque Speed Characteristics
Rated power (W)	4500	
Rated voltage (V)	220	
Rated current (Arms)	15.9	
Maximum current (Arms)	51.7	
Rated torque (N.m)	28.65	
Maximum torque (N.m)	85.95	
Rated speed	1500	
Maximum speed(rmp)	2000	
Back EMF(V/Krmp)	105	
Torque constant (N.m/A)	1.8	
Line resistance (Ω)	0.35	
Line inductance (mH)	6.6	
Electrical time constant (ms)	18.86	
Rotor inertia (X10 -4 kg.m 2)	69.3	
Weight (kg)	16.6	
Motor Body length (mm)	180	
Number of poles (P)	10	
Use environment (°C)	-20~40	

2.6.11 F1M-45215238000-A3180

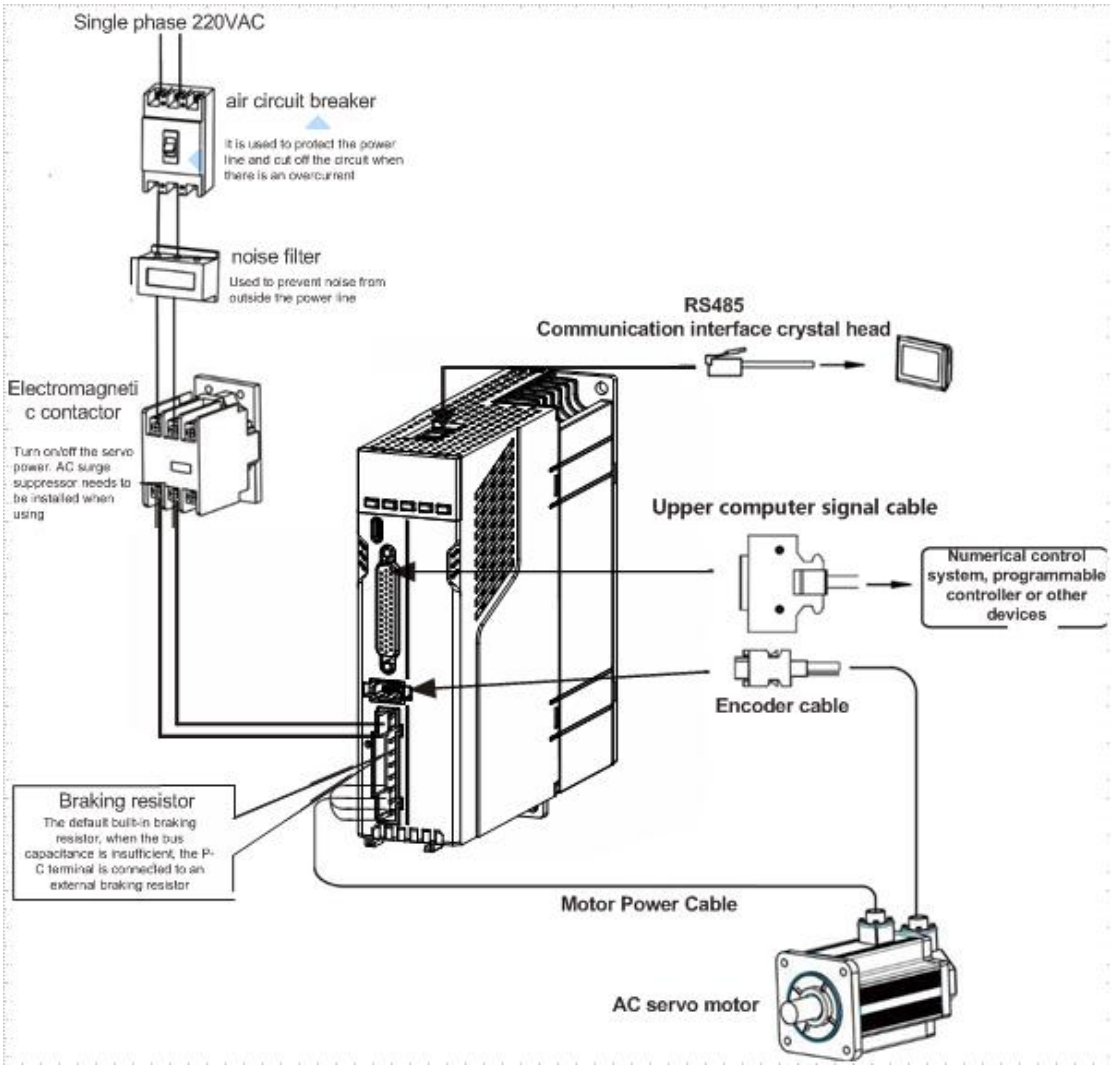
Specification		Torque Speed Characteristics
Rated power (W)	4500	
Rated voltage (V)	380	
Rated current (Arms)	16.6	
Maximum current (Arms)	53.8	
Rated torque (N.m)	28.65	
Maximum torque (N.m)	85.95	
Rated speed	1500	
Maximum speed(rmp)	3500	
Back EMF(V/Krmp)	105	
Torque constant (N.m/A)	1.73	

Line resistance (Ω)	0.35
Line inductance (mH)	6.6
Electrical time constant (ms)	18.86
Rotor inertia (X10 -4 kg.m 2)	69.3
Weight (kg)	16.6
Motor Body length (mm)	180
Number of poles (P)	10
Use environment (°C)	-20~40



Chapter 3 Driver system wiring and composition

3.1 System wiring diagram



◆Be sure to confirm that the grid power is consistent with the input power specification marked on the nameplate of the machine before connecting the drive input power .

◆The electromagnetic contactor is used to switch on and off the main circuit power of the servo driver, do not use it to start and stop the servo driver .

◆Check whether the power supply and wiring of L1 and L2 are correct. If the drive only supports single-phase 220VAC , please do not connect it to 380VAC power supply.

◆Because the high-frequency switching current flows through the servo motor, the leakage current is relatively large. The ground terminal of the motor must be connected with the ground terminal PE of the servo driver and grounded well.

◆To prevent wrong actions caused by noise, please add devices such as insulating transformers and noise filters to the

`

power supply.

◆Please arrange the power line (the high-voltage circuit of the motor line, power line, etc.) and the signal line at a distance of more than 30cm, and do not place them in the same wiring duct.

◆Please install a non-fuse circuit breaker so that the external power supply can be cut off in time when the drive fails.

◆After cutting off the power supply, wait at least 5 minutes before touching the drive and motor.

3.1.1 Input power cable requirements

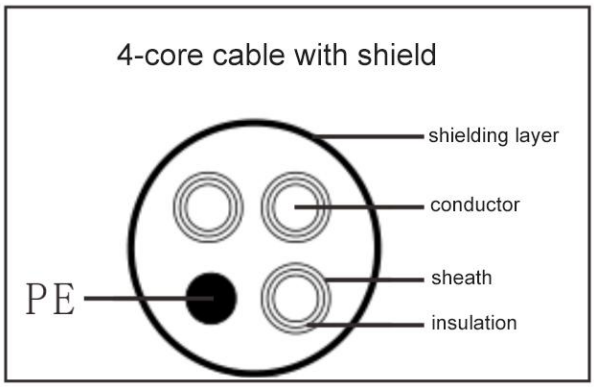
The size of the input power cable should comply with local regulations.

•The input power cable must be able to withstand the corresponding load current.

•The maximum rated temperature margin of the input power cable under continuous working conditions should not be lower than 70°C.

•The conductivity of the PE grounding conductor is the same as that of the phase conductor (use the same cross-sectional area).

It is recommended to use a shielded four-core cable for the input cable:



In order to protect the conductor, when the shielding wire and the phase conductor are made of the same material, the cross-sectional area of the shielding wire must be the same as that of the phase conductor. The purpose is to reduce the grounding resistance and make the impedance continuity better.

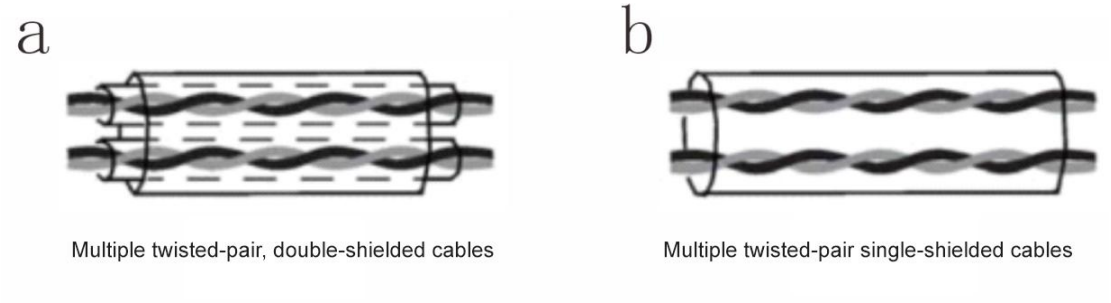
In order to effectively suppress the emission and conduction of radio frequency interference, the conductivity of the shielded wire must be at least 1/10 of that of the phase conductor. The coverage of the shielding layer should reach more than 85%.

3.1.2 Control cable requirements

All analog control cables and cables for frequency input must use shielded cables. Analog signal cables use twisted-pair, double-shielded cables (Figure a). Each signal uses a separate shielded twisted pair. Do not use the same ground wire for

`

different analog signals.

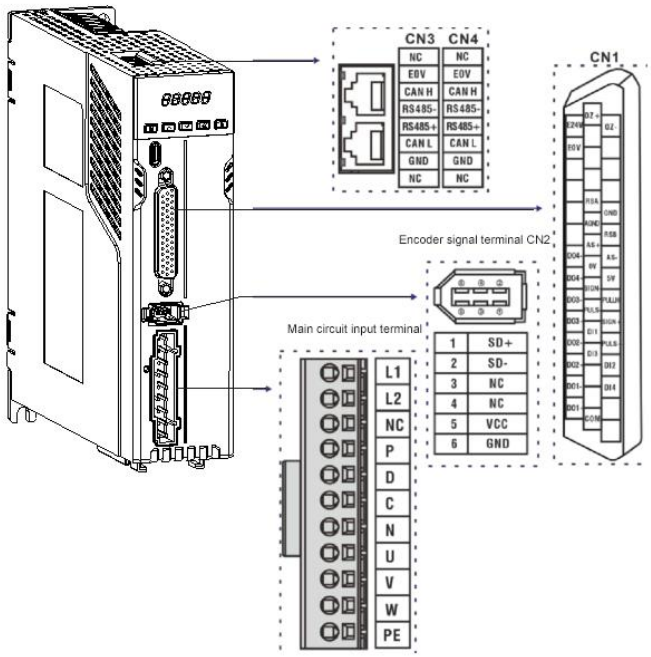


For low-voltage digital signals, double-shielded cables are preferred, but single-shielded or unshielded twisted pairs can also be used (figure b) . For pulse input signals, use only shielded cables.

Communication cables must use shielded twisted-pair cables.

3.2 Main circuit terminal wiring diagram

3.2.1 Servo drive terminal pin distribution



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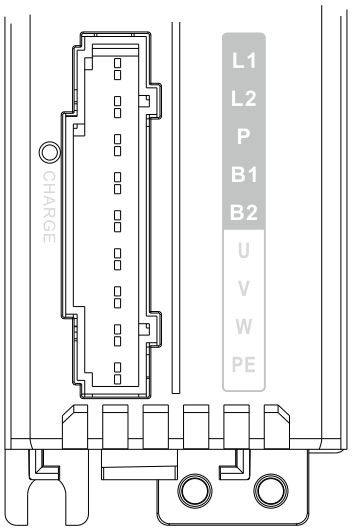
3.2.2 Main circuit terminal introduction



name	Terminal symbol	Detailed description
Main circuit power input terminal	L1、L2	Single phase220VAC -15%~+10%，50/60Hz
Brake resistor terminal	B1、B2	When using the internal braking resistor, short B 1 and B 2
Brake resistor terminal	P、B1	When using an external braking resistor, B1 and B2 are short-circuited and disconnected, and then connect the external braking resistor wiring between P and B1 .
Motor connection terminal	U、V、W	Connect to U, V, W phase of servo motor.
	PE	The drive ground terminal is connected to the power supply and the motor ground terminal.

◆Factory default internal brake resistor connection: B1 and B2 are short-circuited.

Wiring Instructions for Brake Resistor

If the internal braking resistor is used, the driver should short-circuit B1 and B2 , that is, it can be used normally according to the factory state. If you use an external braking resistor, you must first disconnect the short circuit between B1 and B2 , and then connect the external braking resistor across P and B1 . As shown in the figure below:

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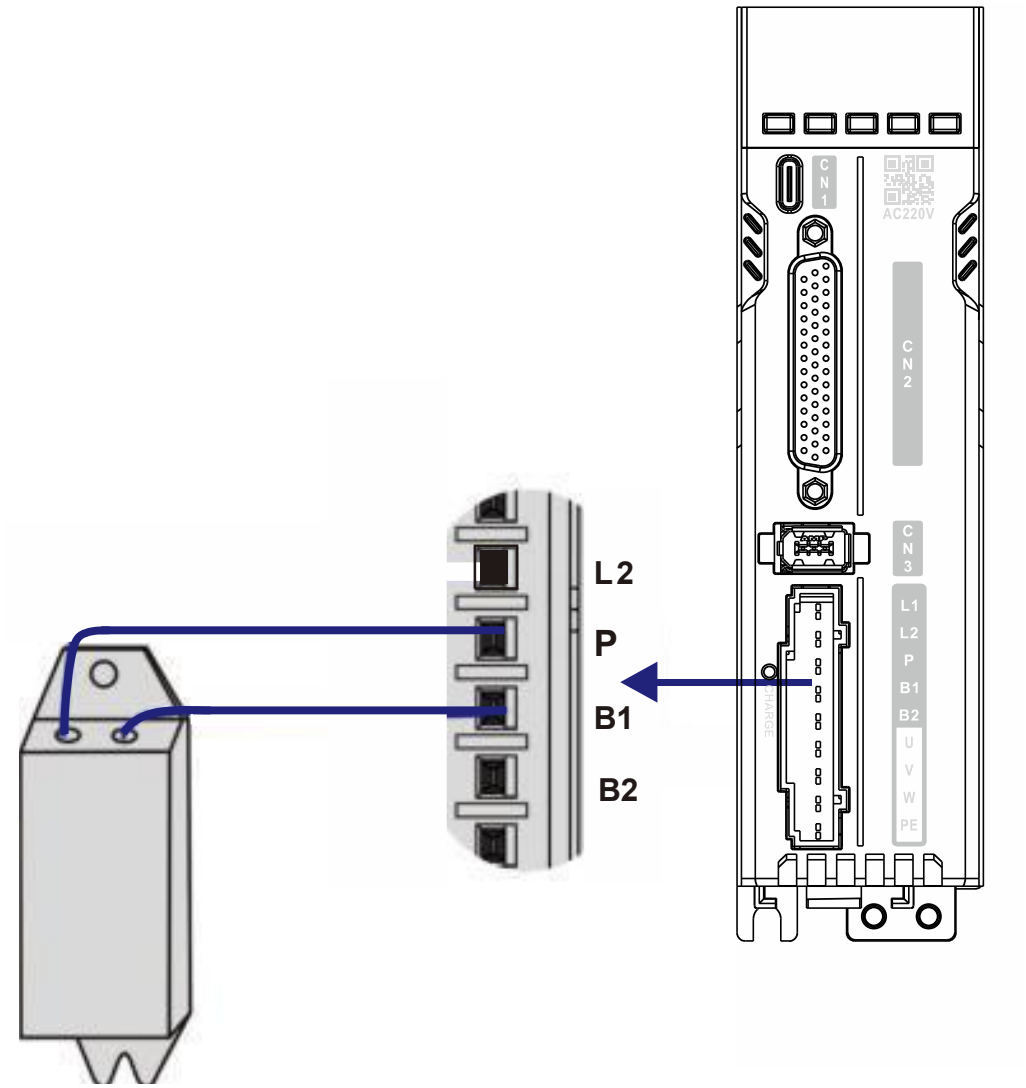
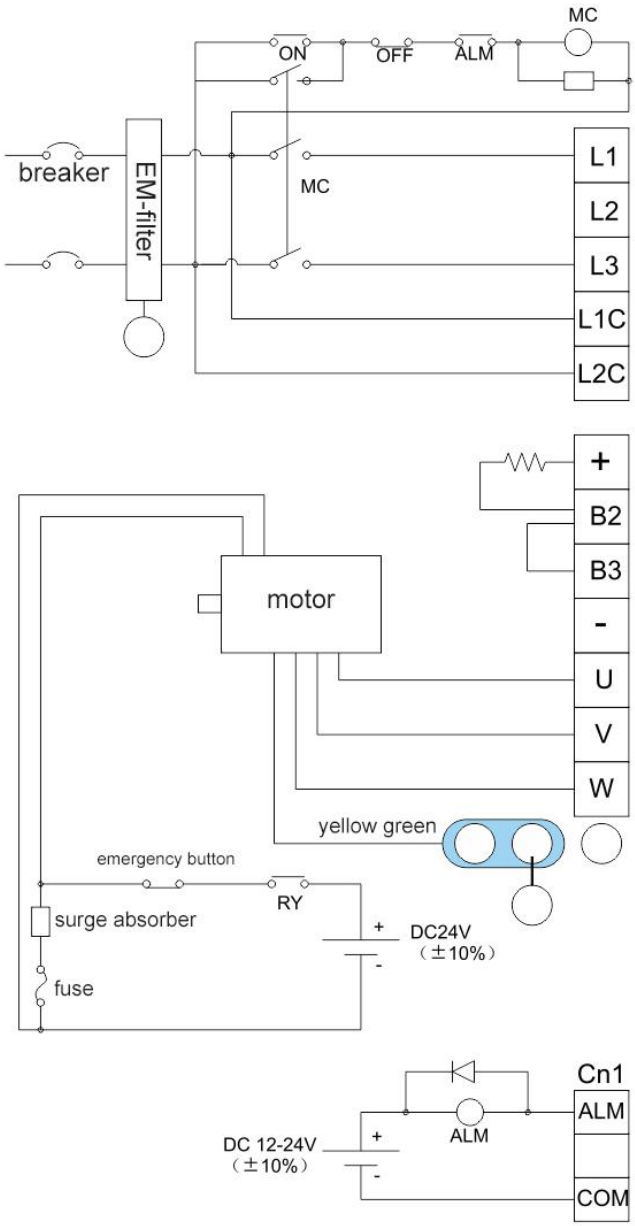
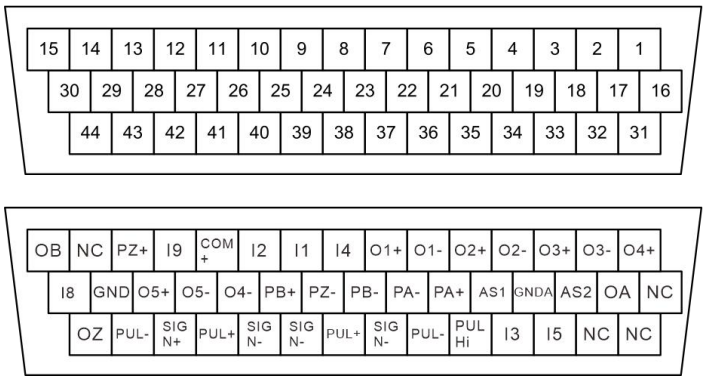

L2
P
B1
B2
CN1
AC220V
CN2
CN3
L1
L2
P
B1
B2
U
V
W
PE

3.2.3 Main circuit wiring diagram



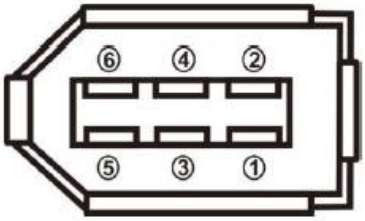
- The user is requested to make this emergency stop protection circuit;
- Surge absorbing devices are added to both ends of the electromagnetic contactor wire package;
- Powerinput voltage range: AC220V(-15%)~240(+10%)
- Please connect the main circuit to the L1 terminal and L3 terminal
- Note that drivers above 1.5KW (included) must use three-phase input power.
- Do not disconnect the short cable between B2 and B3 unless an external regenerative braking resistor is used;
- When using an external regenerative resistor, disconnect the short cable between B2 and B3, and connect it according to the dotted line in the figure.
- Please connect to the U, V, W output of the driver correctly according to the phase sequence of the motor line of the servo motor. Wrong phase sequence will cause drive failure.
- Please be sure to ground the servo driver to avoid electrical injury accidents.
- The 24V DC power supply for electromagnetic braking needs to be prepared by the user, and must be isolated from the DC12-24V power supply for control signals;
- Pay attention to the connection method of the freewheeling diode. If the positive and negative poles are connected reversely, the driver may be damaged

3.3 Wiring of control terminal CN2



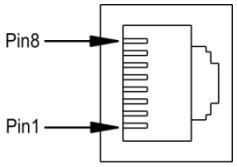
Remarks: This is the interface definition of the standard version model, and the function and application of this terminal are detailed in Chapter 4.

3.4 Encoder CN3 Terminal Wiring



signal name		Pin No.	function
Encoder signal power supply	5V	1	encoder uses 5V power supply (provided by the driver). When the cable is longer than 20m , in order to prevent the encoder voltage from dropping, the power supply and ground wire can be connected with multiple wires or use thick wires.
	0V	2	
Absolute encoder communication positive	SD+	5	Absolute encoder communication positive
Absolute encoder communication negative	SD-	6	Absolute encoder communication negative
null		3	reserve
null		4	reserve

3.5 Communication port wiring



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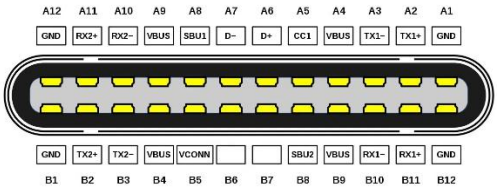
signal name		Pin No.	function
Modbusdata negativeterminal	MBS-	1	Modbus communication data negative terminal
Modbusdata positive terminal	MBS+	2	Modbus communication data positive terminal
地 ground	PE	3	Drive ground, connected to power supply and motor ground terminal
null	NC	4	reserve
null	NC	5	reserve
internal power ground	GND	6	internal power ground
ground	PE	7	Drive ground, connected to power supply and motor ground terminal
null	NC	8	reserve

3.6 CN1 communication port wiring

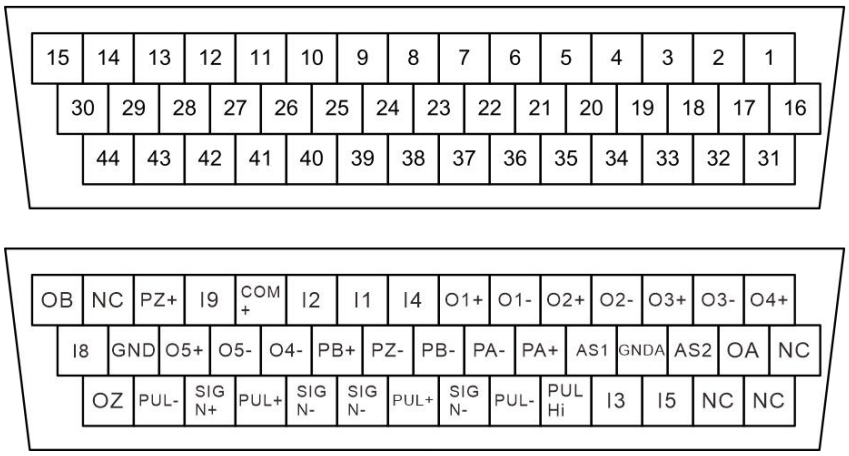


Use standard TYPE-C data cable.

Chapter 4 Driver System Wiring and Composition

4.1 CN2 function detailed explanation

4.1.1 CN2 terminal pin



4.1.2 CN2 terminal pin definition

pin	Signal	Function	pin	Signal	Function
1	DO4+	Universal digital output 4 negative	23	PB-	Universal digital output 4 positive
2	DO3-	Universal digital output 3 negative	24	PZ-	Universal digital output 3 negative
3	DO3+	Universal digital output 3 positive	25	PB+	Universal digital output 3 positive
4	DO2-	Universal digital output 2 negative	26	DO4-	Universaldigital output 4 negative
5	DO2+	Universal digital output 2 positive	27	DO5-	Universal digital output 5 negative
6	DO1-	Universal digital output 1 negative	28	DO5+	Universal digital output 5 positive
7	DO1+	Universal digital output 1 positive	29	GND	internal power ground
8	DI4	Universal digital input 4	30	DI6	Universal digital input 6
9	DI1	Universal digital input 2	31	NC	reserve
10	DI2	Universal digital input 3	32	NC	reserve
11	INCOM	input common	33	DI5	Universal digital input 5
12	DI7	Universal digital input 7	34	DI3	Universal digital input 3
13	PZ+	Encoder Z phase differential output positive	35	PULLHI	Single pulse input common terminal
14	NC	reserve	36	PULS-	Pulse input negative
15	OB	Encoder B-phase open-drain output	37	SIGN+	direction input positive
16	NC	reserve	38	PULS+	Pulse input positive
17	OA	Encoder B-phase open-drain output	39	SIGN-	direction input negative
18	AS2	Universal analog input 2	40	SIGN-	direction input negative
19	GNDA	Analog signal ground	41	PULS+	Pulse input positive
20	AS1	Universal analog input 1	42	SIGN+	direction input positive
21	PA+	Encoder phase A differential output positive	43	PULS-	Pulse input negative
22	PA-	Encoder phase A differential output negative	44	OZ	Encoder Z-phase open-drain output

4.1.3 Power signal

Signal	pin	name	Function
INCOM	11	input common	If DI is low (0V) and valid, then INCOM is connected to an external DC power supply (12V~24V); If DI is high (12V~24V) and valid, then INCOM is connected to the

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			corresponding signal reference ground.
DOx+ DOx-	1,3,5,7,28 2,4,6,26,27	output	For PNP output, DOx+ is connected to an external power supply (12V~24V) DOx- is connected to the positive terminal of the load For NPN output, DOx- is connected to the corresponding signal reference ground, and DOx+ is connected to the negative terminal of the load
GNDA	19	Analog signal ground	External analog signal ground
PULLHI	35	Pulse input common	When the anode is common, PULLHI is connected to an external DC power supply (12V~24V), and the signal is input from PULS-, SIGN- In the case of common cathode, PULLHI is connected to the reference ground of the external DC power supply, and the signal is input from PULS+ and SIGN+

4.1.4 Detailed explanation of general IO functions

4.1.4.1 Detailed explanation of general input functions

signal name	symbol	function code	Applicable mode		
Servo enable	S-ON	FunIN.1	P	S	T
◆Invalid - servo motor enable is prohibited . ◆Valid- Servo motor enable.					

signal name	symbol	function code	Applicable mode		
Fault and warning reset	ALM-RST	FunIN.2	P	S	T
◆The inside of the drive will be processed according to the effective edge. ◆It can reset the fault, you need to turn off the servo enable signal (S ON is set to OFF) before using this function. ◆According to the type of alarm, the servo can continue to work after some alarms are reset.					

signal name	symbol	function code	Applicable mode		
gain switching	GAIN-SEL	FunIN.3	P	S	T
WhenF08.09=1: ◆ invalid- speed control loop is PI control. ◆ Valid - speed control loop is P control. WhenF08.09=2: ◆ Invalid - fixed to the first set of gains. ◆Valid - fixed to the second set of gains.					

signal name	symbol	function code	Applicable mode		
mode switch 1	M1-SEL	FunIN.10	P	S	T
Switch between speed, position and torque according to the selected control mode (3, 4, 5).					

signal name	symbol	function code	Applicable mode		
mode switch 2	M2-SEL	FunIN.11	P	S	T
Switch between speed, position and torque according to the selected control mode (6).					

signal name	symbol	function code	Applicable mode		
Zero fixed enable	ZCLAMP	FunIN.12	P	S	T
◆Valid - enable zero position fixation function. ◆Invalid - prohibits the zero position fixation function.					

signal name	symbol	function code	Applicable mode		
zero instruction	INHIBIT	FunIN.13	P	S	T
◆Valid - prohibit command pulse input. ◆Invalid - command pulse input is allowed.					

signal name	symbol	function code	Applicable mode		
positive overtravel switch	POT	FunIN.14	P	S	T
reverse overtravel switch	NOT	FunIN.15	P	S	T
When the mechanical movement exceeds the movable range, it enters the overtravel prevention function: ◆Valid - prohibit reverse drive. ◆Invalid - allows reverse drive. ◆Valid mode: level					

signal name	symbol	function code	Applicable mode		
Positive external torque limit	P-CL	FunIN.16 FunIN.17	P	S	T
According to the selection of F07.07, switch the torque limit source. F07.07=1: When F07.07=1: ◆Valid- Forward rotation external torque limit is valid. ◆Invalid - Forward rotation internal torque limit is valid.					

signal name	symbol	function code	Applicable mode		
forward jog	JOGCMD+	FunIN.18	P	S	T
◆Valid - Follow the given instructions for input. ◆Invalid - stop input of run command.					

signal name	symbol	function code	Applicable mode		
reverse jog	JOGCMD-	FunIN.19	P	S	T
◆Valid - Input in the reverse direction according to the given command. ◆Invalid - stop input of run command.					

signal name	symbol	function code	Applicable mode

Electronic gear selection	GEAR_SEL	FunIN.24	P	S	T
◆Invalid- electronic gear ratio 1. ◆valid - electronic gear ratio is 2.					

signal name	symbol	function code	Applicable mode		
command direction setting	DirSel	FunIN.27	P	S	T
◆Invalid, the actual command direction is the same as the set position command direction. ◆Valid, the actual command direction is opposite to the set command direction.					

signal name	symbol	function code	Applicable mode		
Origin switch	HomeSwitch	FunIN.31	P	S	T
◆It is recommended to assign it to the fast DI terminal. If it is set to 2 (rising edge is valid), the driver will be forced to change to 1 (high level is valid). If it is set to 3 (falling edge is valid), the driver will be forced to change to 0 (low level is valid). If it is set to 4 (both rising and falling edges are valid), the driver will be forced to change to 0 (low level is valid)					

signal name	symbol	function code	Applicable mode		
Return to origin enable	HomingStart	FunIN.32	P	S	T
◆Invalid-prohibit. ◆Valid-enable					

signal name	symbol	function code	Applicable mode		
emergency shutdown	Emergency Stop	FunIN.34	P	S	T
◆Valid-The position is locked after zero speed stop. ◆Invalid - has no effect on the current running status.					

signal name	symbol	function code	Applicable mode		
Clear position deviation	ClrPosErr	FunIN.35	P		
◆Valid- position deviation is cleared. ◆Invalid - position deviation is not cleared. ◆This DI function is recommended to be configured on DI8 or DI9 terminal.					

signal name	symbol	function code	Applicable mode		
internal speed limit source	V_LmtSel	FunIN.36		S	
◆Invalid - F07.19 is used as the internal forward/reverse speed limit value. ◆Valid- F07.20 is used as the internal forward/reverse speed limit value.					

signal name	symbol	function code	Applicable mode		
Pulse command prohibited	PulseInhibit	FunIN.37	P		
In position control mode, when the source of position command is pulse command (F05.00=0): ◆Invalid - pulse command can be responded. ◆Valid- does not respond to pulse commands.					

signal name	symbol	function code	Applicable mode		
Set the current position as the origin	HomeRecord	FunIN.41	P		
◆Inactive - does not trigger. ◆Valid - the trigger takes the current position as the origin.					

signal name	symbol	function code	Applicable mode		
internal speed selection	SP1~SP2	FunIN.43 FunIN.44		S	
When speed control and speed limit, select the internal speed ◆00: Internal speed1（F06.80） ◆01: Internal speed2（F06.82） ◆10: Internal speed3（F06.82） ◆11: Internal speed4（F06.83）					

signal name	symbol	function code	Applicable mode		
Internal torque selection	TRQ1~TRQ2	FunIN.46 FunIN.47			T
In torque control and torque limit, select internal torque ◆00: Internal torque1（F07.80） ◆01: Internal torque2（F07.81） ◆10: Internal torque3（F07.82） ◆11: Internal torque4（F07.83）					

signal name	symbol	function code	Applicable mode		
proportional control	PC	FunIN.49		S	
◆Valid - speed loop P control ◆Invalid-speed loop PI control					

4.1.4.2 Detailed explanation of general Output function

signal name	symbol	function code	Applicable mode		
Servo ready output	S-RDY	FunOUT.1	P	S	T
The servo state is ready to receive the S-ON valid signal: ◆Valid - servo is ready. ◆Invalid- Servo is not ready.					

signal name	symbol	function code	Applicable mode		
Motor rotation output	TGON	FunOUT.2	P	S	T
◆Invalid - the absolute value of motor speed after filtering is less than the set value of function code F06.16. ◆Valid - After filtering, the absolute value of motor speed reaches the set value of function code F06.16.					

signal name	symbol	function code	Applicable mode		
zero speed	ZERO	FunOUT.3	P	S	T
◆Invalid - when the difference between the speed feedback of the motor and the reference is greater than the setting value of function code F06.15. ◆Valid - when the difference between the speed feedback of the motor and the reference is not greater than the setting value of function code F06.15.					

signal name	symbol	function code	Applicable mode		
Same speed	V-CMP	FunOUT.4	P	S	T
In speed control, it is valid when the absolute value of the difference between the servo motor speed and the speed command is less than the set value of F06.17 speed deviation					

signal name	symbol	function code	Applicable mode		
positioning complete	COIN	FunOUT.5	P		
In position control, it is valid when the position deviation pulse reaches the positioning completion range F05.21.					

signal name	symbol	function code	Applicable mode		
positioning near	NEAR	FunOUT.6	P		
In position control, it is valid when the position deviation pulse reaches the setting value of positioning proximity signal amplitude F05.22.					

signal name	symbol	function code	Applicable mode		
Torque limit	C-LT	FunOUT.7			T
Acknowledgment signal for torque limit: ◆Valid- motor torque is limited. ◆Invalid - motor torque is not limited.					

signal name	symbol	function code	Applicable mode		
speed limit	V-LT	FunOUT.8			T

Acknowledgment signal of speed limitation in torque control: ◆Valid- motor speed is limited. ◆Invalid - motor speed is not limited.

signal name	symbol	function code	Applicable mode		
brake output	BK	FunOUT.9	P		
Brake signal output: ◆Valid- close and release the brake. ◆Invalid - startup brake.					

signal name	symbol	function code	Applicable mode		
warning output	WARN	FunOUT.10	P	S	T
The warning output signal is valid. (breakover)					

signal name	symbol	function code	Applicable mode		
Fault output	ALM	FunOUT.11	P	S	T
The status is valid when a fault is detected.					

signal name	symbol	function code	Applicable mode		
Output 3-digit alarm code	ALMO1	FunOUT.12	P	S	T
Output 3-digit alarm code					

signal name	symbol	function code	Applicable mode		
Output 3-digit alarm code	ALMO2	FunOUT.13	P	S	T
Output 3-digit alarm code.					

signal name	symbol	function code	Applicable mode		
Output 3-digit alarm code	ALMO3	FunOUT.14	P	S	T
Output 3-digit alarm code.					

signal name	symbol	function code	Applicable mode		
Return to zero is completed	HomeAttain	FunOUT.16	P	S	T
Return to zero state: ◆Valid- origin return to zero. ◆Invalid - origin does not return to zero.					

signal name	symbol	function code	Applicable mode		
Electrical zero return output	ElecHome Attain	FunOUT.17	P		
Electrical zero return status: ◆Valid- electrical origin return to zero.					

◆Invalid - electrical origin does not return to zero.

signal name	symbol	function code	Applicable mode		
Torque reach output	ToqReach	FunOUT.18			T
◆Valid- The absolute value of the torque reaches the set value. ◆Invalid - The absolute value of the torque is less than the set value					

signal name	symbol	function code	Applicable mode		
speed reach output	V-Arr	FunOUT.19	P	S	T
◆Valid- speed feedback reaches the set value. ◆Invalid - speed feedback does not reach the set value.					

signal name	symbol	function code	Applicable mode		
DB brake output	DB	FunOUT.21	P	S	
◆Valid- dynamic brake relay disconnected ◆Invalid - dynamic braking relay is closed.					

signal name	symbol	function code	Applicable mode		
Servo running	RUN	FunOUT.26	P	S	T
◆Valid - Servo enable ON ◆Invalid - Servo enable OFF					

4.1.5 Pulse input signal and its function

Signal	Pin	Name	Function
PULLHI	35	Pulse input common	In position control mode, as a position command input terminal; In other control modes, this group of terminals is invalid; Allowable maximum input pulse frequency: differential mode 500KHz, open collector mode 200kHz.
PULS+	38,41	Pulse input positive	
PULS-	36,43	Pulse input negative	
SIGN+	37,42	direction input positive	
SIGN-	39,40	direction input negative	

4.1.6 Encoder output signal and its function

Signal	Pin	Name	Function
PA+	21	A phase output	● The output A-phase pulse and B-phase pulse are still in quadrature, the A-phase is 90° ahead of the B-phase during forward rotation, and the B-phase is 90° ahead of the A-phase during reverse rotation; ●Arbitrary integer frequency division;
PA-	22		
PB+	25	B phase output	
PB-	23		
PZ+	13	Z phase output	

PZ-	24		●The output signal is not isolated.
OA	17	A phase output	Output the open-drain signal of phase A without isolation.
OB	15	B phase output	Output the open-drain signal of phase B without isolation.
OZ	44	Z phase output	Output Z-phase open-drain signal without isolation.

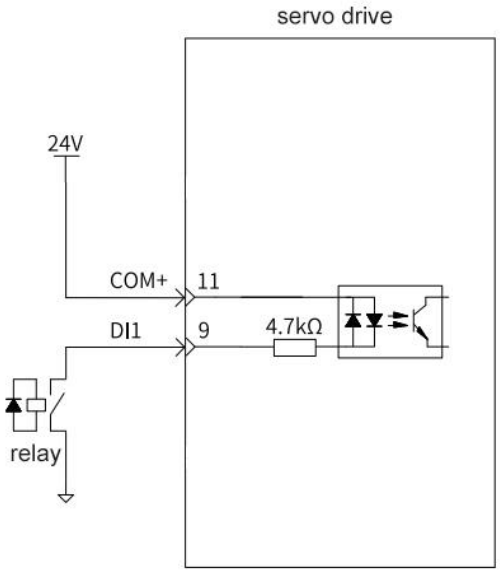
4.1.7 Analog output signal and its function

Signal	Pin	Name	Function
AS1	20	Analog output 1	Its output function definition can be set, and the range and offset can be set.
AS2	18	Analog output 2	Its output function definition can be set, and the range and offset can be set.

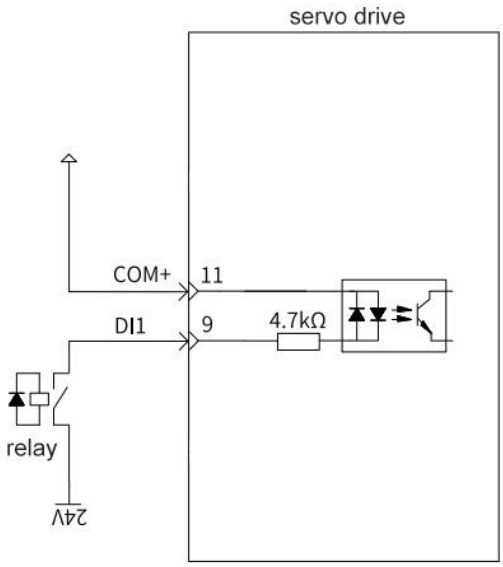
4.2 General input wiring diagram

4.2.1 Common anode connection

Take DI 1 as an example: DI2 to DI7 have the same interface circuit

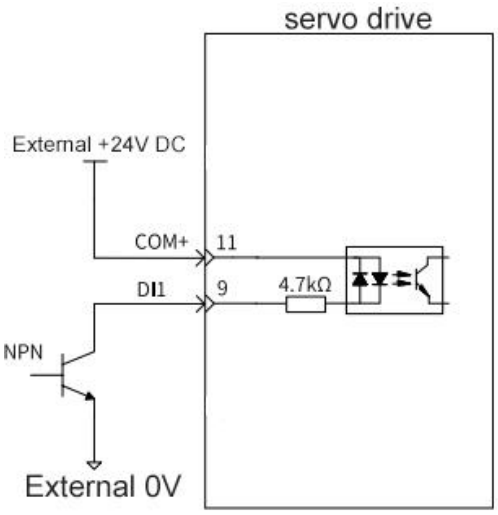


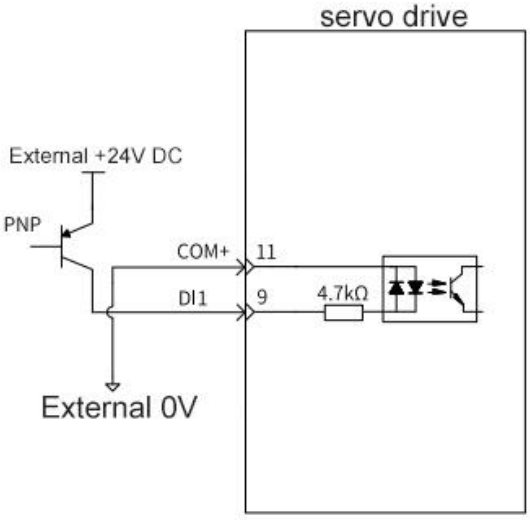
4.2.2 Common cathode connection



4.2.3 When the upper device is an open collector output

When using an external 24V power supply:





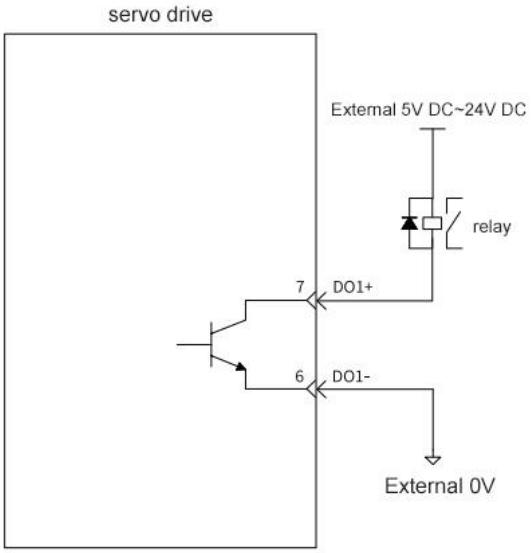
Notice

◆It does not support mixed use of PNP and NPN inputs.

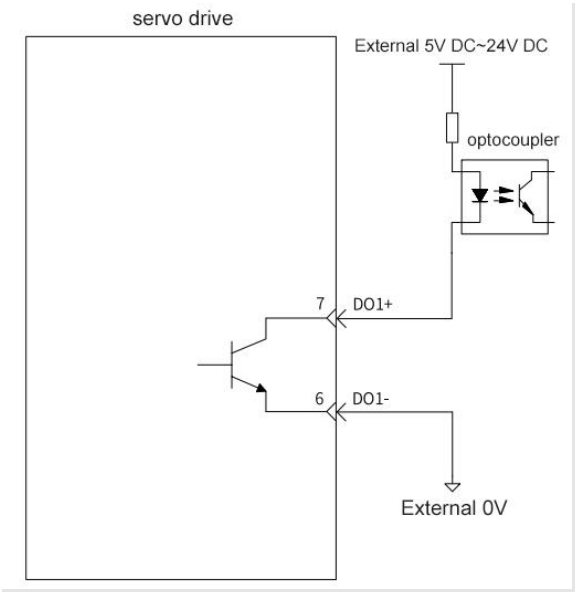
4.3 Universal digital output wiring diagram

Take DO1 as an example: the electrical circuit of DO2 to DO5 interface is the same

4.3.1 The upper device is a relay



4.3.2 The upper device is optocoupler input



Notice

●When the upper device is a relay, please be sure to connect the freewheeling diode, otherwise it may damage the DO port or cause strong signal interference.

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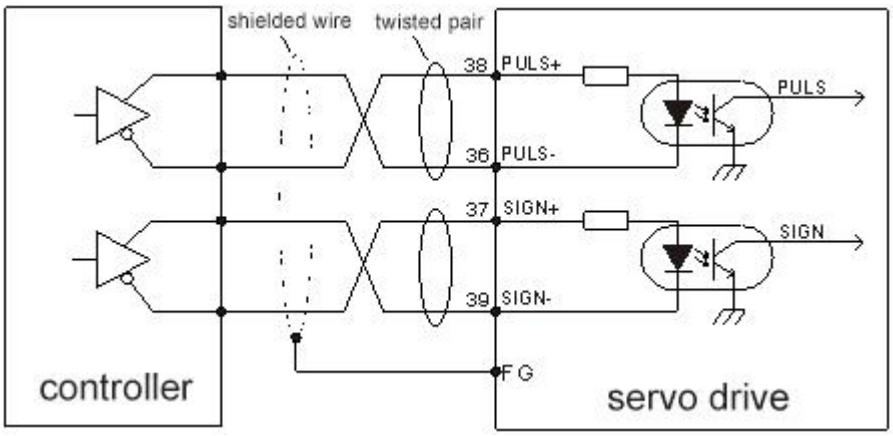
4.4 Pulse input circuit wiring

4.4.1 Difference square

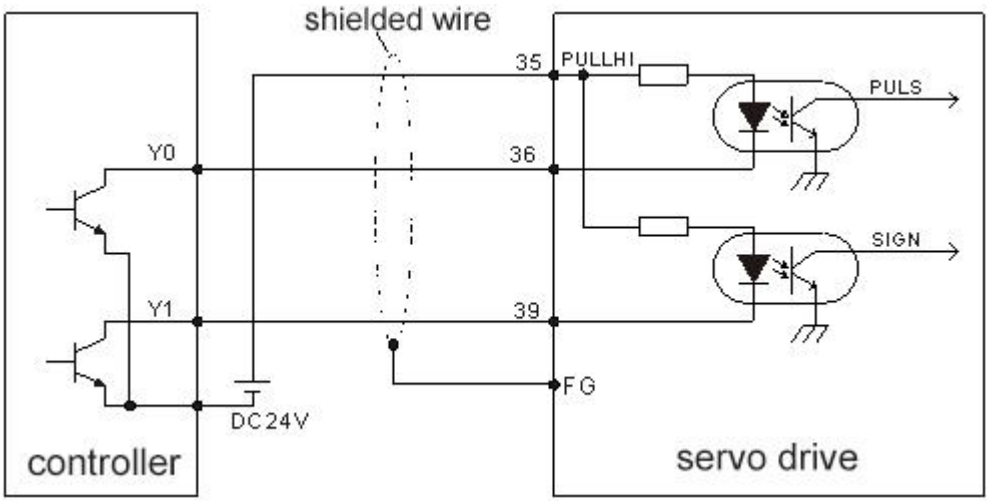


● Differential pulse input signal voltage ±5V, maximum frequency 500 K Hz;

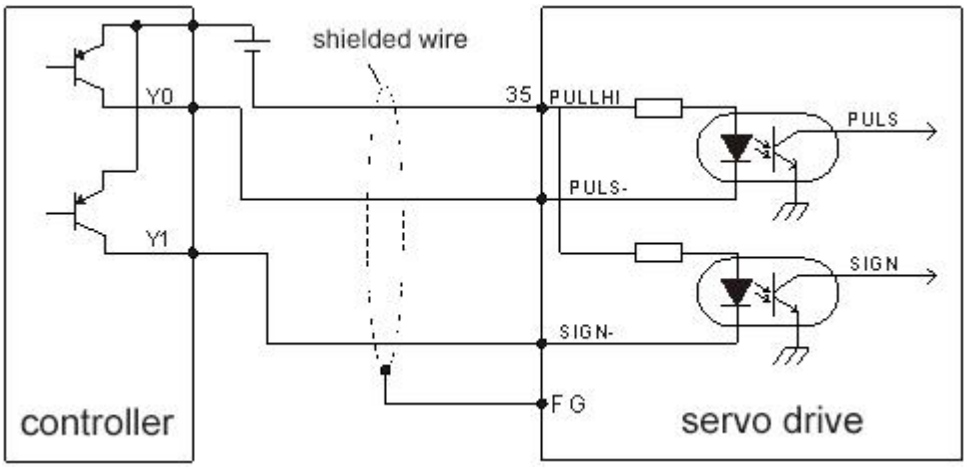
● This signal transmission method has the best anti-noise ability, and it is recommended to use this connection method first.

4.4.2 Open collector mode 1

4.4.2.1 The control module is NPN type (common cathode):



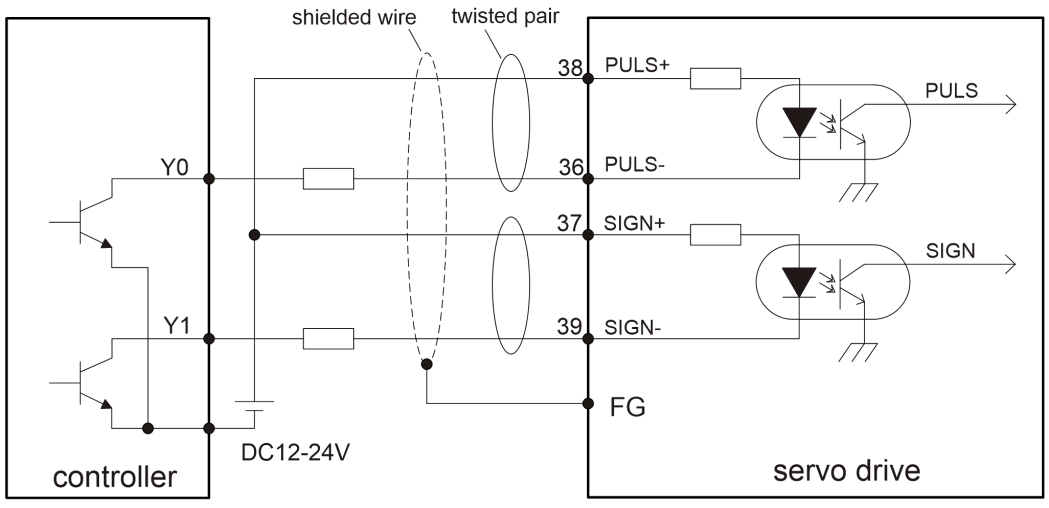
4.4.2.2 The control module is PNP type (common anode):



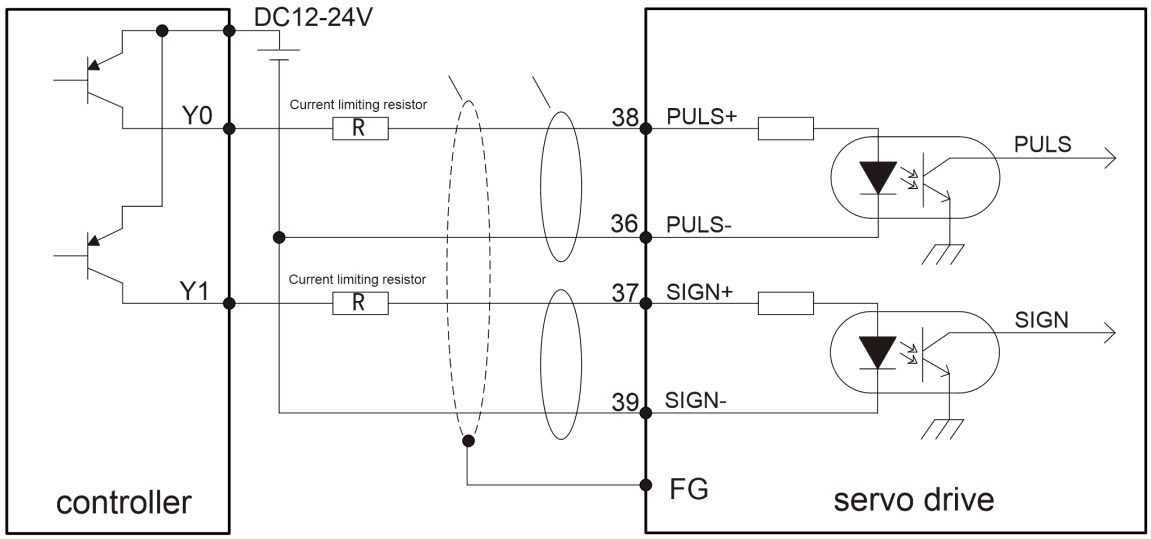
●The maximum input pulse frequency is 200kHz; the 24V power supply provided by the user does not need to connect the current limiting resistor. Generally, the majority of Japanese PLCs are NPN type, and the majority of European PLCs are PNP type.

4.4.3 Open collector mode 2

4.4.3.1 The control module is NPN type (common cathode)



4.4.3.2 The control module is PNP type (common anode)



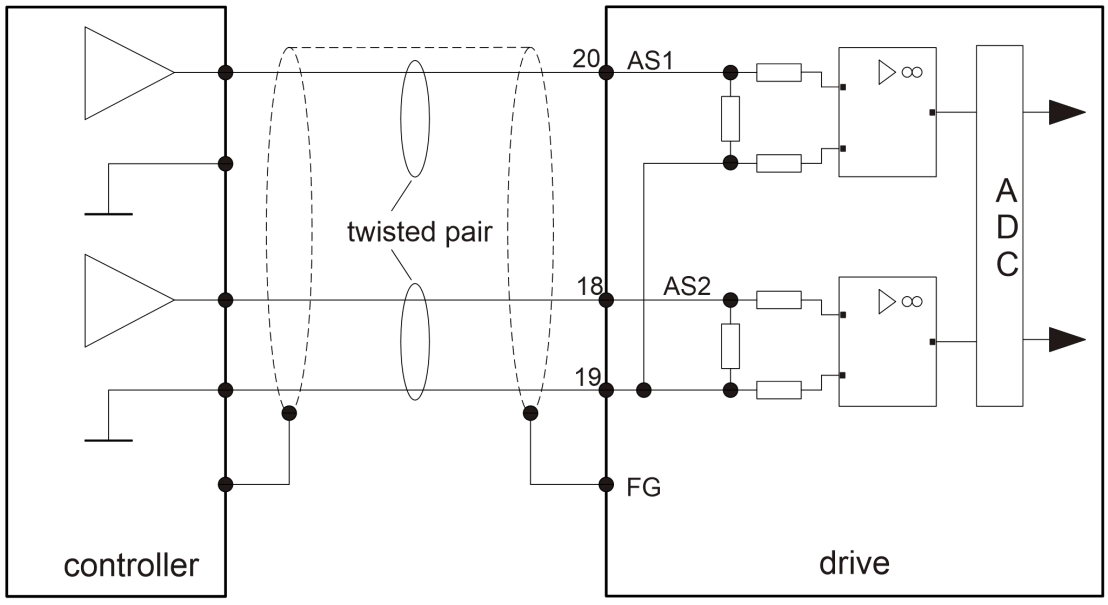
● The input pulse frequency is 200kHz; the user-prepared 12~24V power supply needs an external current-limiting resistor, and the size of the current-limiting resistor is selected according to the table.

DC12V	1kΩ,1/4W
DC24V	2kΩ,1/2W

Resistance value calculation formula:

(VDC-1.5)/(R+150)=10mA

4.5 Analog input circuit wiring



● Two-way analog input circuits, the precision of AS 1 and AS2 is 12 bits. Input impedance 10kΩ; input voltage range -10V~+10V .

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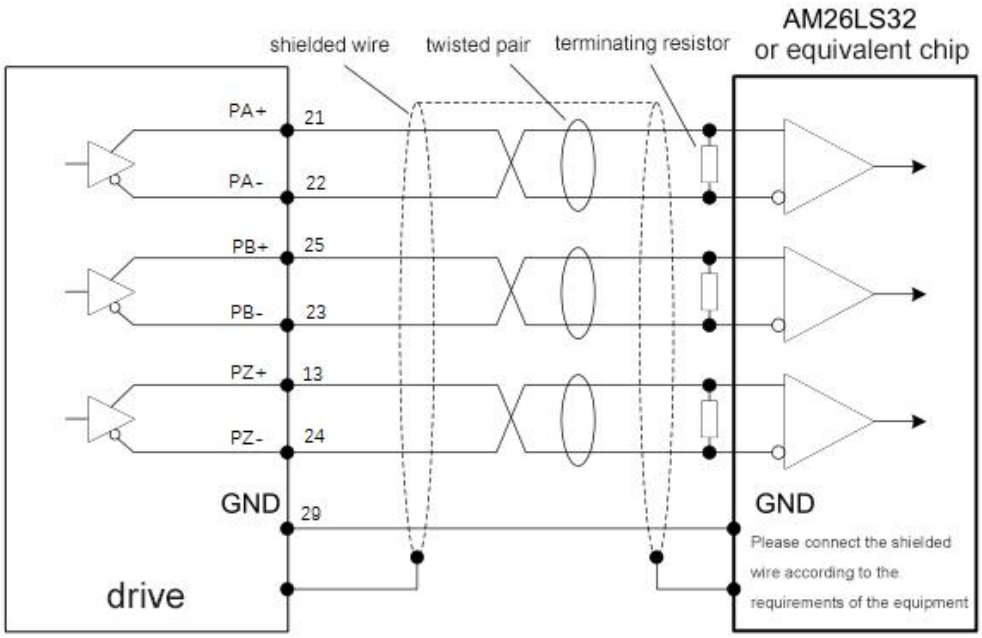
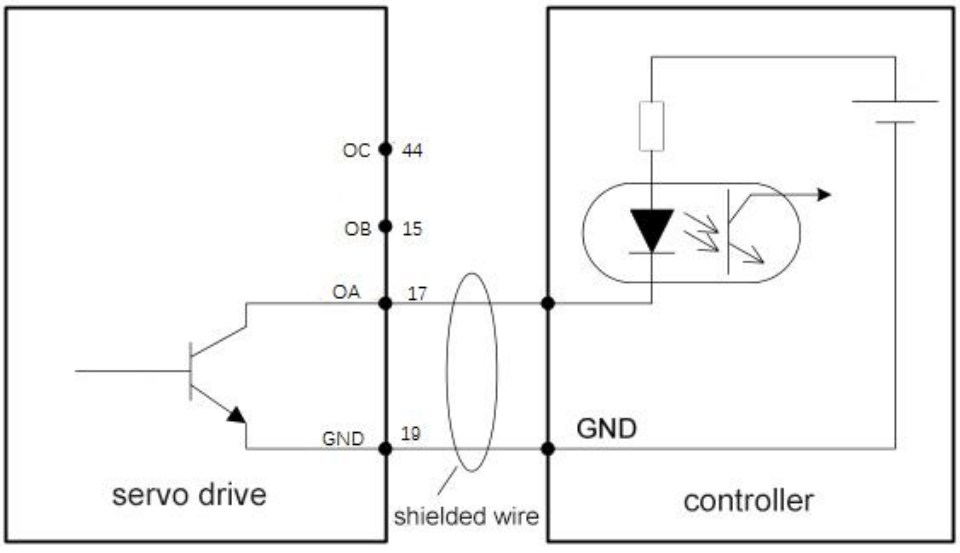
4.6 Encoder feedback signal frequency division output circuit wiring

4.6.1 Differential method



4.6.2 Open collector mode



●A, B, and Z phases of the encoder provide differential output and open-collector output signals.

●For differential output signals, it is recommended that users use AM26C32 or equivalent differential receiving chips, and must add about 220Ω terminal matching resistance.

●For the A, B, and Z phase signals output by the collector open circuit, because the signal pulse width is very narrow, the

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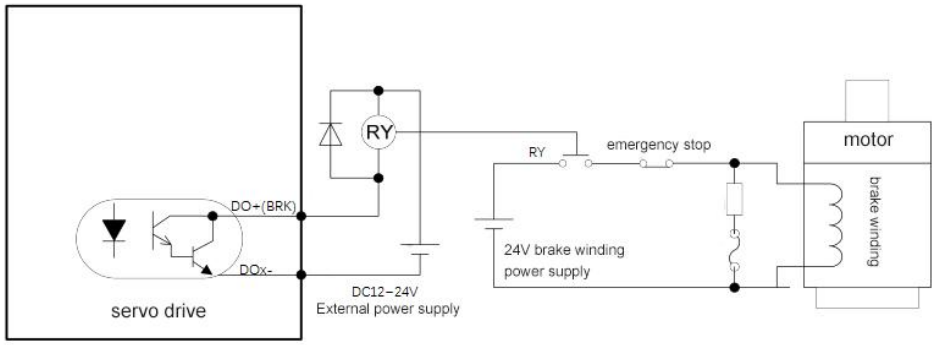
user needs to use a high-speed optocoupler to receive the signal.

●The two output circuits are not isolated.

4.7 Electromagnetic Brake Wiring

When the servo motor is used on the vertical axis, the electromagnetic brake can be used to stop or maintain the speed of the falling weight when the servo drive is powered off . The connection of the electromagnetic brake is as follows:



●The 24V power supply for the electromagnetic brake requires the user to prepare a dedicated power supply, and it must not be shared with the control signal power supply;

●The picture shows (RY) the relay coil, please pay attention to the direction of the diode;

●The electromagnetic brake is used for holding, not for normal parking;

●Although the electromagnetic brake can prevent or keep heavy objects from falling, the user is required to install a braking device outside at the same time.

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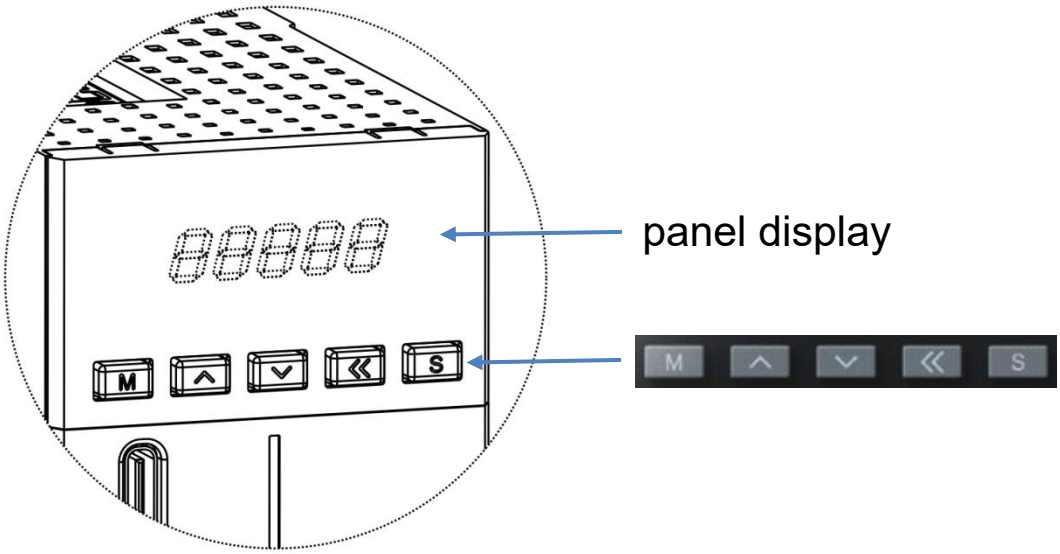
Chapter 5 Debugging Tools

5.1 Operation panel

5.1.1 Introduction to Panel Composition



The panel of the SD300P servo drive consists of a display (5-digit 8-segment LED digital tube) and 5 keys. It can be used for various display, parameter setting, user password setting and execution of general functions of the servo drive. Taking the parameter setting as an example, the general functions of the buttons are shown in the table below:

Table 5 - 1 General function description of button

name	icon	general function
MODEkey	MODE	Switch between modes. Return to the previous menu.
UPkey	▲	Increase the value of the blinking digit of the LED digital tube.
DOWNkey	▼	Reduce the value of the LED digital tube blinking digit.
SHIFT key	◀◀	Change the blinking bit of the LED digital tube. View the high-order value of data with a length greater than 5 bits.
SET key	SET	Enter the next menu. Execute commands such as storing parameter settings.

5.1.2 Panel display

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

●Status display: Display the current status of the servo, such as the servo is ready, the servo is running, etc.

●Parameter display: Display parameters and parameter setting values.

●Fault display: display the faults and warnings of the servo.

●Monitoring display: display the current operating parameters of the servo.

Panel Display Switching Method

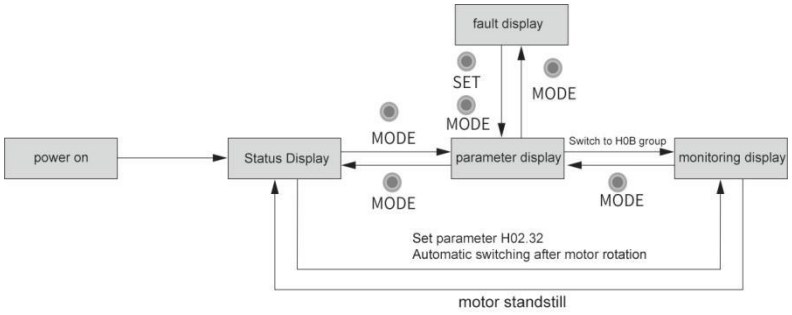


Figure 5-2 Schematic diagram of display switching methods for various types of panels

●When the power is turned on, the panel display immediately enters the status display mode.

●Press the "MODE " key to switch between different display modes, and the switching conditions are shown in "Figure 5-2 ".

●When the status is displayed, after setting F02.32 to select the monitoring target parameter, the display will automatically switch to the monitoring display while the motor is rotating, and the display will automatically return to the status display after the motor stops.

●When the parameters are displayed, set the F0b group parameters to select the target parameters of the pre-monitoring, and can switch to the monitoring display.

●Once a fault occurs, it will immediately switch to the fault display mode, and the 5 -digit digital tube will flash synchronously at this time. Press the "SET " key to stop the digital tube from flashing, and then press the "MODE " key to switch to the parameter display mode.

Status Display

show	name	display occasion	Meaning
rESEt	Reset: Servo initialization	The moment the servo is powered on.	Drive is in initialization or reset state. Wait for the initialization or reset to complete, and automatically switch to other states.
nrd	Nrd: Servo not ready	Servo initialization is complete, but the drive is not ready.	Because the main circuit is not powered on, the servo is in an inoperable state. For details, please refer to the "Troubleshooting"

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			chapter.
	Rdy: Servo ready	The drive is ready.	The servo driver is in the running state, waiting for the servo enable signal from the upper computer.
	Run: Servo is running	The servo enable signal is valid. (S-ON is ON)	The servo drive is running.
	Jog: jog run	The servo driver is in jog running state.	Set jog operation, please refer to See"6.2.3 Jog run

parameter display

SD300P series servo is divided into 14 groups of parameters according to different parameter functions, and the parameter position can be quickly positioned according to the parameter group. For the parameter list, please refer to the "Parameter Description" chapter.

●Parameter group display

show	name	content
FXX.YY	parameter group	XX: parameter group number (hexadecimal). YY: Bias within the parameter group (decimal).

Example: F02.00 is displayed as follows:

show	name	content
	Parameter F02.00	02: parameter group number 00: Bias within the parameter group

● Different length data and negative number display

■ 4-bit or less signed number or 5-bit or less unsigned number

It adopts a single-page (5-digit digital tube) display, and for signed numbers, the highest bit of the data "-" indicates a negative sign.

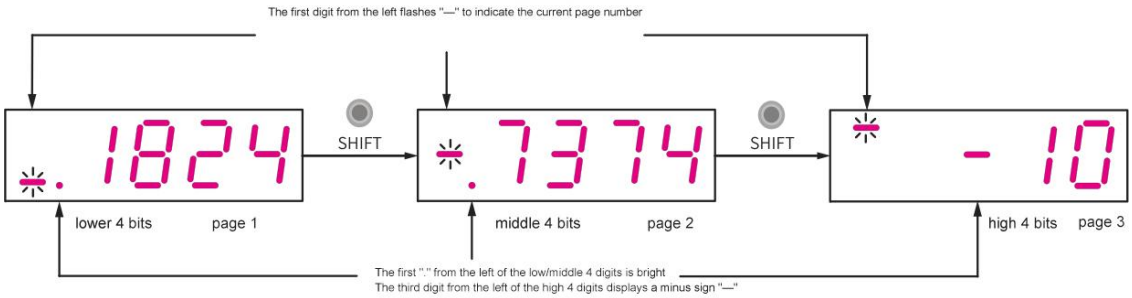
Example: -9999 is displayed as follows:

Example: 65535 is displayed as follows

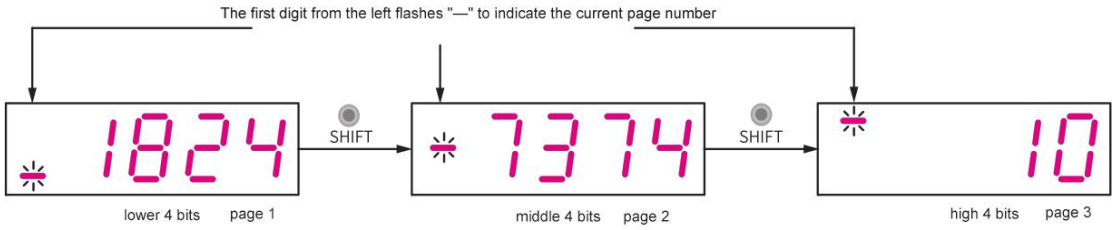
■ 4 or more signed numbers or 5 or more unsigned numbers

Display in pages from low to high digits, every 5 digits is a page, display method: current page + current page value, as shown in the figure below , switch the current page by pressing and holding "SHIFT " for more than 2 seconds.

Example: -1073741824 is displayed as follows

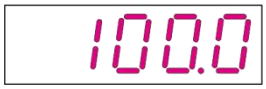


Example: 1073741824 is displayed as follows:



- Decimal point display

The "." of the nixie tube of the unit digit data represents a decimal point, and the decimal point "." does not flash.

show	name	content
	decimal point	100.0

show	display occasion	Meaning
Done: Parameter setting completed	parameter setting is successful.	Indicates that the parameter value has been set and stored in the servo drive (Done). The drive is free to perform other operations at this point.
F.InIt: Parameters restore to factory settings	The current system parameter initial Initialization function(F02.31=1)。	The driver is in the process of restoring the factory settings (Function Code Initialize). After the initialization of the system parameters is completed, turn on the control power again.
Error: wrong password	When using the user password function (F02.30), the password is entered incorrectly.	Prompt password input error (Error), need to re-enter the password.

- Parameter setting display

fault display

- The panel can display current or historical fault and warning codes. For the analysis and troubleshooting of faults and warnings, please refer to the chapter "Troubleshooting".

- When a single fault or warning occurs, the current fault or warning code is displayed immediately; when multiple faults or warnings occur, the fault code with the highest fault level is displayed.

● After setting the number of historical faults to be viewed through F0b.33, check F0b.34, and the panel will display the selected fault or warning code.

● Setting F02.31=2 can clear the information about ten faults or warnings stored in the servo drive .

For example: Er.941, Er.600 and Er.B00 faults are displayed as follows:

show	content
Er.941: current warning code	Er.: There is a fault or warning in the servo drive. 941: Warning code.
Er.600: current warning code	Er.: There is a fault or warning in the servo drive. 600: Warning code.
Er.B00: current warning code	Er.: There is a fault or warning in the servo drive. B00: Warning code.

monitoring display

●F0b group of the servo drive : display parameters can be used to monitor the running status of the servo drive.

● By setting parameter F02.32 (default panel display function), after the servo motor runs normally, the display will automatically switch from "servo status display mode" to "parameter display mode". The parameter group number of the parameter is F0b, and the group number Set value for F02.32.

● Example: set F02.32=00, then when the servo motor speed is not 0, the display will display the parameter corresponding to F0b.00value.

F0b.00 monitoring display details are as follows:

parameter	name	unit	Meaning	Show example
F0b.00	Actual motor speed	rpm	The actual running speed of the servo motor can be displayed accurately to 1rpm after being rounded off.	3000 rpm display:  -3000 rpm display: 

F0b group monitoring display details, please refer to "9.12 Panel monitoring display"

5.1.3 Parameter setting

Example of parameter setting

Parameters can be set using the panel of the servo drive. For parameter details, please refer to "Chapter 9 Parameter Description ". Take the example of changing the drive from position control mode to speed control mode after power on:

`

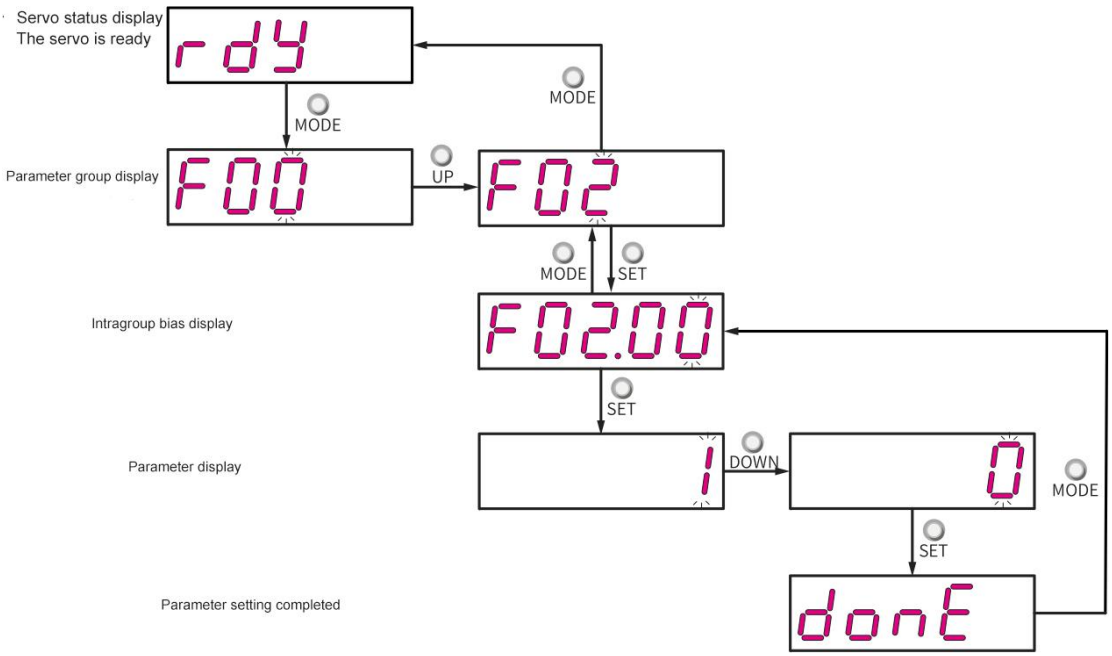


Figure 5-3 Schematic diagram of parameter setting steps

- “The "MODE" key can be used to switch the display mode of the panel and return to the previous interface.
- "UP"/"DOWN" keys can increase or decrease the value of the current flicker bit.
- "SHIFT" key can change the current flicker bit.
- "SET" key can store the current set value or enter the lower level interface.

After the parameter setting is completed, that is, under the "Done" interface, you can press the "MODE" key to return to the parameter group display(“F02.00” interface).

User password: After the user password (F02.30) function is enabled, the user has the parameter setting authority, and other operators can only view it, but cannot change the parameter value.

- User password setting

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

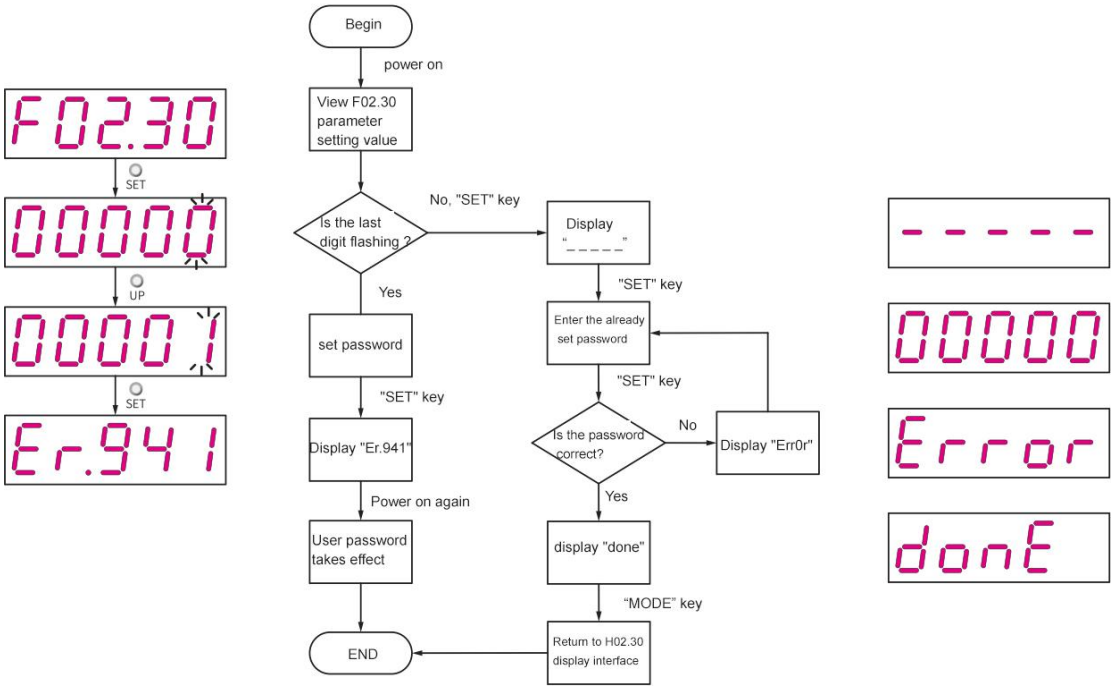


Figure 5-4 Schematic diagram of user password setting steps

When modifying the user password, first enter the current password to enable the parameter setting authority. Enter F02.30 again to set a new password, the setting method is the same as the above picture.

Note : If the last digit is not flashing, it means that it is currently under password protection; if the last digit is blinking, it means that no password has been set or the correct password has been entered.

- Cancellation of user password

After the user must enter the user password that has been set, setting the F02.30 parameter value to "00000" means that the user password is cancelled.

Chapter 6 Debugging and run

6.1 Debugging flowchart

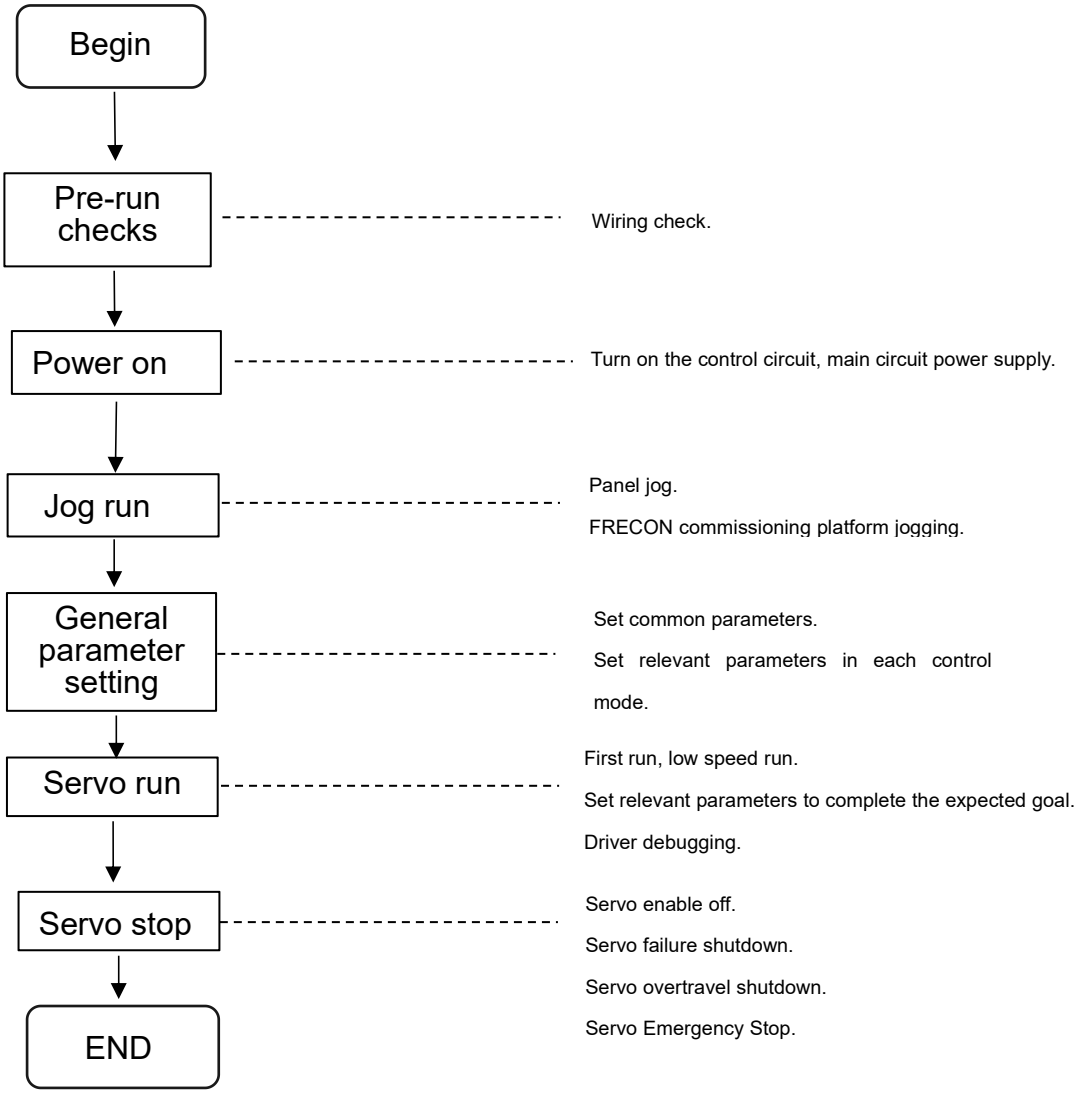


Figure 6 - 1 Servo debugging process

6.2 Debugging steps

6.2.1 Pre-run inspection

The following checks should be carried out before the servo driver and servo motor run:

Table 6–1 Checklist before running

Record	serial	content

	number	
wiring		
☐	1	The power input terminals (L1, L2) of the servo drive must be connected correctly.
☐	2	The output terminals (U, V, W) of the servo drive and the main circuit cables (U, V, W) of the servo motor must have the same phase and be connected correctly.
☐	3	The power input terminals (L1, L2) and main circuit output terminals (U, V, W) of the servo drive cannot be short-circuited.
☐	4	The wiring of each control signal of the servo drive is correct, and the external signal lines such as the brake and overtravel protection have been reliably connected.
☐	5	Servo drives and servo motors must be reliably grounded.
☐	6	The stress of all cables is within the specified range.
☐	7	The wiring terminals have been insulated.
Environment and Machinery		
☐	1	There are no wire stubs, metal filings and other foreign objects inside and outside the servo drive that may cause short circuits in the signal wires and power wires.
☐	2	Servo drives and external braking resistors are not placed on combustible objects.
☐	3	The installation of the servo motor, the connection of the shaft and the machine must be reliable.
☐	4	The servo motor and connected machinery must be in can run condition.

6.2.2 power on

● Connect input power

■ L1、L2。For single-phase 220V input power terminals are L1, L2.

■ For three-phase input, the power terminals are L1, L2, L3 or L1C, L2C (control circuit power input), R, S, T (main circuit power input terminals). After the input power is turned on, the bus voltage indicator shows no abnormality, and the panel display shows "Reset" → "Nrd" → "Rdy" in sequence, Indicates that the servo drive be in can run condition, waiting for the servo enable signal from the host computer.

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● If the display on the panel of the servo driver keeps displaying “Nrd”, please refer to the chapter “Troubleshooting” to analyze and eliminate the cause of the failure.

● If the display on the panel of the servo driver displays a fault, please refer to the chapter "Troubleshooting" to analyze and eliminate the cause of the fault.

● Set the servo enable (S - ON) to invalid (OFF) to use the servo enable, first configure a DI terminal of the servo driver as function 1 (FunIN.1: S - ON, servo enable), and determine the DI terminal Terminal valid logic. Then set it to invalid through the upper computer communication or external switch.

☆Associated function coding:

coding	name	function name	Function
FunIN.1	S-ON	Servo enable	Invalid, the servo motor is not powered. Valid, the servo motor is powered on.

`

6.2.3 Jog run

Notice

When using the jogging function, the servo enable signal (S - ON) must be disabled, otherwise it cannot be executed!

In order to test run the servo motor and driver, you can use the jog function to confirm whether the servo motor can rotate normally, and there is no abnormal vibration and abnormal sound when rotating. The jogging function can be used in three ways: through the panel, configuring two external DI, and the FRECON drive debugging platform. The motor takes the value stored in the current parameter F06.04 as the jog speed.

panel jog

● Commissioning steps

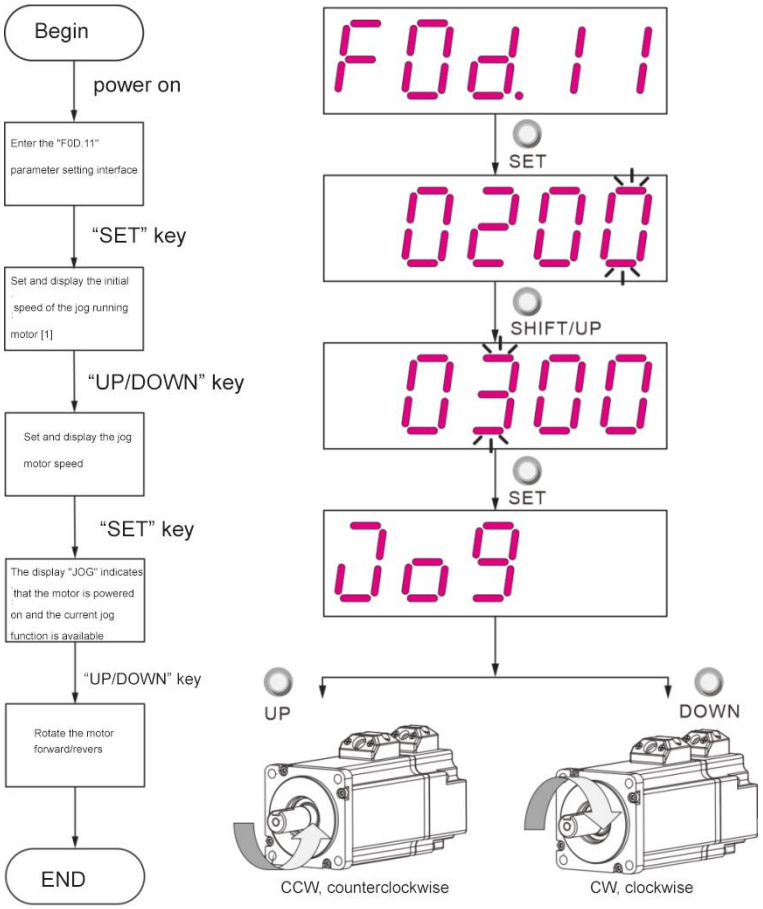

Figure 6- 2 Schematic diagram of setting steps for jog operation

illustrate

● [1]Press the "UP" or "DOWN" key to increase or decrease the speed of the jog running motor, and the initial speed will be restored after exiting the jog running function.

● [2]Press the "UP" or "DOWN" button, the servo motor will rotate in the forward or reverse direction, and the servo motor will stop running immediately when the button is released.

`

● Operation instructions

1. Enter the jog operation mode through the panel operation F0d.11. At this time, the panel displays the default value of F06.04 Jog speed.

2. Use the UP/DOWN key to adjust the jogging speed, and press the SET key to enter the jogging state. At this time, the panel displays "JOG" status.

3. Press the UP/DOWN key to realize forward and reverse jogging run.

4. Press the MODE key to exit the jog run mode and return to the previous menu at the same time. The previously set F06.04 Jog speed value will not be saved, and will be restored to the default value.

★Associated parameters:

parameter	name	setting range	unit	Function	Setting method	effective time	factory setting
F06.04	Jog speed setpoint	0~6000	rpm	Set the speed command value in JOG mode.	run settings	Effective immediately	100

● Exit jog run

Press the "MODE" key to exit the current jog running state and return to the previous menu at the same time.

DI jog run

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The DI jog run is not affected by the servo control mode, that is, the DI jog operation function can be performed in any control mode.

Configure 2 external DI terminals, set them as FunIN.18 and FunIN.19 functions, set the F06.04 jog speed value, turn on the servo enable S - ON, and jog running through the DI state.

☆Associated function coding:

coding	name	function name	describe
FunIN.18	JOGCMD+	forward jog	Valid- follow the given command input. Invalid- running command stops input.
FunIN.19	JOGCMD-	reversal jog	Valid - reverses the input as given. Invalid- running command stops input.

`

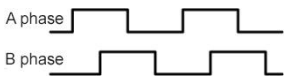
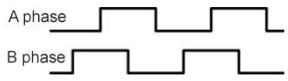
6.2.4 General parameter setting

Output pulse phase selection

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

By setting the output pulse phase (F02.03), the phase relationship between the A-phase pulse and the B-phase pulse can be changed without changing the rotation direction of the motor.

★Associated parameters:

parameter	name	setting range	Function	Setting method	effective time	factory setting
F02.03	Output pulse phase	0- A ahead of B 1- A lags B	Sets the phase relationship of the output pulses.  A ahead of B90°  A lags B 90°	Shutdown setting	power on again	0

brake setting

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

Notice

● The brake mechanism built into the servo motor is a non-energized action type fixed special mechanism, which cannot be used for braking purposes, and is only used to keep the servo motor in a stopped state.

● The brake coil has no polarity.

● After the servo motor stops, the servo on signal (S - ON) should be cut off.

● When the motor with the built-in brake is running, the brake may make a clicking sound, but it has no effect on the function.

● When the brake coil is energized (the brake is released), magnetic flux leakage may occur at the shaft end and other parts. Be careful when using instruments such as magnetic sensors near the motor.

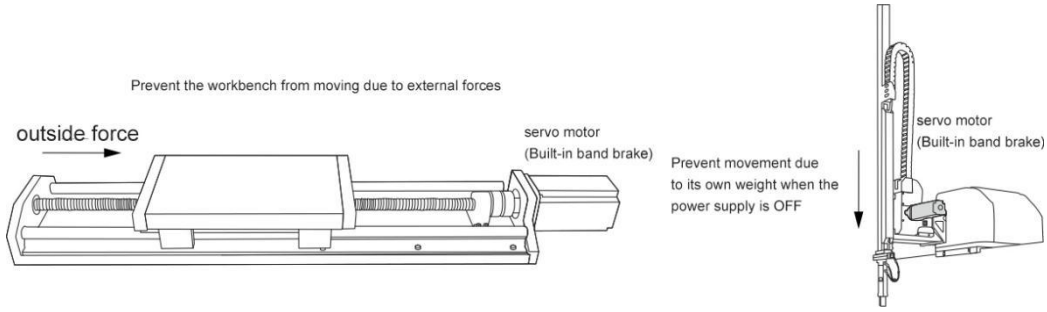


Figure 6-3 Schematic diagram of brake application

●Brake software setting

For a servo motor with a brake, one DO terminal of the servo drive must be configured as function 9 (FunOUT.9: BK, brake output), and the effective logic of the DO terminal must be determined.

★Associated function coding:

coding	name	function name	Function
FunOUT.9	BK	brake output	Invalid, the brake power supply is disconnected, the brake acts, and the motor is in a position-locked state. valid, the brake power is turned on, the brake is released, and the motor can rotate.

According to the current state of the servo drive and the servo motor, the working timing sequence of the brake mechanism can be divided into the free running sequence of the servo motor and the deceleration running timing sequence of the servo motor.

● Servo motor free running timing sequence

The free running timing sequence is divided into two cases: the motor is stationary and the motor is rotating

Motor static: The actual speed of the motor is lower than the setting value of parameter F0A.70.

Motor rotation: The actual speed of the motor reaches the setting value of parameter F0A.70.

■Brake timing sequence when the servo motor is stationary

When the servo enable is turned from ON to OFF, if the current motor speed is lower than the setting value of parameter F0A.70, the drive will act according to the timing sequence of static brake.

Notice

● After the brake output is turned from OFF to ON, within the time of F02.09, please do not input position/speed/torque command, otherwise it will cause command loss or run error.

● When used on a vertical axis, the machine may move slightly due to its own weight or external force on the moving part of the machine. When the servo motor is at rest, the servo enable OFF occurs, and the brake output immediately turns OFF, but within the time of F02.10, the motor is still in the energized state to prevent the mechanical moving part from moving due to its own weight or external force.

`

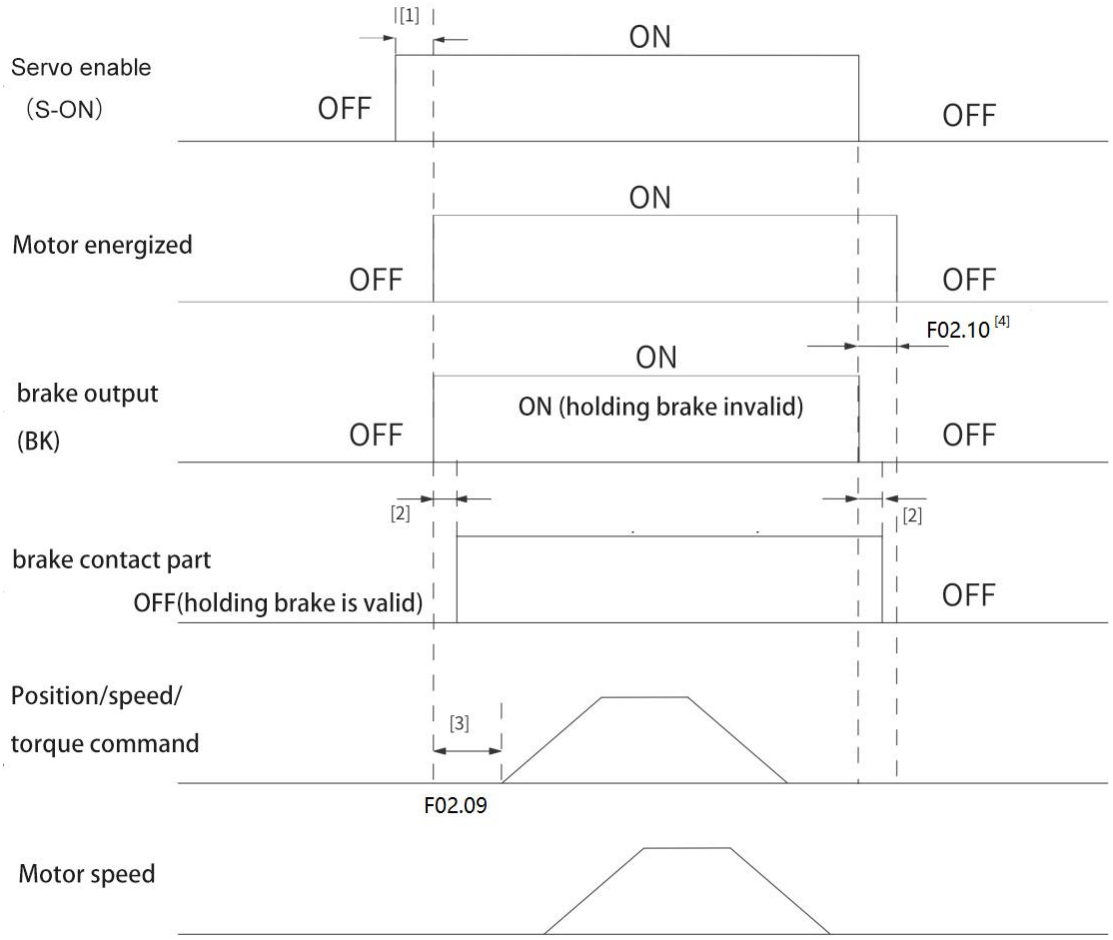


Figure 6-4 Timing diagram of holding brake when the motor is at rest

illustrate

● [1]: When the servo enable is ON, the delay is about 100ms, the brake output is set to ON, and the motor enters the power-on state at the same time.

● [2]: For the delay time of the action of the brake contact part, please refer to the relevant specifications of the motor.

● [3]: From the time when the brake output is set to ON to when the command is input, please set the interval of F02.09 or more.

● [4]: When the servo motor is static (the motor speed is lower than the setting value of parameter F0A.70), when the servo enable is OFF, the brake output will be set to OFF at the same time. After the brake output is OFF, it can be set by F02.10, the delay for the motor to enter the non-energized state.

★Associated parameters:

parameter	name	setting range	unit	Function	SettingMode	effective time	factory setting
F02.09	Brake output ON to command reception time delay	0~1000	ms	Set the delay time from the brake output (BK) ON when the servo drive starts to receive the input command. F02.09 has no effect when the brake output (BK) is not assigned.	run settings	Effective immediately	0
F02.10	Static state, delay from brake output OFF to motor power off	1~2000	ms	Set the delay time from the brake output (BK) OFF when the motor is in a static state and enters a non-energized state. F02.10 has no effect when the brake output (BK) is not allocated .	run settings	Effective immediately	150

- Brake timing sequence when the servo motor rotates
- When the servo enable is turned from ON to OFF, if the current motor speed is greater than or equal to the setting value of F0A.70, the driver will act according to the rotation brake timing sequence.

Notice

● When the servo enable is turned from OFF to ON , do not input position/speed/torque command within the time of F02.09, otherwise it will cause command loss or operation error.

● When the servo motor is rotating, if the servo enable is OFF, the servo motor enters a non-energized free stop state, but the brake output must meet the

It can be set to OFF only when one of the following conditions is met:

–	F02.12 time is not up, but the motor has decelerated to F02.11.
–	F02.12 time has come, but the motor speed is still higher than F02.11.

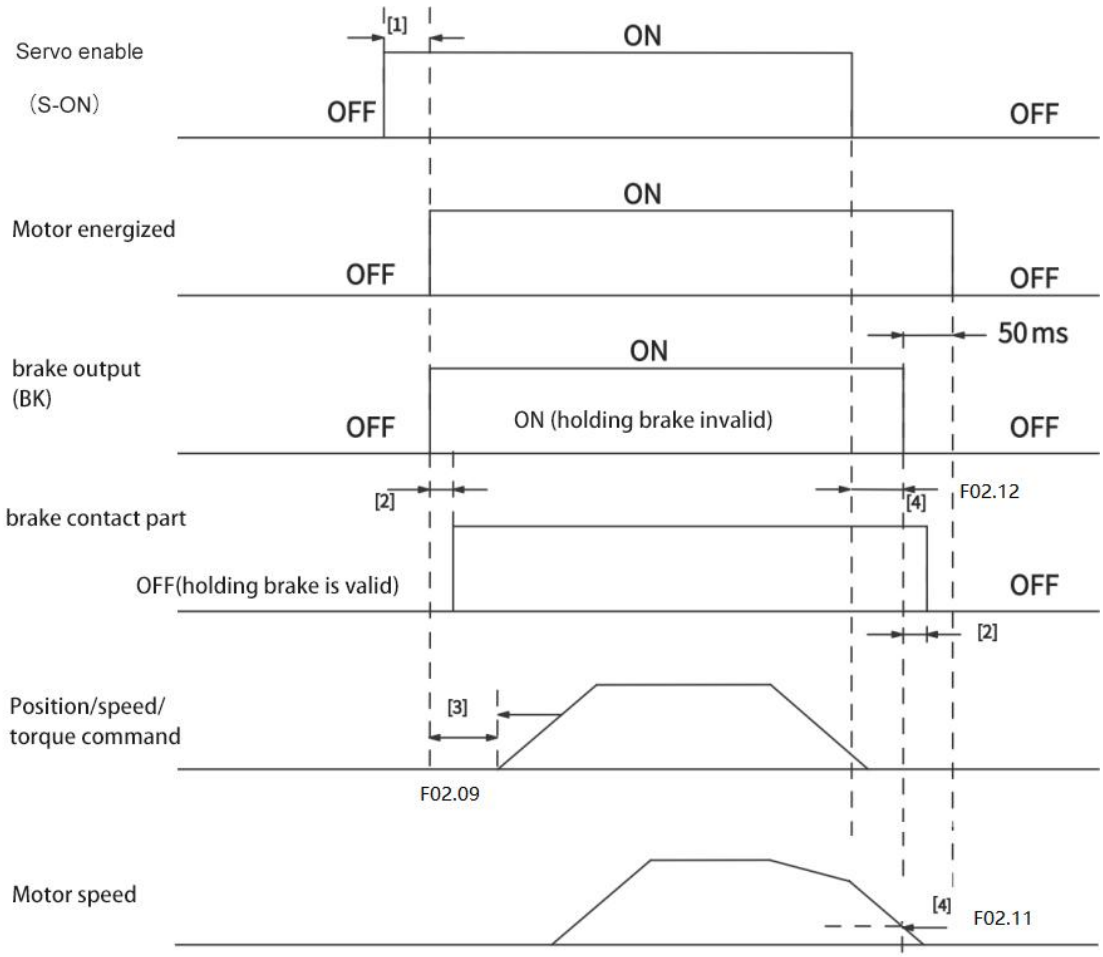


Figure 6-5 Brake timing diagram when the motor rotates

illustrate

● [1]: When the servo enable is ON, the delay is about 100ms, the brake output is set to ON, and the motor enters the power-on state at the same time.

● [2]: For the delay time of the action of the brake contact part, please refer to the relevant specifications of the motor.

● [3]: From the time when the brake output is set to ON to when the command is input, Please interval F02.09 time or more

● [4]: When the servo motor is rotating, when the servo enable is OFF, the motor enters the non-energized state. After the servo enable is OFF, the delay of the brake output OFF can be set through F02.11 and F02.12.

★: Associated parameters:

parameter	name	setting range	unit	Function	SettingMode	effective time	factory setting
F02.11	Rotation state, the speed threshold when the brake output is OFF	0~3000	rpm	Set when the motor is in rotation , The motor speed threshold when the brake output (BK) is set to OFF. When no brake output	run settings	Effective immediately	100

`

				(BK) is allocated, F0 2.11 has no effect.			
F02.12	Rotation state, delay from servo enable OFF to brake output OFF	0~2000	ms	the delay time from when the brake output (BK) is OFF to when the servo enable (S ON) is OFF when the motor is rotating. When the brake output (BK) is not assigned, F0 2.12 has no effect.	run settings	Effective immediately	0

● Servo motor deceleration running timing sequence

Notice

● After the brake output is turned from OFF to ON , do not input position/speed/torque command within the time of F02.09, otherwise it will cause command loss or operation error.

● When the servo enable is turned from ON to OFF, the servo motor remains energized. If the current motor speed is lower than the setting value of parameter F0A.70, the drive will operate according to the sequence of static brake. If the servo drive fails, the fault will follow the stop mode. Different, it is divided into Type 1 fault (abbreviation: NO.1) and type 2 fault (abbreviation: NO.2), please refer to the "Troubleshooting" chapter. The brake sequence in the fault state of the servo drive can be divided into the following two situations:

■ Type 1 failure occurs:

The brake DO output condition is the same as "the brake timing sequence when the servo motor rotates in the normal state of the servo drive". That is: the brake output must meet any of the following conditions before it can be set to OFF:

■ The time of F02.12 has not come yet, but the motor has decelerated to F02.11.

■ F02.12 time has come, but the motor speed is still higher than F02.11.

■ Type 2 failure occurs:

When the second type of fault occurs and the brake is enabled, the shutdown mode of the second type of fault is forced to "stop at zero speed and maintain the DB state".

At this time, the servo motor first stops at zero speed. When the actual speed of the motor is lower than 20rpm, the DO output condition of the brake is the same as "the brake timing sequence when the servo motor is stationary under the normal state of the servo drive", that is: the brake output immediately becomes OFF, but within the time of F02.10, the motor is still powered on.

`

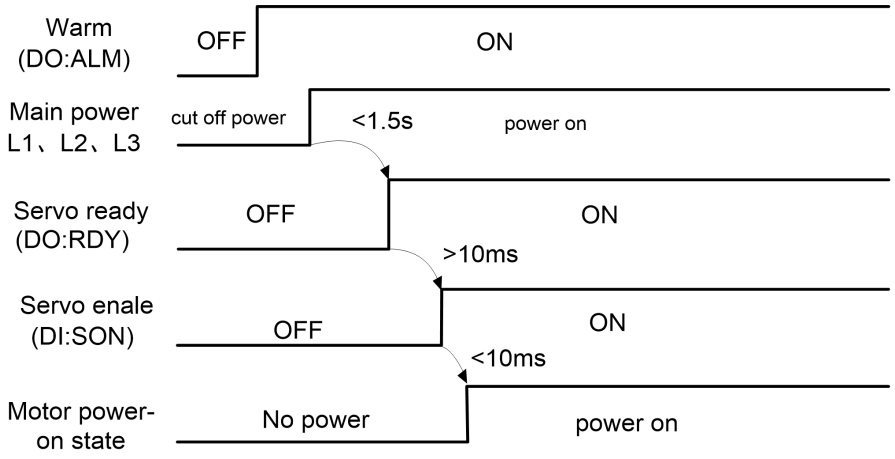
6.2.5 Servo working timing sequence

Set the servo enable (SON) to valid (ON).

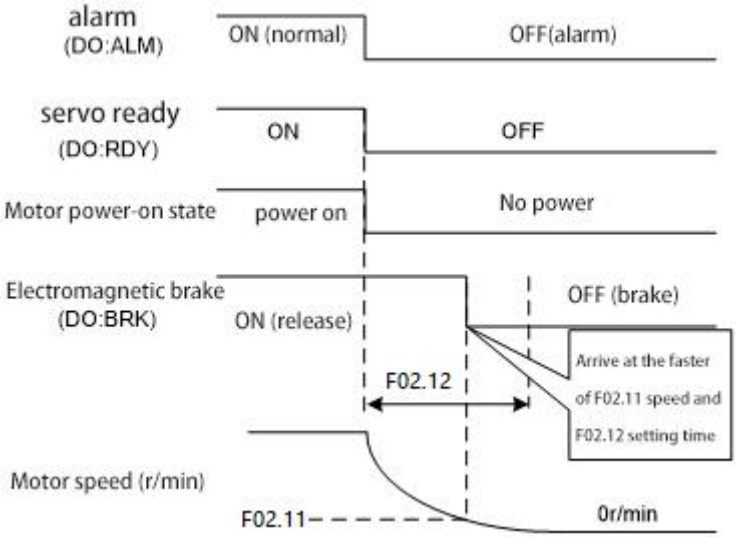
The servo drive is in the running state, and the display shows "Run", but because there is no command input at this time, the servo motor does not rotate and is in a locked state. After the command is input, the servo motor rotates.

- The main power supply L1, L2, L3 is connected at the same time or before the main circuit power supply. If only the control circuit power is turned on, the servo ready signal (RDY) is OFF .
- After the main power supply is turned on, there is a delay of about 1.5 seconds, and the servo ready signal (RDY) is ON. At this time, the servo enable (SON) signal can be accepted, the servo enable is detected to be valid, the power circuit is turned on, and the motor is excited. is running. If it is detected that the servo enable is invalid or there is an alarm, the power circuit is closed and the motor is in a free state.

Power On Timing Chart



●Timing chart of alarm when servo is ON



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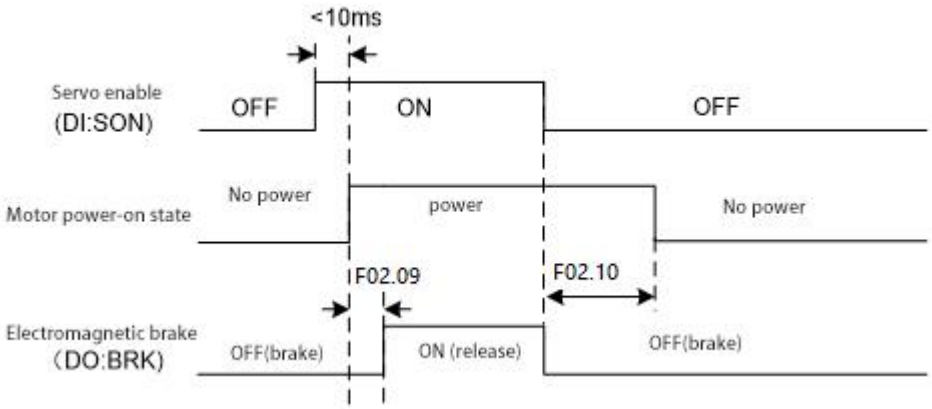
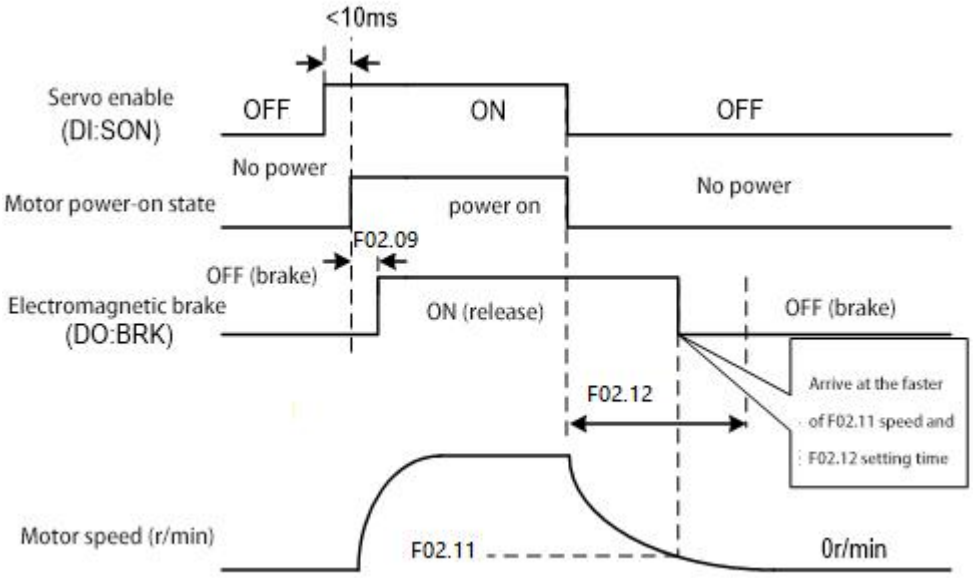
●Servo ON/OFF action sequence when the motor is stationary

Action timing sequence when the motor speed is lower than parameter F0A.70:



●Servo ON/OFF action timing sequence when the motor is running

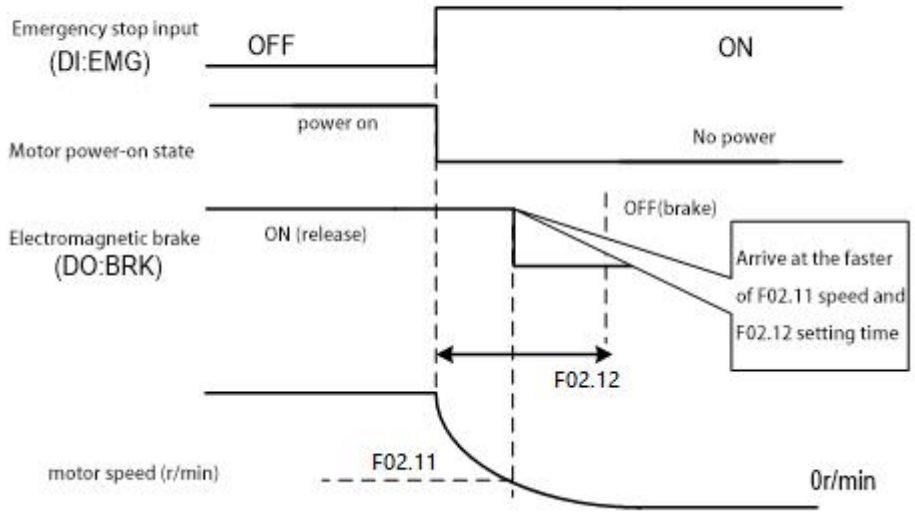
Action timing sequence when the motor speed is higher than parameter F0A.70:



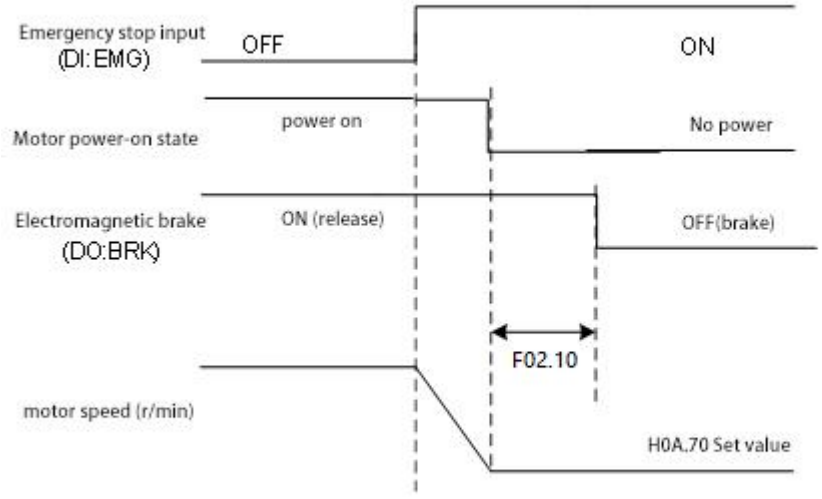
- **Emergency Shutdown timing Sequence Diagram**

1、When F02.70=0 , coast to stop

`



2、When F02.70=1 , decelerate and stop



● Use DI function 34: FunIN.34: EmergencyStop, brake.

☆Associated function coding:

coding	name	function name	Function

`

FunIN.34	Emergency Stop	brake	Invalid, the servo driver maintains the current running state; Valid, stop at zero speed, keep the position locked, the servo sends warning Er.900 (DIemergency brake).

6.2.7 DB dynamic braking function

Dynamic braking related parameters:

parameter	name	parameter range	default value	unit	Be applicable
F02.64	The dynamic braking function is valid (stop setting, power on again to take effect)	0 ~ 1	1		ALL
F02.62	Dynamic braking effective speed (stop setting, effective immediately)	0~100	50	%	ALL

The dynamic braking function is to realize the rapid stop of the servo motor by short-circuiting the electrical circuit of the servo motor. When the dynamic brake is effective (DB ON), the rotation of the servo motor rotor will generate a resistance torque that prevents the rotor from rotating. When the speed of the servo motor is not 0, the dynamic brake can stop the motor quickly; and when the motor is at a standstill and the motor shaft rotates due to external force, the servo motor will also stop quickly due to the resistance torque.

However, the resistance torque is generated by the rotation of the motor rotor, and the resistance torque will not be generated when the rotor does not move. Therefore, when the motor shaft is continuously subjected to external force, the dynamic brake cannot keep the motor in a stopped state, so the dynamic brake cannot be used to replace the motor brakeFunction.

When the dynamic braking function is invalid (F02.64=0), and the control power supply is not cut off, the motor decelerates freely during deceleration, and enters the free state after stopping.

When the dynamic braking function is valid (F02.64=1), and the control power supply is not cut off, the motor will decelerate with dynamic braking during deceleration, and enter the dynamic braking stop state after stopping.

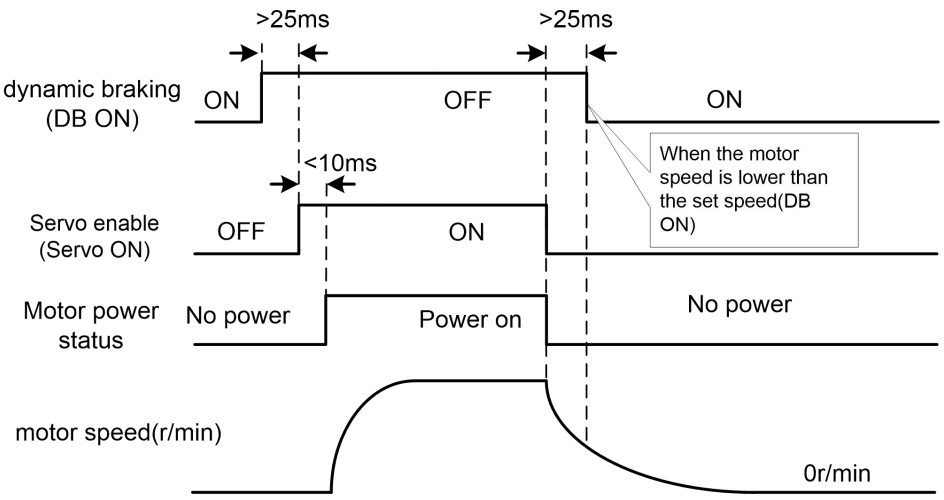
When the control power supply is cut off during operation, the servo motor will enter the dynamic braking deceleration process no matter whether the dynamic braking function is valid or not, and enter the dynamic braking stop state after the motor stops.

When the servo system is in the power-off state, the dynamic braking function status is always valid.

The dynamic braking action speed is the percentage of the rated speed of the motor, which is set by the F02.62 parameter.

The dynamic braking function timing diagram is as follows:

`



Note: The dynamic braking function is only supported by models SD300PA-2S and SD300N-2S, and the function is invalid for models that do not support it.

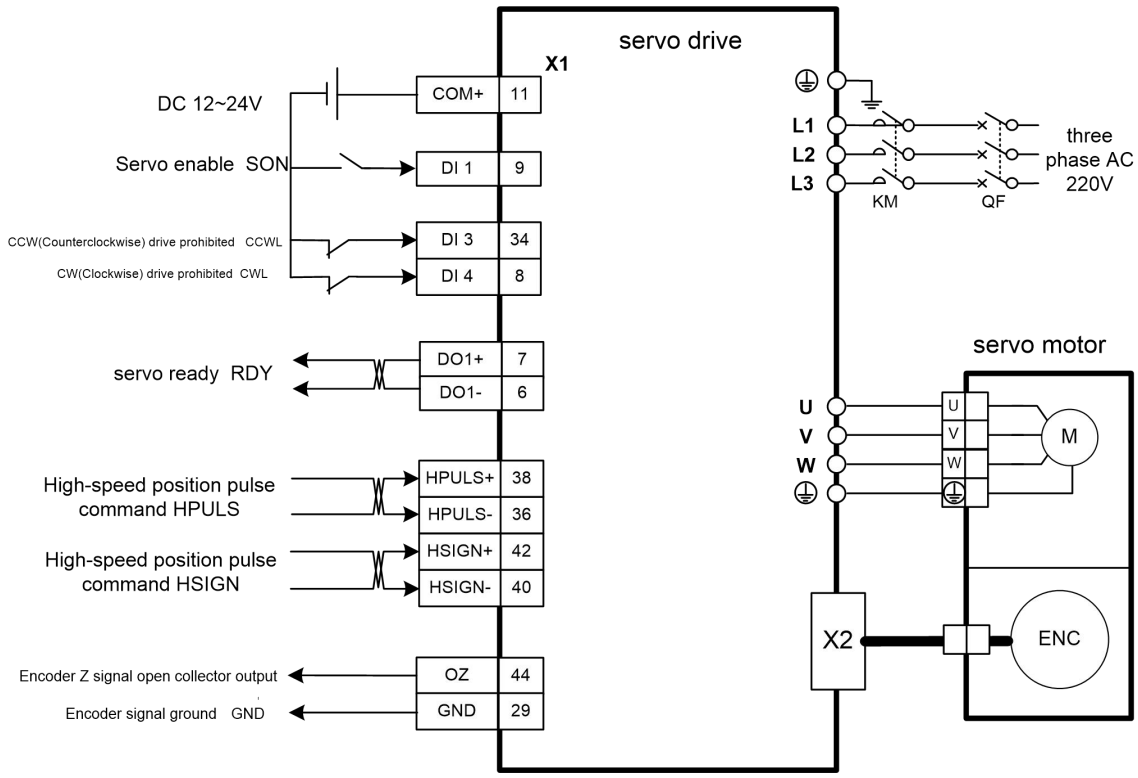
6.3 Position Mode Instructions

In the position control mode, the displacement of the movement is generally determined by the number of pulses, and the pulse frequency of the external input determines the size of the rotation. Since the position mode can strictly control the speed and position, it is generally used in positioning devices. It is the control mode with the most servo applications, mainly used in manipulators, placement machines, engraving, milling and engraving, CNC machine tools, etc.

6.3.1 Example of position control

The schematic wiring diagram of position control is as follows:

`



Note: Signal cables and power cables must be routed separately, with an interval of at least 30cm.

The parameters of the control example in the above figure are explained as follows

parameter	name	Settings	default value	Parameter Description
F02.00	control mode selection	0	0	set to position control
F05.01	Pulse input frequency selection	1	0	Select high speed pulse
F02.97	Ignore Drive Inhibit	3	3	Forward drive prohibition (CCWL) and reverse drive prohibition (CWL) . If it is set to ignore, It is not necessary to connect digital input signals FunIN.14(P-OT), FunIN.15(N-OT).
F03.00	DI1 terminal function selection	1	1	DI1 is set to FunIN.1 servo enable S-ON
F04.00	DO1 terminal function selection	1	1	DO1 set to FunOUT.1 servo ready S -RDY

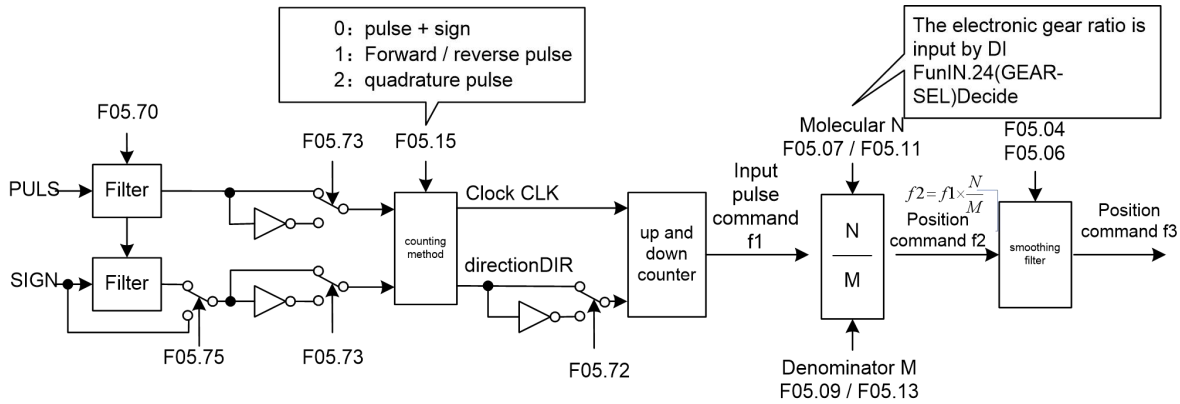
6.3.2 Position control mode related function setting

6.3.2.1 Associated parameter setting in position control mode

parameter	name	parameter range	default value	unit	Be applicable

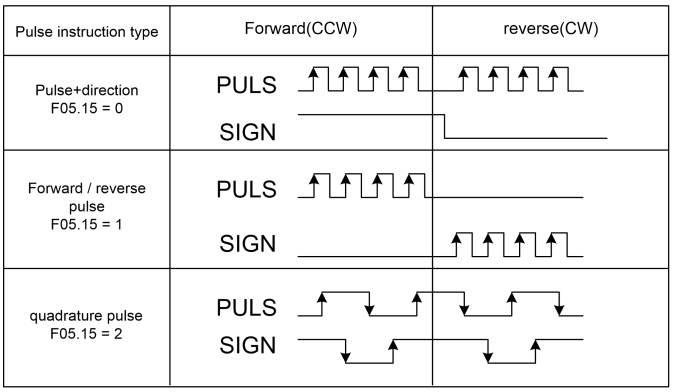
F05.01	Pulse input frequency selection	0 ~ 1	0		P
F05.02	Number of position commands per motor revolution [Note]	1~1048576	10000		P
F05.04	Exponential smoothing filter time of position command	0 ~ 1000	0	ms	P
F05.06	Position command linear filter time	0 ~ 256	0	ms	P
F05.07	Electronic gear ratio 1 molecule	1~1073741824	1		P
F05.09	Electronic gear ratio 1 denominator	1~1073741824	1		P
F05.11	Electronic gear ratio 2 molecules	1~1073741824	1		P
F05.13	Electronic gear ratio 2 denominator	1~1073741824	1		P
F05.15	Command pulse input method	0 ~ 2	0		P
F05.70	Command pulse input signal filtering	0 ~ 31	1		P
F05.72	Command pulse input direction signal polarity	0 ~ 1	0		P
F05.73	Command pulse input signal logic	0 ~ 3	0		P
F05.75	Command pulse input signal filter mode	0 ~ 1	0		P

6.3.2.2 Command pulse transmission path



6.3.2.3 Command pulse input mode

The input method is determined by parameter F05.15 . The phase of input signal PULS and SIGN signal can be set by parameter F05.73 to adjust the counting edge. Parameter F05.72 is used to change the counting direction.



Note: The arrow indicates the counting edge, and F05.72 =0, F05.73 =0.

Pulse signal inhibit input

By setting the DI function FunIN.37 (PulseInhibit), the pulse command input can be prohibited.

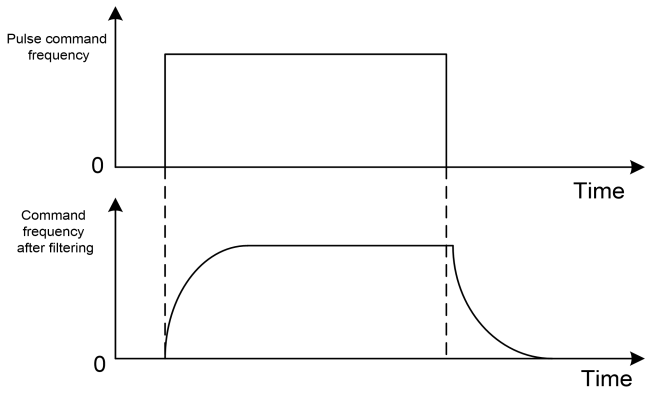
Pulse command signal filtering

Parameter F05.70 sets the input signal PULS and SIGN digital filter, the larger the value, the larger the filter time constant. By default, the maximum pulse input frequency is 1000kHz (kpps), and the larger the value is, the lower the maximum pulse input frequency will be.

It is used to filter the noise on the signal line to avoid counting errors. If there is an inaccurate movement due to inaccurate counting, the parameter value can be increased appropriately. Parameter F05.75 can close SIGN signal filtering.

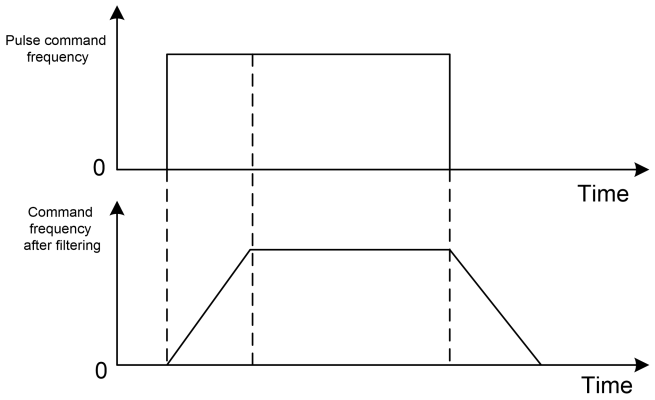
6.3.2.4 Pulse command smoothing filter

As shown in the figure below, parameter F 05.04 is used to smooth and filter the command pulse, with exponential acceleration and deceleration. The filter will not lose the input pulse, but there will be command delay phenomenon. When set to 0, the filter has no effect. The parameter value represents the time from 0 frequency to 63.2% of the position command frequency.



As shown in the figure below, the parameter F05.06 is to smooth and filter the command pulse, with linear acceleration and deceleration. When set to 0, the filter has no effect. The parameter value represents the time from 0 frequency to 100% position command frequency.

`



The filter smooths the incoming pulse frequency. This filter is used in situations where the upper controller has no acceleration/deceleration function, the electronic gear ratio is relatively large, and the command frequency is low.

6.3.3 Electronic gear ratio setting

The unit pulse command input to the device can be defined through the electronic gear to make the transmission device move any distance. The pulse command generated by the upper controller does not need to consider the gear ratio, reduction ratio or motor encoder line number of the transmission system. The following table is the electronic gear variable description:

variable	variable illustrate	The value of this device
Pt	Resolution per revolution of the motor(pulse/rev)	F05.02=10000(pulse/rev)
R	Reduction ratio	Incremental
ΔP	One instruction pulse movement amount	
Pc	Number of command pulses for one revolution of the load shaft	
Pitch	Ball screw pitch (mm)	
D	Roller diameter(mm)	

Calculation formula:

$$\text{Electronic gear ratio}(\frac{N}{M}) = \frac{\text{Motor resolution per turn}(P_t)}{\text{Number of command pulses for one revolution of the load shaft}(P_c) \times \text{Reduction ratio}(R)}$$

in,

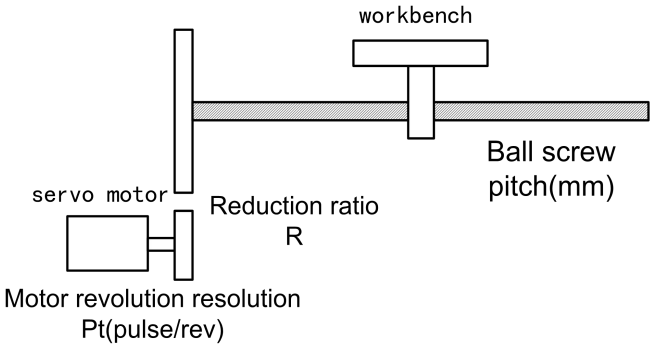
$$\text{Number of command pulses for one revolution of the load shaft}(P_c) = \frac{\text{The command movement amount of one revolution of the load shaft}}{\text{One instruction pulse movement amount}(\Delta P)}$$

Reduction the above calculation results, and make the numerator and denominator less than or equal to the integer value of 1073741824, ensure that the ratio is within the range of 1/50<N/M<200, and write it into the parameter.

`

- Electronic gear ratio switching
- It supports up to 2 sets of electronic gear ratios, and the gear ratio switching function FunIN.24 can be used to complete the selection of gear ratios.
- When the GEAR-SEL signal is invalid, select the electronic gear ratio 1,
- When the GEAR-SEL signal is valid, select the electronic gear ratio 2.

6.3.3.1 Application of electronic gear in ball screw



For ball screw loads, there are

$$\text{Electronic gear ratio}\left(\frac{N}{M}\right)=\frac{P_t}{P_c\times R}$$

in,

$$\mathrm{P_c}=\frac{Pitch}{\Delta P}$$

For example:

It is known that the reduction ratio is 1/1, the pitch Pitch=8mm, and the movement amount of one pulse ΔP=0.001mm, and the electronic gear ratio is calculated.

calculation steps:

Calculation of motor revolution resolution (Pt)

$$\mathrm{P_t}=\mathrm{F05.02}=10000(pulse/rev)$$

Calculate the number of command pulses for one revolution of the load shaft(Pc)

$$\mathrm{P_c}=\frac{Pitch}{\Delta P}=\frac{8mm}{0.001mm}=8000$$

Calculate Electronic Gear Ratio

$$\text{Electronic gear ratio}\left(\frac{N}{M}\right)=\frac{P_t}{P_c\times R}=\frac{10000}{8000\times(1/1)}=\frac{5}{4}$$

`

Set parameters (take electronic gear ratio 1 as an example)

Numerator N=5, denominator M=4, set F05.07=5 and F05.09=4.

6.3.3.2 The relationship between the number of motor revolutions and the electronic gear ratio

The relationship between the number of revolutions of the motor and the electronic gear is:

$$\text{Number of revolutions of the motor} = \frac{pulse \times N}{P_t \times M}$$

Among them, pulse is the number of input pulses. For example, the resolution of the motor per revolution Pt=10000, N=20, M=3, pulse=1000, calculated as:

$$\text{Number of revolutions of the motor} = \frac{1000 \times 20}{10000 \times 3} = \frac{2}{3}(\text{circle})$$

6.3.3.3 Relationship between motor rotation speed and electronic gear ratio

The relationship between the motor rotation speed and the electronic gear is:

$$\text{motor speed}(r/\min) = \frac{f(Hz) \times 60 \times N}{P_t \times M}$$

Among them, f is the input pulse frequency, the unit is Hz (pps), for example, the resolution of each revolution of the motor is Pt=10000, N=3, M=1, f=100kHz (kpps), calculated as:

$$\text{motor speed}(r/\min) = \frac{100 \times 10^3 \times 60 \times 3}{10000 \times 1} = 1800\,(r/\min)$$

1.Encoder signal output

Parameter F05.17 sets the number of encoder output lines, and the actual encoder pulse is output at a frequency multiplied by 4.

Parameter F02.03 sets the encoder B pulse output phase, 0: forward, 1: reverse.

Parameter F05.41 sets the encoder Z pulse output phase, 0: forward, 1: reverse.

Parameter F05.95 sets the encoder Z pulse output width, 0: 1 times A pulse width, 1: 4 times A pulse width.

2.Position related DO output (to be added)

Parameter F05.21 sets the threshold of the positioning completion range. When the position deviation is less than the set value of this parameter, DO outputs theFunOUT.5 (COIN) positioning completion signal to be valid, and the comparator has return difference function, which is set by parameter F05.91.

Parameter F05.22 sets the threshold of positioning proximity range. When the position deviation is less than the set value of this parameter, DO outputs FunOUT.6 (NEAR) positioning proximity signal is valid, and the comparator has return difference

`

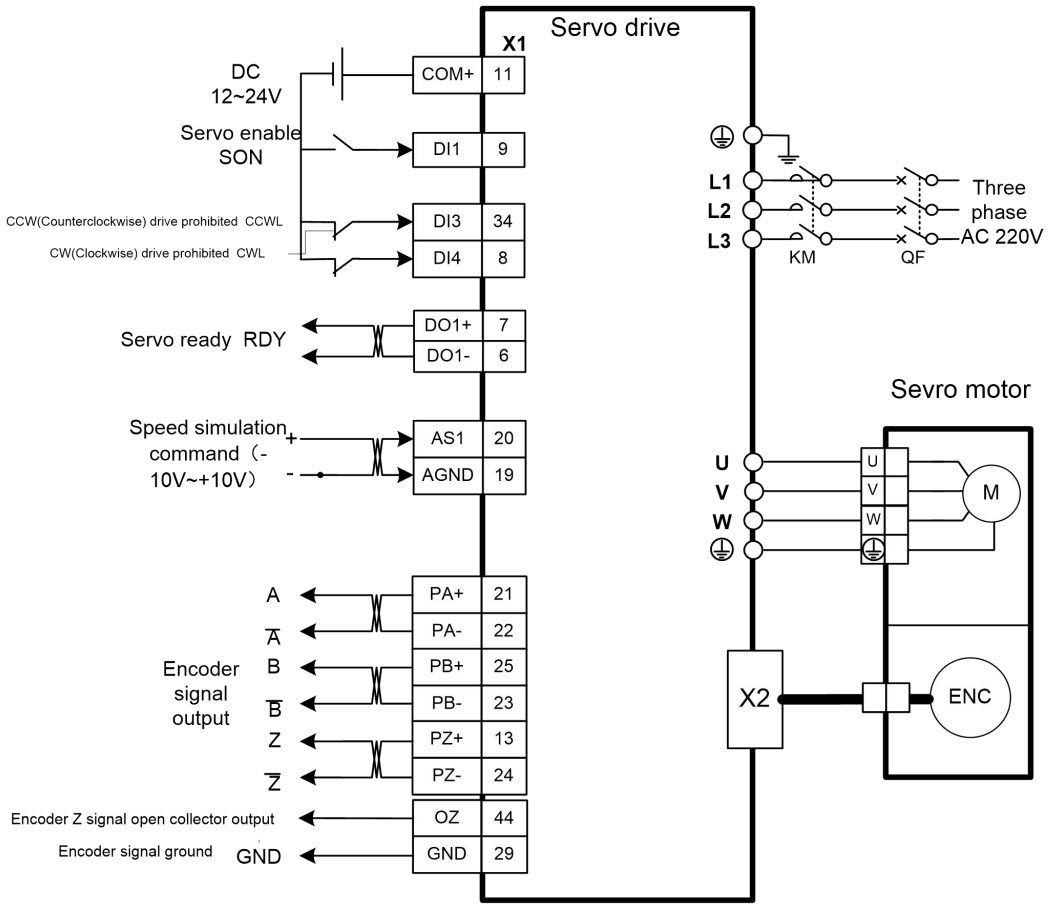
function, which is set by parameter F05.92.

3.Gain related to position control (this part is described in the adjustment chapter)

6.4 Speed Mode Instructions

The speed control mode is to control the rotation speed through analog input or digital setting, which is mainly used in occasions that require precise speed control, such as engraving machines, knitting machines, and drilling machines. It can also form a position control with the upper device.

6.4.1 Example of speed control



The schematic wiring diagram of speed control is as follows:

Note: Signal cables and power cables must be routed separately, with an interval of at least 30cm.

The parameters of the control example in the above figure are explained as follows

parameter	name	Settings	Defaults	Parameter Description

`

F02.00	control mode selection	1	0	set to speed control
F02.41	Analog channel selection	0	0	AS1 channel, corresponding to speed command A S2 channel, corresponding to torque command
F06.59	Source of speed command	0	0	Set as analog input
F06.05	Speed command ramp acceleration time	suitable	0	
F06.06	Speed command ramp deceleration time	suitable	0	
F02.97	Ignore Drive Inhibit	3	3	Forward drive prohibition (CCWL) and reverse drive prohibition (CWL). If it is set to ignore, the digital input signal FunIN.14(P-OT), FunIN.14(N-OT) need not be connected.
F03.00	DI1 terminal function selection	1	1	DI1 is set to FunIN.1 servo enable S-ON
F04.00	DO1 terminal function selection	1	1	DO1 set to FunOUT.1 servo ready S -RDY

6.4.2 Speed control mode related function setting

Associated parameter setting in speed control mode

parameter	name	parameter range	default value	unit	Be applicable
F02.41	Analog channel selection [note]	0 ~ 1	0		ST
F03.51	AS1 analog command filter time constant	0.20 ~ 50.00	2.00	ms	ST
F03.53	AS1 analog instruction dead zone	0 ~ 13000	0	mv	ST
F03.54	AS1 analog command zero offset compensation	-1500.0 ~ 1500.0	0.0	mv	ST
F03.80	Analog speed command gain	10 ~ 3000	300	rpm/V	S
F06.04	JOG running speed	0 ~ 7500	100	rpm	S
F06.59	Source of speed command	0 ~ 5	0		S
F06.60	Analog speed command direction	0 ~ 1	0		S
F06.61	Analog speed command polarity	0 ~ 2	0		S
F06.80	internal speed 1	-5000~5000	0	rpm	S

F06.81	internal speed 2	-5000~5000	0	rpm	S
F06.82	internal speed 3	-5000~5000	0	rpm	S
F06.83	internal speed 4	-5000~5000	0	rpm	S

Note: When selecting AS1, please set parameters related to AS1 analog quantity F03.51, F03.53 , F03.54 When selecting AS2, please set parameters related to AS2 analog quantity F03.56, F03.58 , F03.59

6.4.3 Speed command source selection :

The speed command comes from several different sources, which are set by parameter F06.59:

F06.59	illustrate	explain
0	Analog speed command	The source of the analog command is selected by F02.41 parameter AS1 or AS2
1	Internal speed command	Determined by FunIN.43(SP1) and FunIN.44(SP2) input by DI
2	Analog speed command + internal speed command	Determined by FunIN.43(SP1) and FunIN.44(SP2) input by DI[Note 2]
3	JOG speed command	Automatically set when performing jog (JOG) operation
4	Function reserved	
5	demo speed command	Automatically set when performing a demo run operation

Note 1: Internal speed command, 0 means OFF, 1 means ON :

DIsignal		speed command
SP2	SP1	
0	0	Internal speed 1 (parameter F06.80)
0	1	Internal speed 2 (parameter F06.81)
1	0	Internal speed 3 (parameter F06.82)
1	1	Internal speed 4 (parameter F06.83)

Note 2 : Analog speed command + internal speed command, 0 means OFF, 1 means ON:

DIsignal		speed command
SP2	SP1	
0	0	Analog speed command
0	1	Internal speed 2 (parameter F06.81)
1	0	Internal speed 3 (parameter F06.82)
1	1	Internal speed 4 (parameter F06.83)

Analog zero drift setting

he zero offset compensation of AS1 analog quantity directly by setting F03.54, or set 1 through D0.10 to trigger the automatic compensation of AS1 analog quantity zero offset compensation.

directly by setting F03.59, or set 2 through D0.10 to trigger automatic compensation of AS2 analog zero offset compensation.

`

Speed command Zero command

By setting DI function FunIN.13(INHIBIT), you can use DI to force the speed command to be 0 .

Inversion of speed command

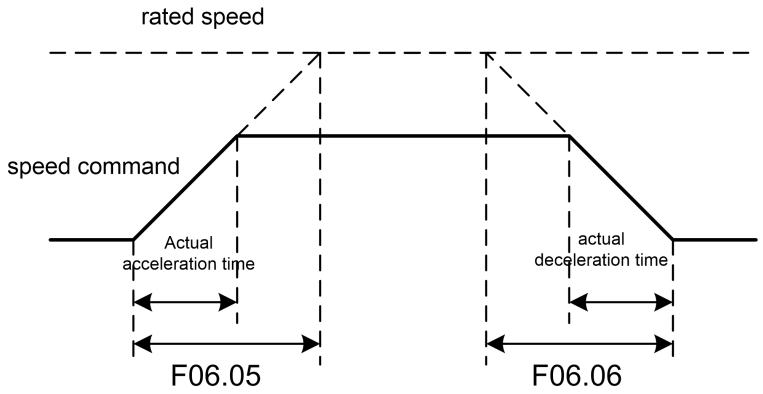
By setting the DI function FunIN.27 (DirSel), you can use the DI to control the reverse of the speed command.

6.4.4 Acceleration and deceleration setting of speed command

- Related parameters

	name	parameter range	default value	unit	Be applicable
F06.05	Speed command ramp acceleration time	0 ~ 30000	0	ms	S
F06.06	Speed command ramp deceleration time	0 ~ 30000	0	ms	S
F02.44	EMG (emergency stop) deceleration time	0 ~ 10000	1000	ms	ALL

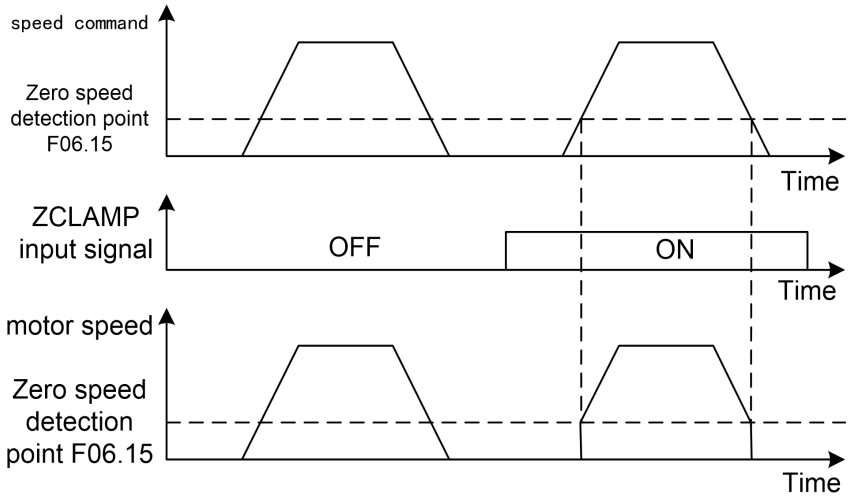
Acceleration and deceleration can slow down sudden changes in speed and make the motor run smoothly. As shown in the figure below, parameter P06.05 sets the acceleration time of the motor from zero speed to rated speed, and P06.06 sets the deceleration time of the motor from rated speed to zero speed. If the command speed is lower than the rated speed, the required acceleration and deceleration time will be correspondingly shortened. If the driver and the upper device form a position control, the parameter should be set to 0.



6.4.5 Zero speed clamp function

Related parameters

parameter	name	parameter range	default value	unit	Be applicable
P06.15	Zero speed detection threshold	0 ~ 1000	10	r/min	ALL
P06.88	Zero speed detection ruturn difference	0 ~ 1000	5	r/min	ALL
P06.90	Zero speed clamp mode selection	0 ~ 1	0		S



During speed control, even if the motor is at zero speed, external forces may rotate and cause position changes. If it is an analog speed command input, the absolute zero speed command is not easy to realize. In order to solve these two problems, the zero speed clamp function can be considered. When the following conditions are met, the zero-speed clamp function is enabled:

Condition 1: speed control mode;

Condition 2: FunIN.12 (ZCLAMP) (zero speed clamp) in DI is ON;

Condition 3: The speed command is lower than the parameter F06.15.

When any of the above conditions are not met, execute normal speed control. Zero speed clamp has two modes:

F06.90	illustrate
0	The motor position is fixed at the moment the function is turned on. At this time, the position control is internally connected, and even if the rotation occurs due to external force, it will return to the zero fixed point.
1	When the function is turned on, the speed command is forced to zero speed. The interior is still speed controlled and may rotate due to external forces.

1.Speed related DO output (to be added)

2.Parameter F06.18 sets the speed arrival speed threshold. When the actual speed of the motor exceeds the set value of this parameter, DO outputs the FunOUT.19 (V-Arr) speed arrival signal to be valid. The comparator has return difference function, which is set by parameter F06.85; the comparator has polarity setting function, which is set by parameter F06.86.

`

3.Parameter F06.15 sets the zero-speed speed threshold. When the actual speed of the motor is lower than the set value of this parameter, DO outputs FunOUT.3 (ZERO) zero-speed signal is valid, and the comparator has return differencefunction, which is set by parameter F06.88 .

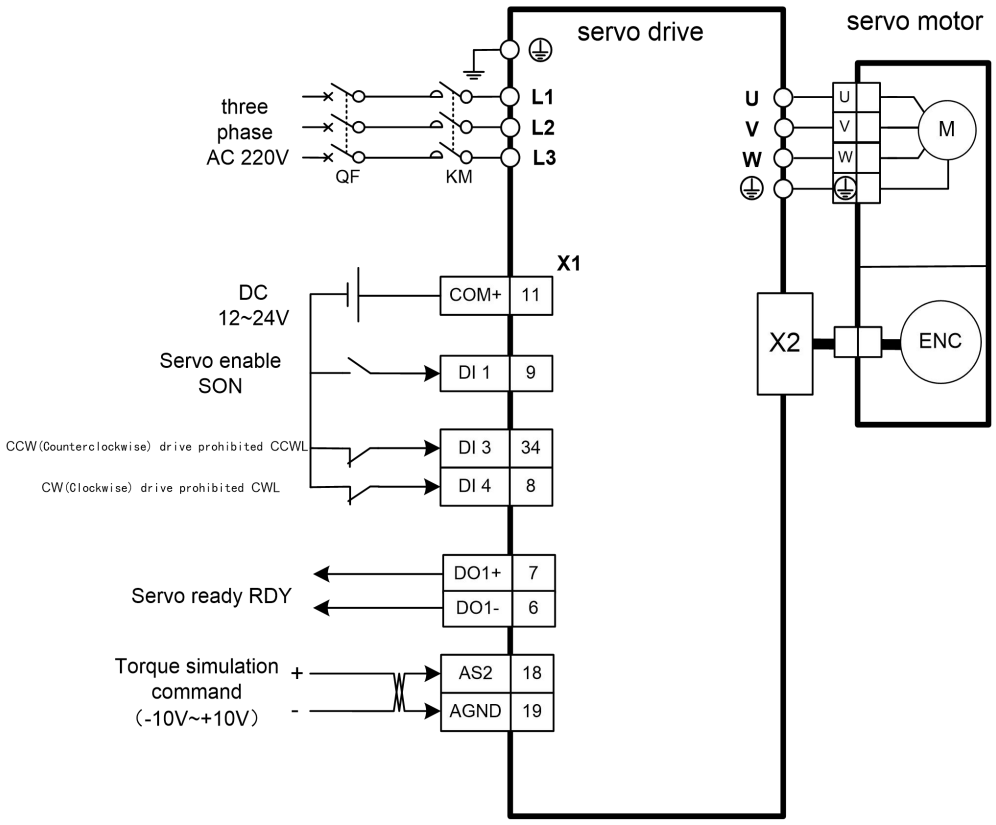
4.Gain related to position control (this part is described in the adjustment chapter)

6.5 Torque Mode Instructions

The torque control mode controls the output torque through analog input or digital setting, and is mainly used in winding and unwinding devices that have strict requirements on the force of the material, such as printing machines, winding machines, injection molding machines, etc. machine. The torque output by the motor is proportional to the input command.

6.5.1 Example of torque control

The schematic wiring diagram of torque control is as follows:



Note: Signal cables and power cables must be routed separately, with an interval of at least 30cm.

The parameters of the control example in the above figure are explained as follows

parameter	name	Settings	default value	Parameter Description

`

F02.00	control mode selection	2	0	Set to torque control
F02.41	Analog channel selection	0	0	AS1 channel, corresponding to speed command AS2 channel, corresponding to torque command
F07.59	Source of torque command	0	0	Set as analog input
F02.97	Ignore Drive Inhibit	3	3	Forward drive prohibition (CCWL) and reverse drive prohibition (CWL) . If it is set to ignore, the digital input signals FunIN.14(P-OT) and FunIN.14(N-OT) need not be connected .
F03.00	DI1 terminal function selection	1	1	DI1 is set to FunIN.1 servo enable S-ON
F04.00	DO1 terminal function selection	1	1	DO1 set to FunOUT.1 servo ready S -RDY

6.5.2 Torque control mode related function settings

1.Associated parameter setting in torque control mode

parameter	name	parameter range	default value	unit	Be applicable
F02.41	Analog channel selection [note]	0 ~ 1	0		ST
F03.56	AS2 analog command filter time constant	0.20 ~ 50.00	2.00	ms	ST
F03.58	analog command dead zone	0 ~ 13000	0	mv	ST
F03.59	AS2 analog command zero offset compensation	-1500.0 ~ 1500.0	0.0	mv	ST
F03.81	Analog torque command gain	1 ~ 300	30	%/V	T
F07.59	Source of torque command	0~2	0		T
F07.60	Analog torque command direction	0 ~ 1	0		T
F07.61	Analog torque command polarity	0 ~ 2	0		T
F07.80	Internal Torque 1	-300~300	0	%	T
F07.81	Internal Torque 2	-300~300	0	%	T
F07.82	Internal Torque 3	-300~300	0	%	T
F07.83	Internal Torque 4	-300~300	0	%	T

Note: When selecting AS1, please set parameters F03.51, F03.53 , F03.54 related to AS1 analog

selecting AS2, please set parameters related to AS2 analog quantity F03.56, F03.58 , F03.59

2.Torque command source selection

Torque command comes from several different sources, set by parameter F07.59:

F07.59	illustrate	explain
0	Analog torque command	The source of the analog command is selected by F02.41 parameter AS1 or AS2

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1	Internal torque command	Determined by FunIN.46(TRQ1) and FunIN.47(TRQ2) input by DI [Note 1].
2	Analog torque command + internal torque command	Determined by FunIN.46(TRQ1) and FunIN.47(TRQ2) input by DI [Note 2].

Note 1: Internal torque command, 0 means OFF, 1 means ON:

DIsignal		Torque command
TRQ2	TRQ1	
0	0	Internal torque 1 (parameter F07.80)
0	1	Internal torque 2 (parameter F07.81)
1	0	Internal torque 3 (parameter F07.82)
1	1	Internal torque 4 (parameter F07.83)

Note 2 : Analog torque command + internal torque command, 0 means OFF, 1 means ON:

DIsignal		Torque command
TRQ2	TRQ1	
0	0	Analog torque command
0	1	Internal torque 2 (parameter F07.81)
1	0	Internal torque 3 (parameter F07.82)
1	1	Internal torque 4 (parameter F07.83)

3.Analog zero drift setting

- the zero offset compensation of AS1 analog quantity directly by setting F03.54, or set 1 through D0.10 to trigger the automatic compensation of AS 1 analog quantity zero offset compensation.
- directly by setting F03.59, or set 2 through D0.10 to trigger automatic compensation of AS2 analog zero offset compensation.

4.Torque command zero command

By setting DI function FunIN.13(INHIBIT), DI can be used to force the torque command to be 0 .

5.Inversion of torque command

By setting the D I function FunIN.27 (DirSel), you can use the D I to control the reverse of the torque command.

6.Torque mode speed limit function

During torque control, the torque output of the motor is controlled by commands, but the speed of the motor is not controlled. Therefore, under light load, overspeed may occur. In order to protect the machine, the speed must be limited. The speed limit related parameters are as follows：

parameter	name	parameter range	default value	unit	Be applicable

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F07.17	speed limit selection	0 ~ 2	0		T
F07.62	Speed limit during torque control	0 ~ 5000	3000	r/min	T

There are three types of speed limit in torque control:

F07.17	illustrate	explain
0	basic limit	Limited by parameter F07.62
1	Basic limit + analog limit	In addition to the basic limit, it is also limited by the analog speed command.
2	Base limit + internal speed limit	In addition to the basic limit, it is also limited by the internal speed command, which is determined by the FunIN.43(SP1) and FunIN.44(SP2) input by DI.

6.Torque related DO output function (to be added)

1.Parameter F07.84 sets the torque arrival torque threshold. When the actual motor torque exceeds this parameter setting value, DO outputs the FunOUT.18 to(ToqReach)rque arrival signal to be valid. The comparator has return difference function, which is set by parameter F07.85; the comparator has polarity setting function, which is set by parameter F07.86.

The motor speed is output through the FunOUT.8(V-LT) speed limit of the DO output after being limited by the speed

6.6 Torque command limit

For the purpose of protecting the machine, the output torque command can be limited. Torque command limit is valid in position control mode, speed control mode and torque control mode.

6.6.1 Function setting related to torque command limit

1.Torque command limit associated parameter setting

parameter	name	parameter range	default value	unit	Be applicable
F07.07	Torque limit selection	0 ~ 2	0		ALL
F07.09	Internal forward rotation (CCW) torque limit	0 ~ 500	300	%	ALL
F07.10	Internal reverse (CW) torque limit	-500 ~ 0	-300	%	ALL
F07.11	External forward rotation (CCW) torque limit	0 ~ 500	100	%	ALL
F07.12	External reverse (CW) torque limit	-500 ~ 0	-100	%	ALL
F02.64	Test run torque limit	0 ~ 300	100	%	ALL

2.Torque limit mode description

F07.07	illustrate	Forward rotation (CCW)	reverse (CW)
0	basic limit	Determined by DI input FunIN.16(P-CL), FunIN.16(P-CL)=OFF: parameter F07.09	Determined by DI input FunIN.17(N-CL), FunIN.17(N-CL)=OFF: parameter F07.10

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		FunIN.16(P-CL)=ON: parameter F07.11	FunIN.17(N-CL)=ON: parameter F07.12
1	Basic limit+ Analog limit	In addition to the basic limit, it is also limited by the analog torque command (this limit does not distinguish between directions).	
2	Basic limit+ Internal torque limit	In addition to the basic limit, it is also limited by the internal torque command (this limit does not distinguish between directions), and the internal torque command is determined by FunIN.46 (TRQ1) and FunIN.47 (TRQ2) input by DI.	

Note: 1. If multiple restrictions occur, the final limit value is the one with the smaller absolute value.

2.The limits of F07.09 and F07.10 are valid at any time.

3.Even if the set value exceeds the maximum torque allowed by the system, the actual torque will be limited within the maximum torque.

4.Internal torque command , 0 means OFF, 1 means ON:

DIsignal		Torque command
TRQ2	TRQ1	
0	0	Internal torque 1 (parameter F07.80)
0	1	Internal torque 2 (parameter F07.81)
1	0	Internal torque 3 (parameter F07.82)
1	1	Internal torque 4 (parameter F07.83)

3.Torque limit related DO output function

The motor torque is output through the FunOUT.7(C-LT) torque limit of DO output after being limited by the torque.

6.7 Absolute encoder setting

6.71. Backup of multi-turn information of absolute encoder

Absolute encoder defaults to single-turn absolute value. If the user needs to use the multi-turn position value, it is necessary to set the parameter F02.01 to 1, save and power on again to take effect.

In order to save the multi-turn position data of the absolute encoder, a battery unit needs to be installed.

Add an encoder battery box installation example here.

Note: Please install the battery unit on either side close to the servo drive or close to the motor .

Battery voltage requirement: 3.2VDC ~ 4.8VDC

After the encoder battery voltage exceeds the range, the servo driver will alarm "encoder battery alarm" (Er.730) when powering on , please replace the battery at this time. The battery needs to be replaced while the drive is powered on. After replacing the battery, please ensure that the servo drive is not enabled, and only cancel the display of "encoder battery alarm (Er.730)" by setting parameter F0D.20 = 1 , and retain the multi-turn position information stored by the encoder. The servo drive can work normally.

After the encoder battery is disconnected, the servo driver will alarm "encoder battery fault" (Er.731) when powering on, and it is necessary to check the connection status of the encoder battery at this time. After ensuring that the encoder battery status is connected normally, please ensure that the servo drive is not enabled , and clear the display of "encoder battery fault (Er.731)" by setting parameter F0D.20 = 2 , and clear the multi-turn stored by the encoder at the same time information. The

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servo drive can work normally after power on again.

6.8 Origin return

6.8.1 Function setting related toorigin return

The origin return function means that in the position control mode, when the servo enable is ON, after the origin return function is triggered, the servo motor will actively search for the zero point and complete the positioning function.

During the origin return operation, other position commands are shielded; after the origin return operation is completed, the servo driver can respond to other position commands.

After the origin return is completed, the current absolute position of the motor (F0B.07) is consistent with the mechanical origin offset (F05.36).

After the origin return is completed, the servo driver outputs the homing completion signal FunOUT.16(HomeAttain). The upper computer can confirm the completion of the zero return after receiving this signal.

parameter	name	parameter range	default value	unit	Be applicable
F05.30	Origin return enable control	1 ~ 3	1		ALL
F05.31	Return to origin mode	0 ~ 37	0		ALL
F05.36	Mechanical origin offset	-1073741824 ~ 1073741824	0	pulse	ALL
F05.32	High-speed search origin switch signal speed	1 ~ 3000	500	r/min	ALL
F05.33	Low speed search origin switch signal speed	1 ~ 3000	50	r/min	ALL
F05.34	Acceleration and deceleration time when searching for origin	0 ~ 30000	0	ms	ALL
F0D.76	High speed search origin switch signal distance	0 ~ 4294967295	2147483648	pulse	ALL
F0D.78	Low speed search origin switch signal distance	0 ~ 4294967295	2147483648	pulse	ALL
F05.87	Origin in-position delay	0 ~ 3000	50	ms	ALL
F05.88	Origin return completion signal delay	1 ~ 3000	100	ms	ALL
F05.89	Origin return instruction execution mode	0 ~ 1	0		ALL

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6.8.2 Operation steps of origin return

●origin return is carried out in the following two steps：

1.High-speed search for origin switch signal

After starting the origin return function, search the reference point signal according to the high-speed search origin switch signal speed, and use D I to input FunIN.31(HomeSwitch) , FunIN.14(P-OT) or FunIN.15(N-OT) as the reference point , you can also use the Z pulse as a reference point, and you can choose to search in the direction of forward rotation or reverse rotation.

In a specific origin return mode, after the FunIN.14 (P-OT) signal is searched in the forward direction or the FunIN.15 (N-OT) signal is searched in the reverse direction, the motor will immediately return to search for the set reference point signal again. When no reference point signal is found within the distance of the high-speed search origin switch signal set by parameter F0D.76, the servo will report Er.601 No reference point signal found when returning to zero. This warning can be cleared.

2.Low speed search origin switch signal

After completing the first step , press the low speed to search for the origin switch signal and search for the origin switch signal. You can choose to continue forward or backward to find the origin switch signal. You can use the Z signal as the origin switch signal, or you can directly use the reference point As the origin switch signal.

In the specific zero return mode, after the FunIN.14 (P-OT) signal is searched in the forward direction or the FunIN.15 (N-OT) signal is searched in the reverse direction, the motor will immediately turn back and search for the Z signal again.

When the origin switch signal is not found within the low-speed search origin switch signal distance set by parameter F0D.78, the servo will report Er.602 No origin switch signal warning when returning to zero, and this warning can be cleared.

●parameter F0D.76 and parameter F0D.78 is the command unit pulse, which is related to parameter F05.02.

●Parameter F05.34 sets the acceleration and deceleration when searching for the origin to prevent mechanical shock caused by too fast speed changes during the origin return process.

●Parameter F05.36 sets the offset of the mechanical origin. After the origin switch signal is found in the second stage of origin return, it will directly locate to the offset position set by this parameter. The offset unit is pulse, and the pulse resolution is fixed at 6 5536/turn.

6.8.3 Operation timing sequence of origin return

1. DI input signal FunIN.32 (HomingStart) level trigger (F05.30 =1)

After the servo is enabled, the DI input signal FunIN.32 (HomingStart) ON triggers the origin return execution, and suspends the normal command execution. FunIN.32 (HomingStart) keeps ON. After the origin return is completed, the position and position deviation are cleared, and the DO output signal FunOUT.16 (HomeAttain) turns ON. Until FunIN.32 (HomingStart)

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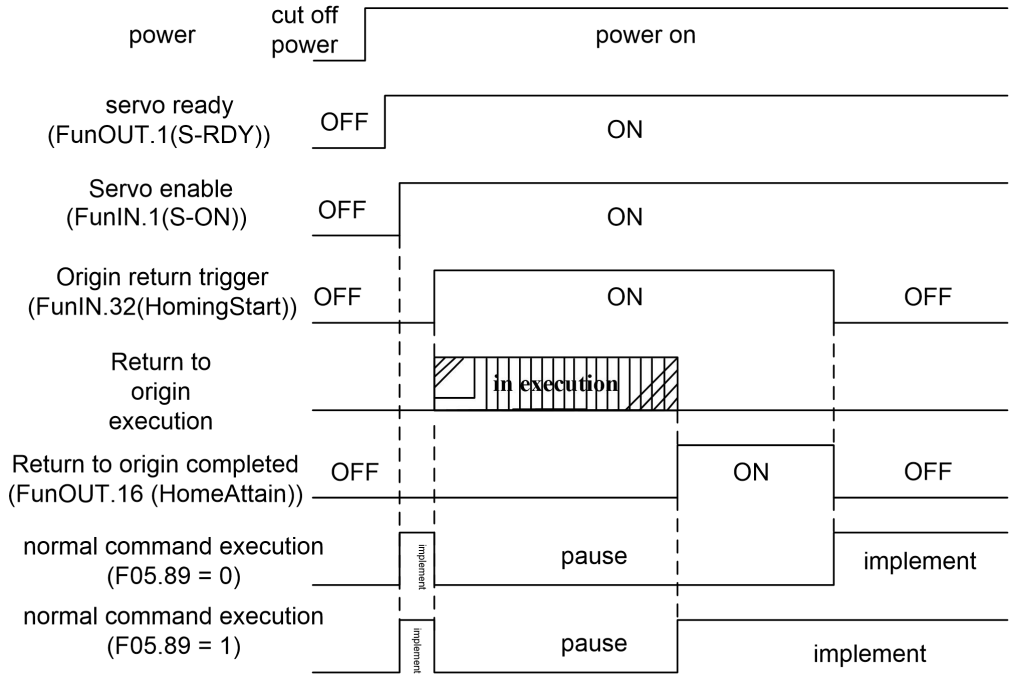
turns OFF, then FunOUT.16 (HomeAttain) turns OFF.

When the parameter F05.89=0, After the origin return is completed, wait for the FunOUT.16 (HomeAttain) signal to turn OFF then executing the command. During the waiting period, the motor stays at the origin and does not accept the instruction; when the parameter F05.89 =0=1, Execute the command immediately after the origin return is completed.

If during homing execution, the servo enable is canceled, the servo generates any alarm, and FunIN.32 (HomingStart) turns OFF in advance, the homing function is terminated and the output terminal FunOUT.16 (HomeAttain) does not act.



2.DI input signal FunIN.32 (HomingStart) rising edge trigger (F05.30 =2)

After the servo is enabled, the rising edge of the DI input signal FunIN.32 (HomingStart) triggers the origin return execution and suspends the normal command execution. After the origin return is completed, the position and position deviation are cleared, and the DO output signal FunOUT.16 (HomeAttain) turns ON. After the time set by delay parameter F05.88, FunOUT.16 (HomeAttain) turns OFF.

When the parameter F05.89=0, after the origin return is completedwait for the FunOUT.16 (HomeAttain) signal to turn OFF, and then execute the instruction. During the waiting period, the motor stays at the origin and does not accept the instruction; when the parameter F05.89=1, the homing Execute the command immediately after completion.

If the origin return is in progress, cancel the servo enable,If the servo generates any alarm, the origin return function will be suspended and the output terminal FunOUT.16 (HomeAttain) will not act.

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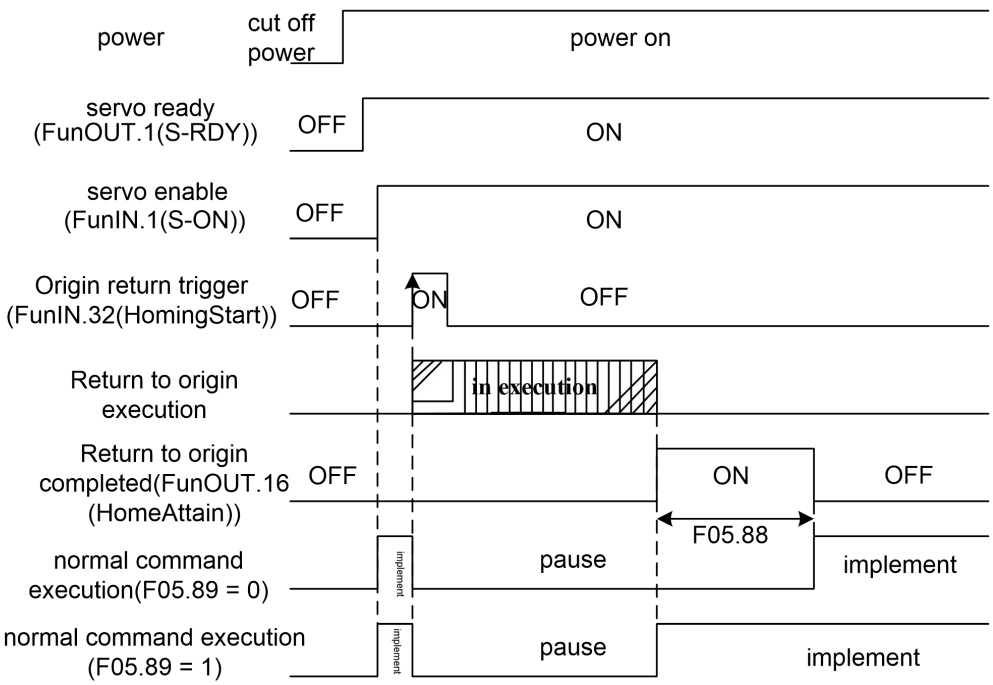

3. Automatic execution after power-on (F05.30=3)

This function is only used once when the servo is enabled for the first time after power-on, and the origin return is performed every time the power is turned on, and there is no need to repeat the origin return in the future. Use this function to omit a FunIN.32 (HomingStart) input terminal.

Execute origin return after the servo is enabled for the first time. After the origin return is completed, the position and position deviation are cleared, and the output terminal FunOUT.16 (HomeAttain) turns ON. After the time set by the delay parameter F05.88, FunOUT.16 ( ) becomes OFF, and the command can be input in the future to run normally.

When parameter F05.89 = 0, after the origin return is completed, wait for the FunOUT.16 (HomeAttain) signal to turn OFF before executing the command. During the waiting period, the motor stays at the origin and does not accept commands; when parameter F05.89=1, after the origin return Execute the order immediately.

If the origin return is in progress, the servo enable is canceled and any alarm is generated, the origin return function is suspended and the output terminal FunOUT.16 (HomeAttain) does not act. If the servo enablement is not the first time valid, the origin return cannot be triggered again.

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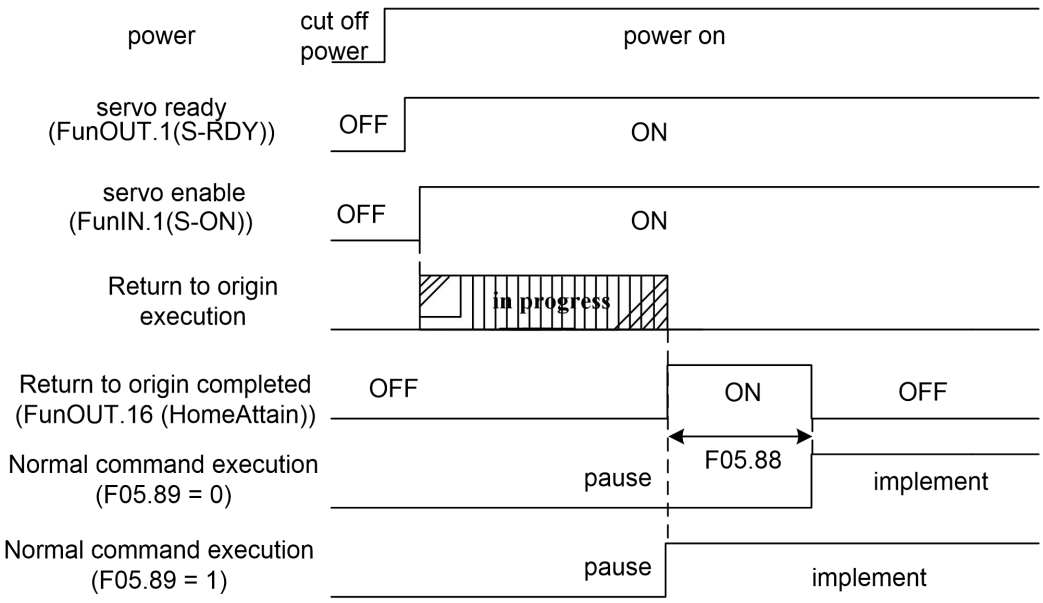


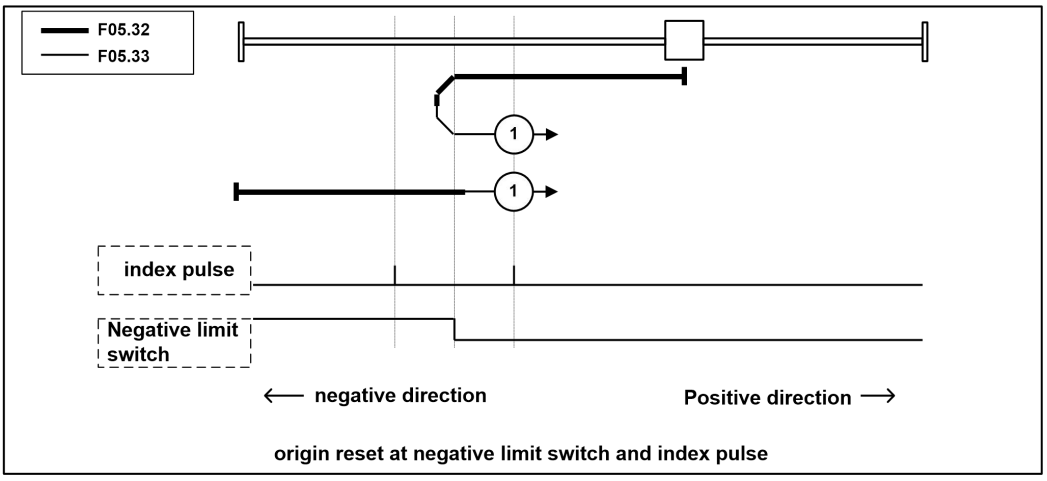
6.8.4 Detailed explanation of origin return mode

origin return mode is specified by parameter F05.31 , and when it is set to unplanned mode, the origin return function will not be executed

Mode 1: parameter F05.30=1, 2, 3, parameter F05.31=1, configure DI input FunIN.32(HomingStart), configure DI input FunIN.15(N-OT) , not configure DI input FunIN.15(N-OT), the origin return function is not executed.

● In this mode, if the negative limit switch of FunIN.15 (N-OT) is not activated, the initial action direction is the negative direction. (The low level state in the figure is the inactive state of FunIN.15(N-OT))

●The origin detection position is the first index pulse detection position on the positive direction side after the negative limit signal is deactivated .



Mode 2: parameter F05.30 = 1, 2, 3, parameter F05.31 = 2, configure DI input FunIN.32(HomingStart), configure DI input FunIN.14(P-OT)

When the DI input FunIN.14 (P-OT) is not configured, the origin return function does not execute.

●In this mode, if the positive limit switch of FunIN.14 (P-OT) is not activated, the initial action direction is the positive direction.

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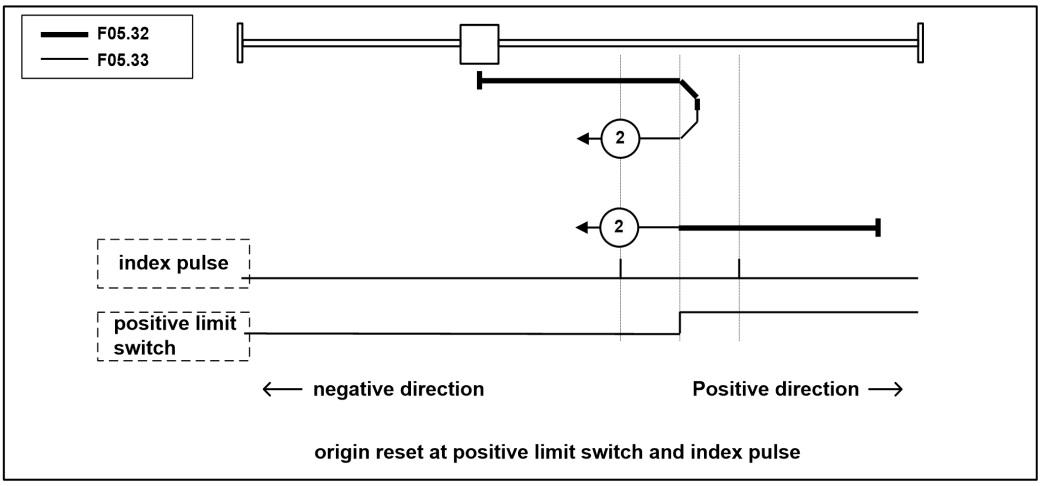
(The low level state in the figure is the inactive state of FunIN.14(P-OT))

The origin detection position is the first index pulse detection position on the negative direction side after the positive limit signal is deactivated. (Please refer to the picture below)

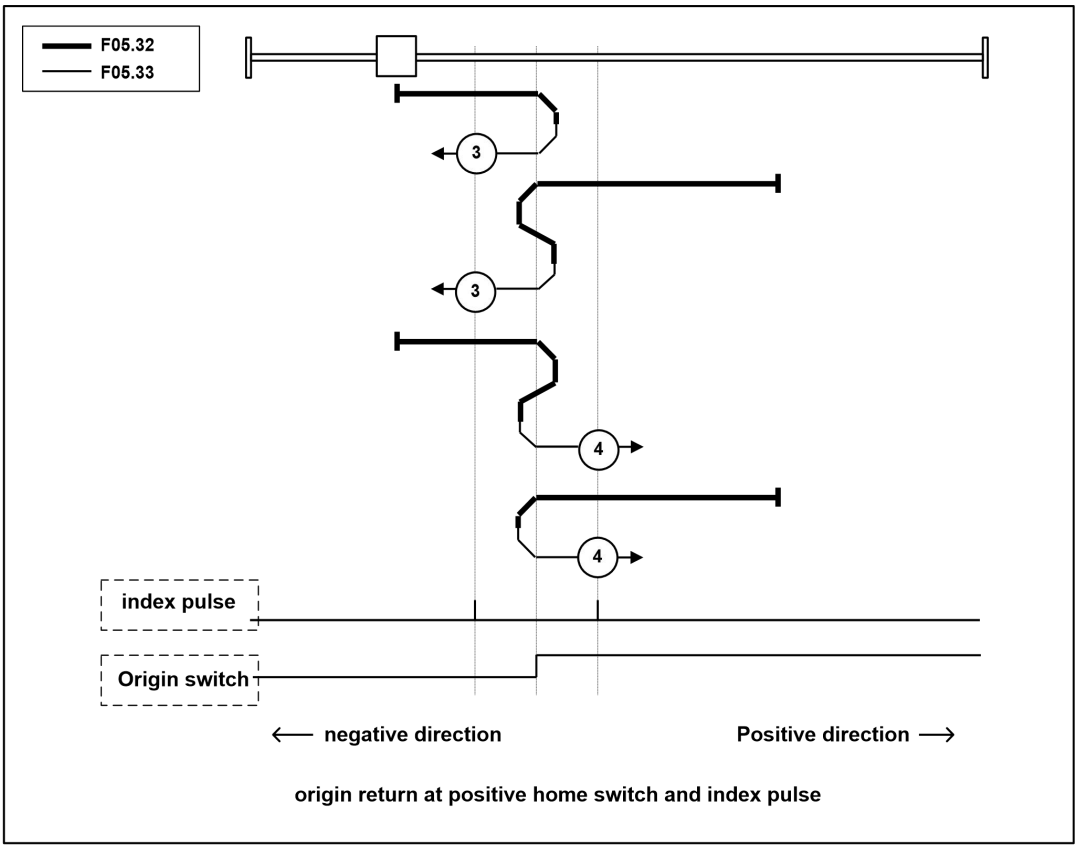


Mode 3, 4: parameter F05.30 = 1, 2, 3, parameter F05.31 = 3, 4, configure DI input FunIN.32 (HomingStart), configure DI input FunIN.31 (HomeSwitch)

When the DI input FunIN.31 (HomeSwitch) is not configured, the origin return function does not execute.

● This mode is to initialize the action direction change based on the state of the origin switch FunIN.31 (HomeSwitch) at startup.

The origin detection position is the negative direction side after the state of the origin switch changes, or the first index pulse detection position on the negative direction side. (Please refer to the picture below)



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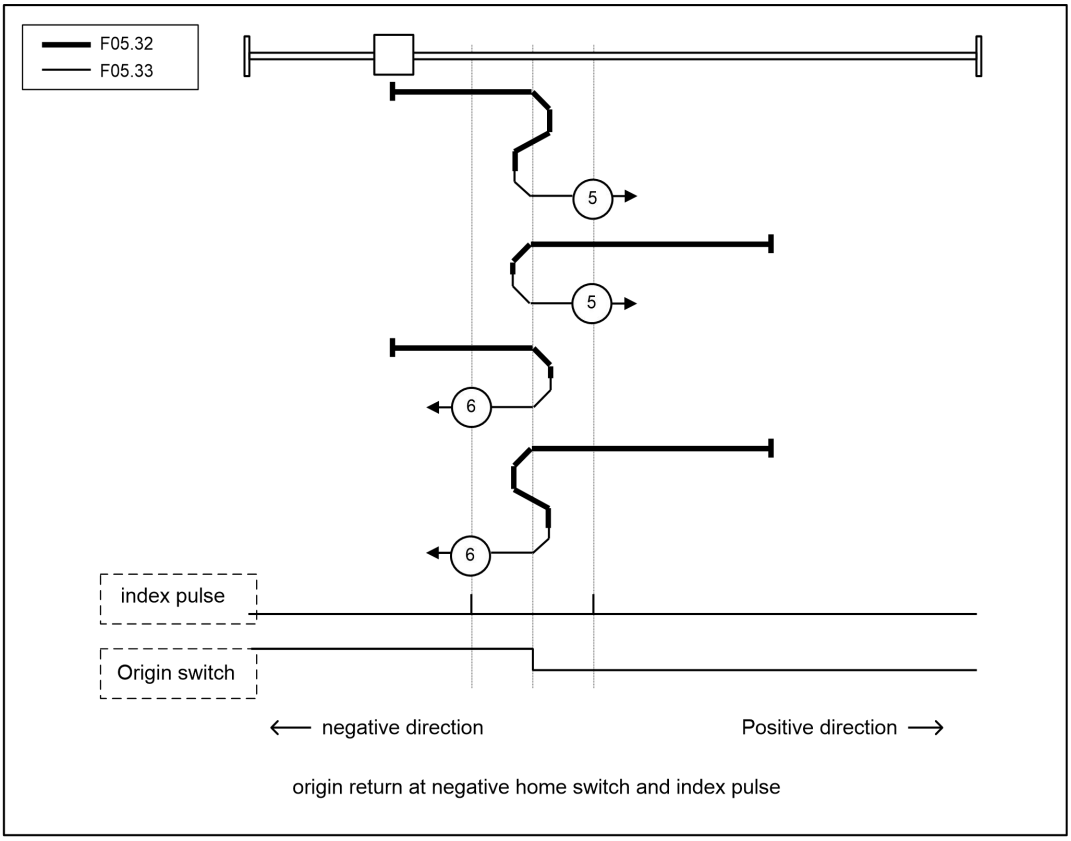
Mode5, 6: parameter F05.30 = 1, 2, 3, parameter F05.31 = 5, 6, configure DI input FunIN.32 (HomingStart), configure DI input FunIN.31 (HomeSwitch)

When the DI input FunIN.31 (HomeSwitch) is not configured, the origin return function does not execute.

● This mode is to initialize the action direction change based on the state of the origin switch FunIN.31 (HomeSwitch) at startup.

The origin detection position is the first index pulse detection position on the negative direction side or the positive direction side after the state of the origin switch changes. (Please refer to the picture below)



origin return at negative home switch and index pulse

Mode 7, 8, 9, 10: parameter F05.30 = 1, 2, 3, parameter F05.31 = 7, 8, 9, 10, configure DI input FunIN.32(HomingStart), configure DI input FunIN.31(HomeSwitch), configure DI input FunIN.14(P-OT)

●When DI input FunIN.31(HomeSwitch) and FunIN.14(P-OT) are not configured, the homing function does not execute.

This mode is to use the origin switch FunIN.31 (HomeSwitch) and the index pulse Z signal.

●The initial action direction of modes 7 and 8 is the negative direction if the origin switch has been activated at the beginning of the action

●The initial action direction of modes 9 and 10 is the positive direction if the origin switch has been activated at the beginning of the action.

●When the positive limit switch of FunIN.14 (P-OT) is encountered during the process of searching the origin in the positive direction, the motor will turn back and run immediately.

●The origin detection position is the index pulse near the rising edge or falling edge of the origin switch.

(Please refer to the picture below)

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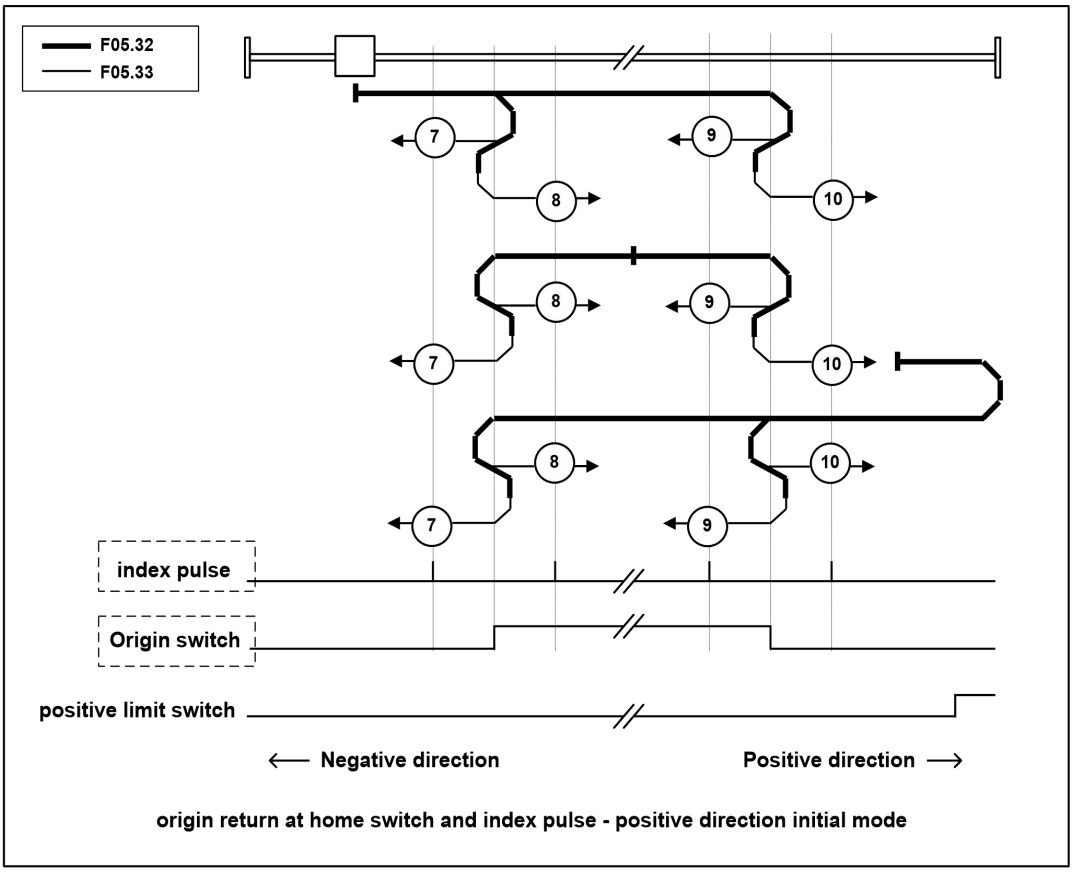

Mode 11, 12, 13, 14: parameter F05.30 = 1, 2, 3, parameter F05.31=11, 12, 13, 14, configure DI input FunIN.32(HomingStart), configure DI input FunIN.31(HomeSwitch), configure DI input FunIN.15(N-OT)

● When the DI input FunIN.31(HomeSwitch) and FunIN.15(N-OT) are not configured, the origin return function does not execute.

This mode is to use the origin switch FunIN.31 (HomeSwitch) and the index pulse Z signal.

● The initial action direction of modes 11 and 12 is the positive direction if the origin switch has been activated at the beginning of the action.

● The initial action direction of modes 13 and 14 is the negative direction if the origin switch has been activated at the beginning of the action.

●When the negative limit switch of FunIN.15 (N-OT) is encountered during the starting process of searching the origin in the negative direction, the motor will turn back and run immediately.

●The origin detection position is the index pulse near the rising edge or falling edge of the origin switch.

(Please refer to the picture below)

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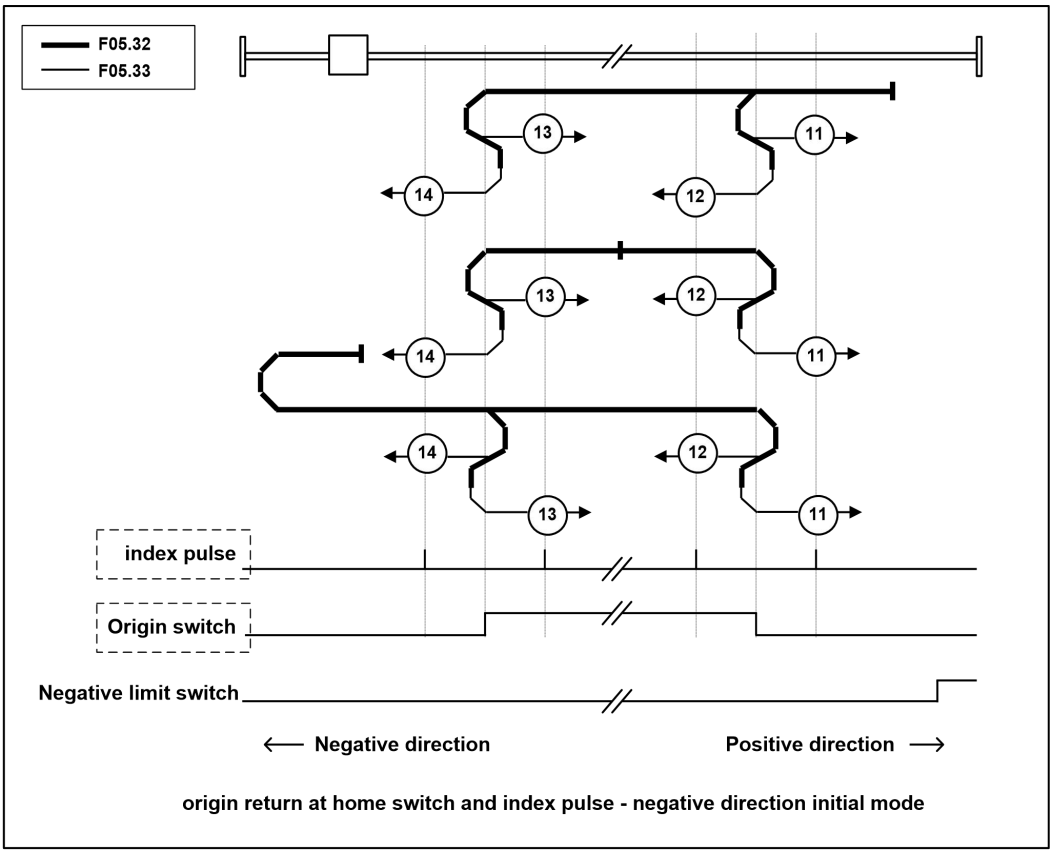
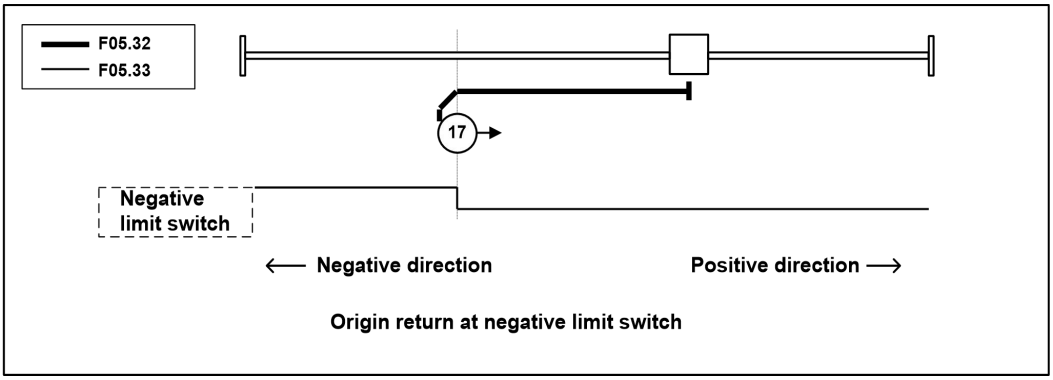


origin return at home switch and index pulse - negative direction initial mode

Mode 17: parameter F05.30 = 1, 2, 3, parameter F05.31 = 17, configureDI input FunIN.32(HomingStart), configure DI input FunIN.15(N-OT)

When the DI input FunIN.15 (N-OT) is not configured, the origin return function does not execute.

●This mode is similar to mode 1. The difference is that the origin detection position is not the index pulse, but the position where the limit switch changes. (Please refer to the picture below)



Origin return at negative limit switch

Mode 18: parameter F05.30=1, 2, 3, parameter F05.31=18, configure DI input FunIN.32(HomingStart), configure DI input FunIN.14(P-OT)

When the DI input FunIN.14 (P-OT) is not configured, the origin return function does not execute.

●This mode is similar to mode 2. The difference is that the origin detection position is not the index pulse, but the position where the limit switch changes. (Please refer to the picture below)

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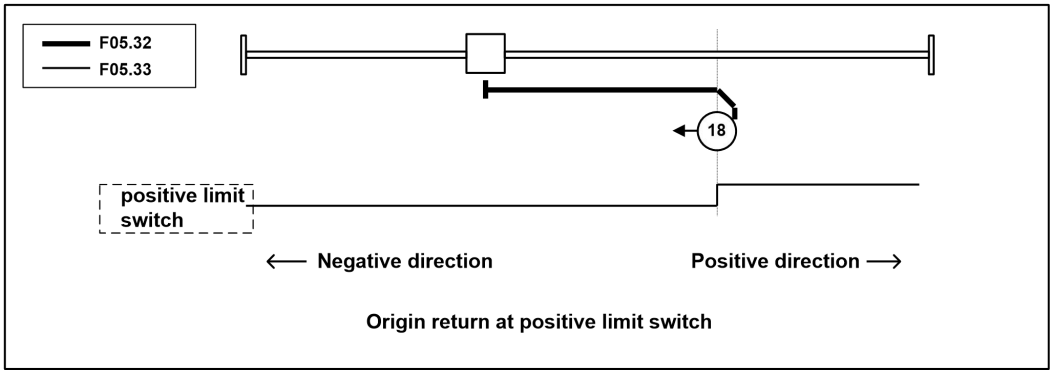
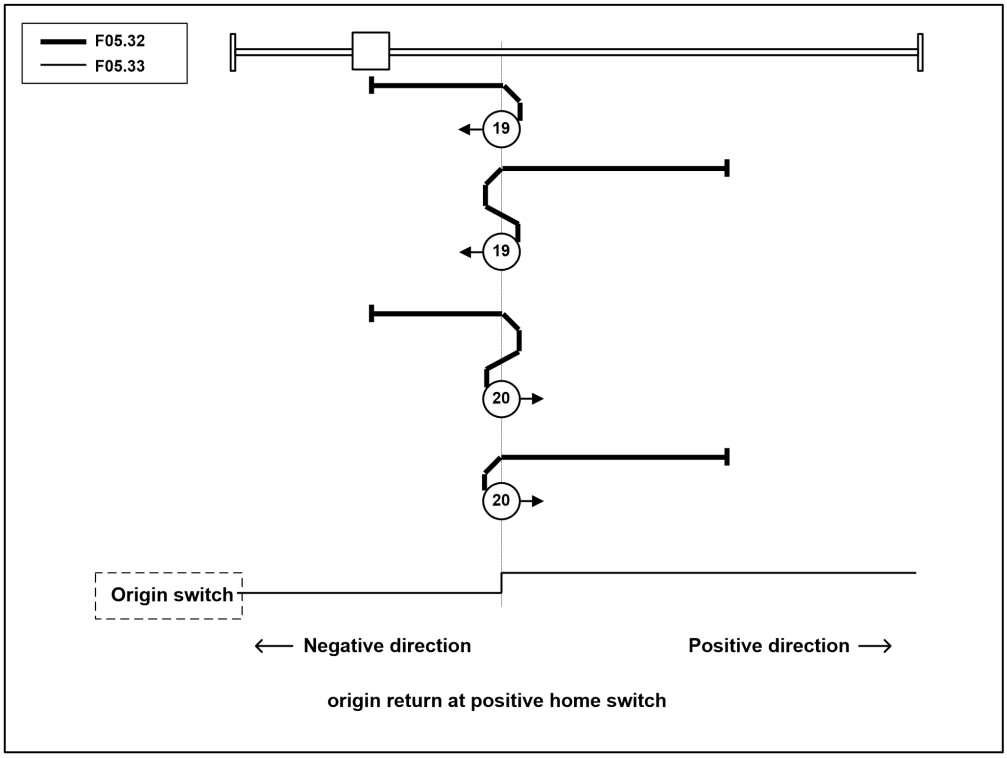


Mode 19, 20: parameter F05.30 = 1, 2, 3, parameter F05.31 = 19, 20, configure DI input FunIN.32 (HomingStart), configure DI input FunIN.31 (HomeSwitch)

When the DI input FunIN.31 (HomeSwitch) is not configured, the origin return function does not execute.

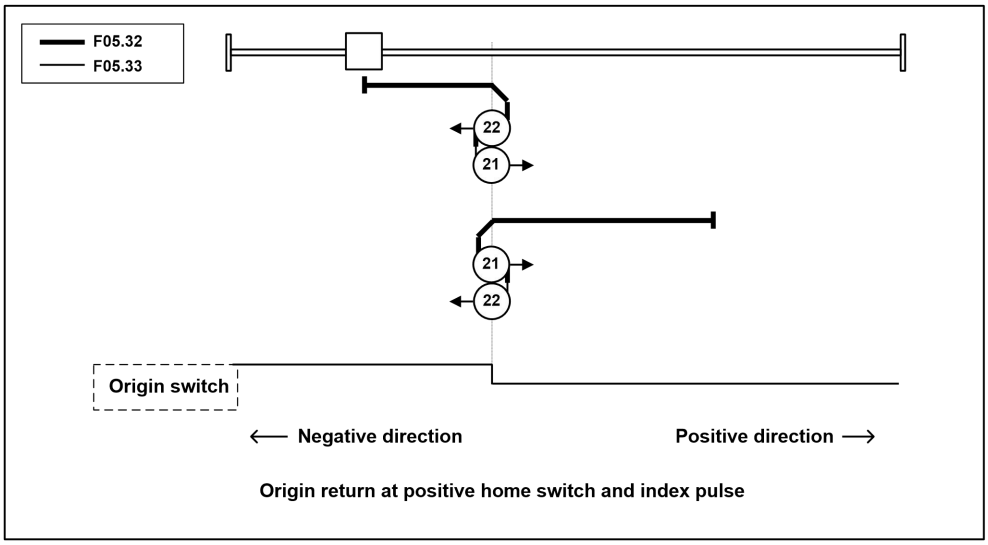
● This mode is similar to modes 3 and 4. The difference is that the origin detection position is not the index pulse, but the position where the origin switch changes. (Please refer to the picture below)



Mode 21, 22: parameter F05.30 = 1, 2, 3, parameter F05.31 = 21, 22, configure DI input FunIN.32 (HomingStart), configure DI input FunIN.31 (HomeSwitch)

When the DI input FunIN.31 (HomeSwitch) is not configured, the origin return function does not execute.

● This mode is similar to modes 5 and 6. The difference is that the origin detection position is not the index pulse, but the position where the origin switch changes. (Please refer to the picture below)

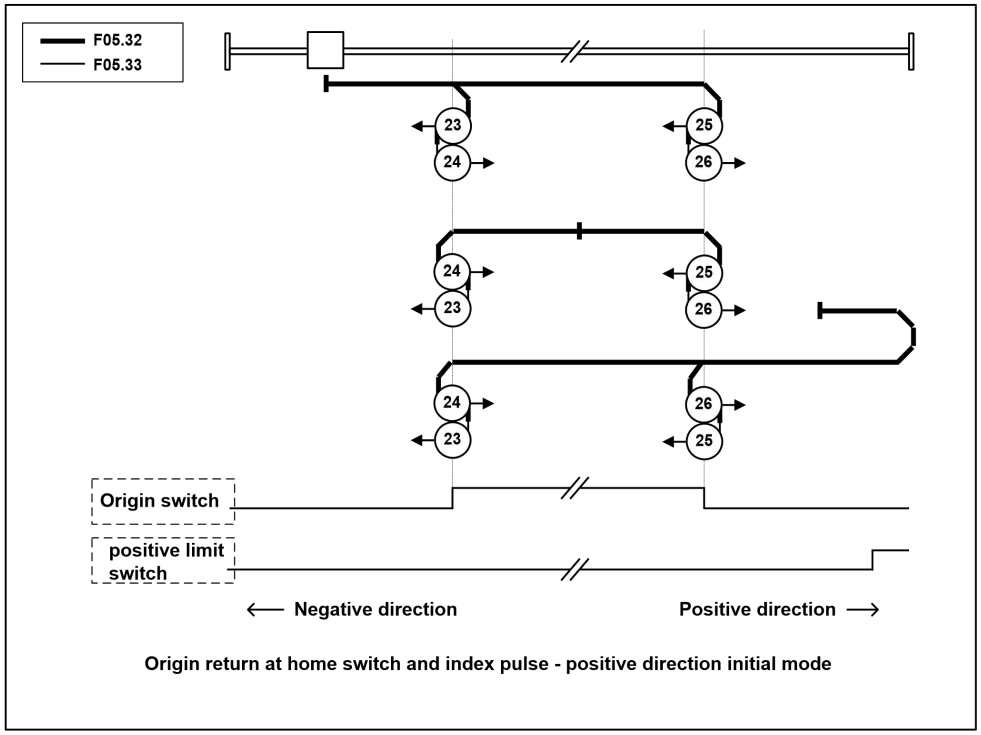


Origin return at positive home switch and index pulse

Mode 23, 24, 25, 26: parameter F05.30=1, 2, 3, parameter F05.31=23, 24, 25, 26, configure DI input FunIN.32(HomingStart), configure DI input FunIN.31(HomeSwitch), configure DI input FunIN.14(P-OT)

When the DI input FunIN.31(HomeSwitch) and FunIN.14(P-OT) are not configured, the origin return function does not execute.

●This mode is similar to modes 7, 8, 9, 10. The difference is that the origin detection position is not the index pulse, but the position where the origin switch changes. (Please refer to the picture below)



Origin return at home switch and index pulse - positive direction initial mode

Mode 27, 28, 29, 30: parameter F05.30 = 1, 2, 3, parameter F05.31 = 27, 28, 29, 30, configure DI input FunIN.32(HomingStart), configure DI input FunIN.31(HomeSwitch), configure DI input FunIN.15(N-OT)

When the DI input FunIN.31(HomeSwitch) and FunIN.15(N-OT) are not configured, the origin return function does not execute.

●This mode is similar to mode 11, 12, 13, 14. The difference is that the origin detection position is not the index pulse, but the position where the origin switch changes. (Please refer to the picture below)

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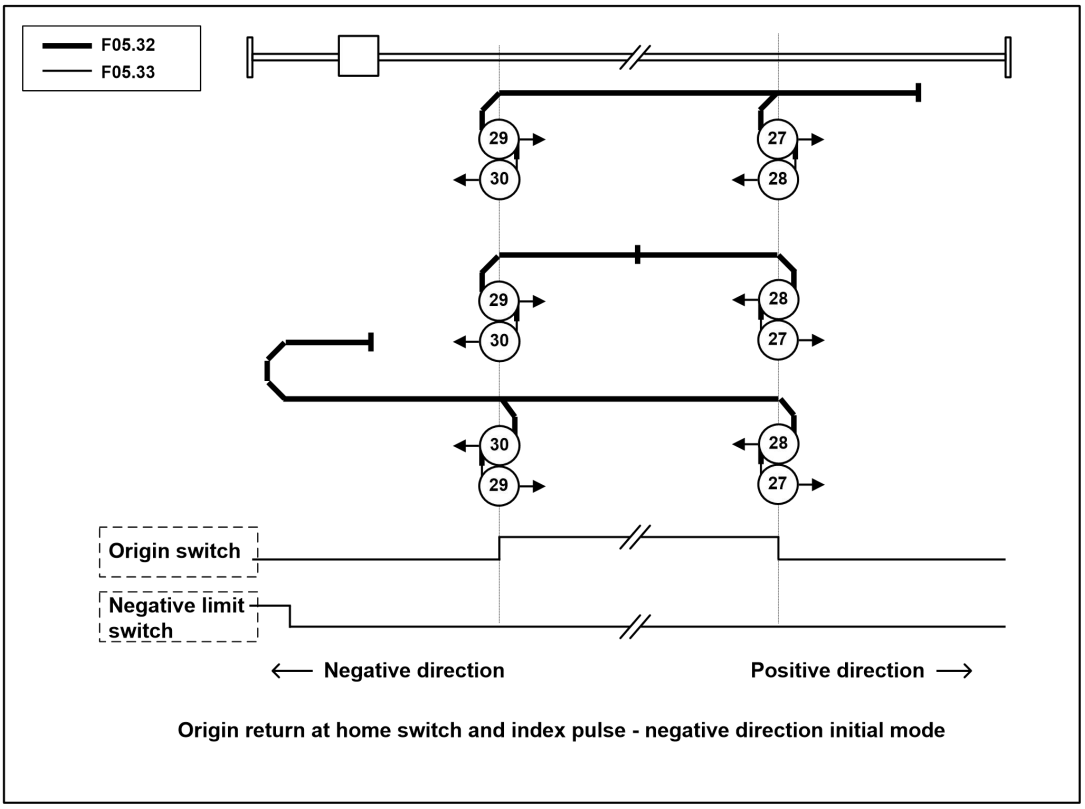
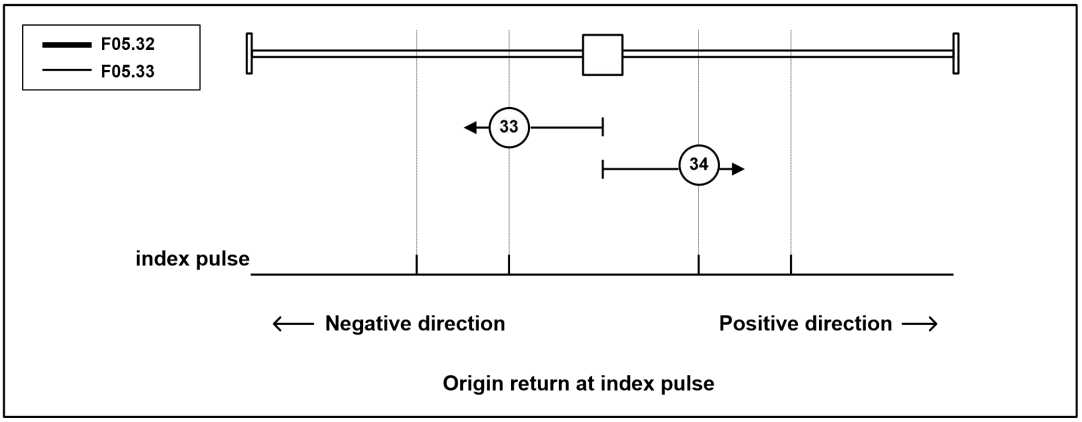


Origin return at home switch and index pulse - negative direction initial mode

Mode 33, 34: parameter F05.30 = 1, 2, 3, parameter F05.31 = 33, 34, configure DI input FunIN.32 (HomingStart)

●In this mode, only the index pulse Z signal is used.

●Detect the index pulse as the origin detection position after moving in the direction shown in the figure.

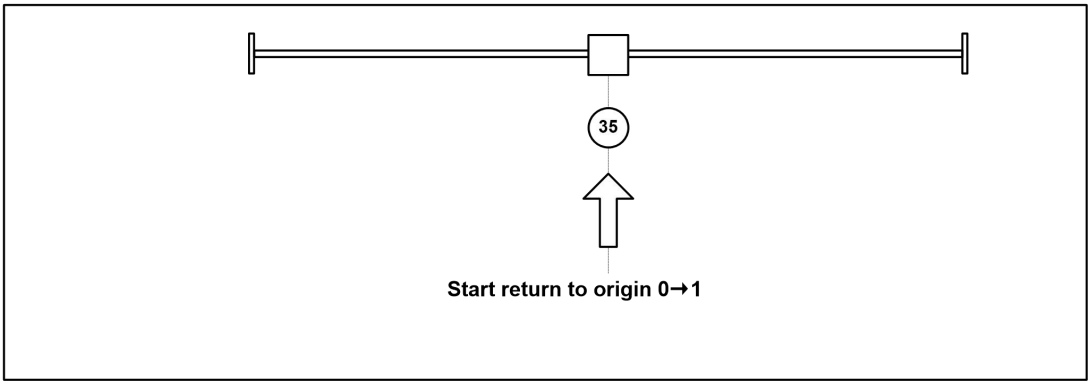


Origin return at index pulse

Mode 35: parameter F05.30 = 1, 2, 3, parameter F05.31 = 35, configure DI input FunIN.32(HomingStart)

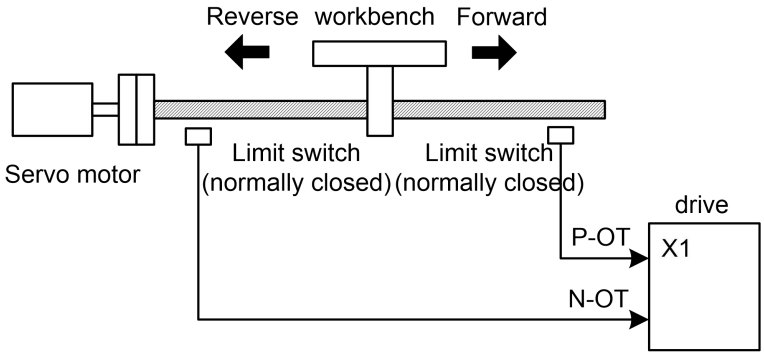
●It is used when setting the coordinate system of the servo driver (setting of position information).

●The following objects are initialized (preset) based on the point at which the return-to-origin is started.



6.9 Overtravel protection

The overtravel protection function refers to the safety function that when the moving part of the machine exceeds the designed safe movement range, the limit switch acts to force the motor to stop. The schematic diagram of overtravel protection is as follows:



It is recommended to use a normally closed contact for the limit switch, which is closed within the safe range and open when overtravel. Connected to forward drive prohibition (P-OT) and reverse drive prohibition (N-OT), it can also be set to use or ignore by parameter F02.97. If it is set to use, the limit signal must be connected; if it is set to ignore, the signal is not required. The default value of the parameter is to ignore both P-OT and N-OT. If it needs to be used, the parameter F02.97 must be modified. Even in the overtravel state, it is still allowed to exit the overtravel state by inputting a reverse command.

F02.97	Reverse drive prohibited (N-OT)	Prohibition of forward rotation drive (P-OT)
0	use	use
1	use	neglect
2	neglect	use
3 (default)	neglect	neglect

`

Chapter 7 Adjustment

7.1 Overview

The servo drive needs to drive the motor as quickly and accurately as possible to track the instructions from the upper computer or internal settings. In order to meet this requirement, the servo gain must be adjusted reasonably.

Figure 7-1 Example of gain setting

Position loop gain: 40.0Hz

Position loop gain: 200.0Hz

Speed loop gain: 25.0Hz

Speed loop gain: 200.0Hz

Speed loop integral time constant:100.00ms

Speed loop integral time constant:50.00ms

Speed loop integral time constant:50.00ms

Speed feed-forward gain: 0 Speed feed-forward gain: 50.0%

Load inertia ratio: 30

The servo gain is set through a combination of multiple parameters (position loop, speed loop gain, filter, load moment of inertia ratio, etc.), and they affect each other. Therefore, the setting of servo gain must take into account the balance between the setting values of various parameters.

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Before adjusting the gain, it is recommended to perform a jog test run to confirm that the motor can operate normally!

The general flow of gain adjustment is shown in the figure below:

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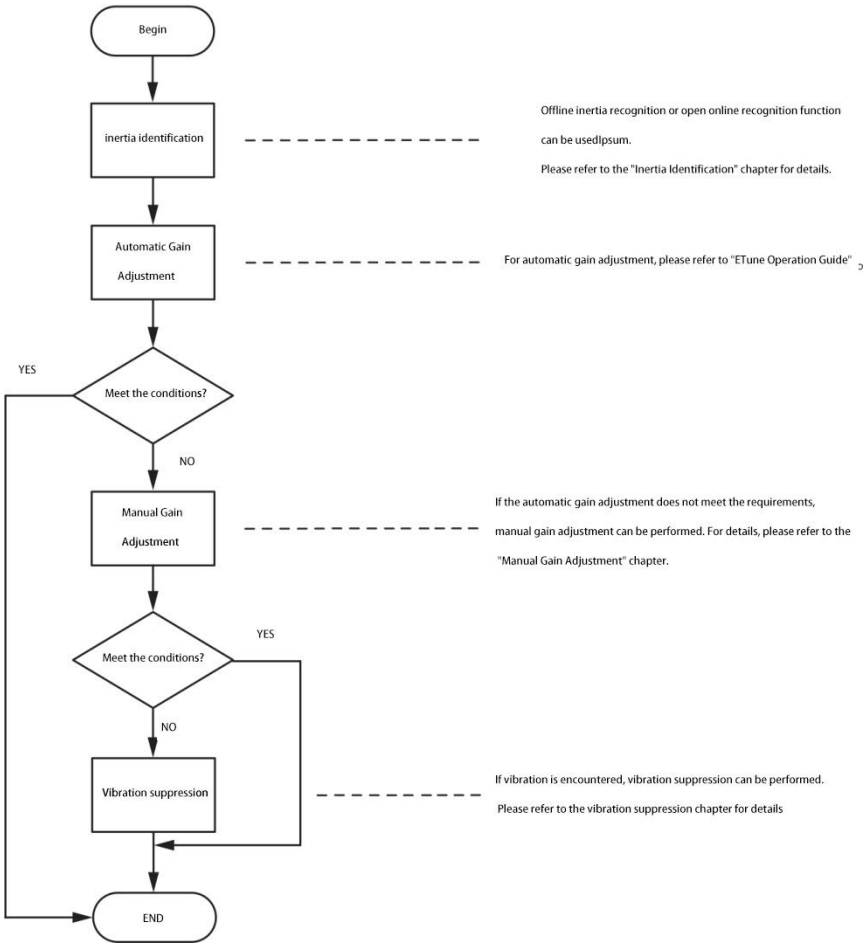

Figure 7-2 Gain adjustment process

7.2 Inertia Identification

The load inertia ratio is one of the most important parameters in a servo system, and its proper setting is crucial for the driver to achieve gain adjustment quickly and efficiently. It can be manually set by modifying the parameter table directly or automatically set using the inertia identification function of the servo driver. The servo driver utilizes offline inertia identification method to estimate and determine the load inertia.offline inertia identification takes F08.15 as the initial inertia ratio for identification;in the parameter display mode, after switching to the "F0d.02" parameter, press the "SET" key to enableOffline inertia identification.

☆Associated parameters

<table>
<tr><td rowspan="2">F0d.02</td><td>name</td><td colspan="3">Enable offline inertia identification</td><td>Setting mode</td><td>Operation mode</td><td>correlation mode</td><td>-</td></tr>
<tr><td>setting range</td><td>-</td><td>unit</td><td>-</td><td>Way of taking effect</td><td>Effective immediately</td><td>factory setting</td><td>-</td></tr>
<tr><td colspan="9">The operation entrance of the offline inertia identification function of the panel. In the parameter display mode, after switching to the "F0d.02" parameter, press the "SET" key to enable offline inertia identification.</td></tr>
</table>

`

Before performing offline inertia identification, first confirm the following:

● The movable stroke of the motor shall meet the following requirements:

■ Please make sure that the limit switch is installed on the machine, and ensure that the motor has a movable stroke of more than 3 turns in the positive and negative directions, so as to prevent overtravel during the inertia identification process and cause accidents!

● Estimated value of load inertia ratio F08.15.

If F08.15 is the default value (1.00), and the actual load inertia ratio is greater than 30.00, the motor may move slowly and cause the identification to fail. At this time, the following measures can be taken:

■ The preset F08.15 is a larger initial value.it is recommended that the preset value be 5.00 times as the initial value, and gradually increase until the value displayed on the panel will be updated during the identification process.

●The load torque is relatively stable and cannot change drastically

●During the inertia identification process, if vibrations occur, it is recommended to immediately stop the identification and reduce the gain. Afterward, the inertia identification can be restarted.

●The backlash in the transmission mechanism should not be excessively large, as it can result in the failure of the identification process.

The general operation process of offline inertia identification is as follows:

`

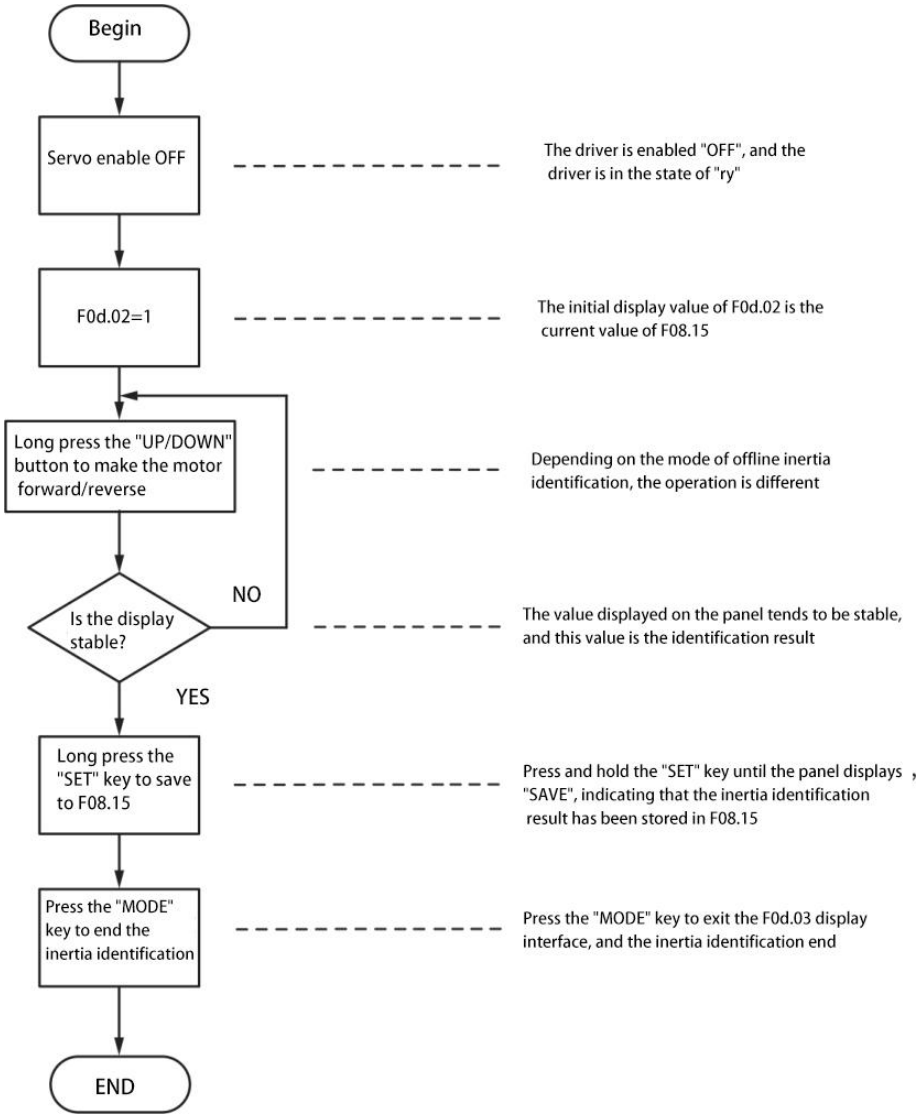

Figure 7-3 Flow chart of offline inertia identification

7.3 Gain adjustment

7.3.1 Basic parameters

The purpose of gain adjustment is to make the servo system have strong stability and responsiveness, as well as a certain level of disturbance rejection against noise and external disturbances.

The servo system consists of three control loops, which are position loop, speed loop and current loop from outside to inside. The basic control block diagram is shown in the figure below.

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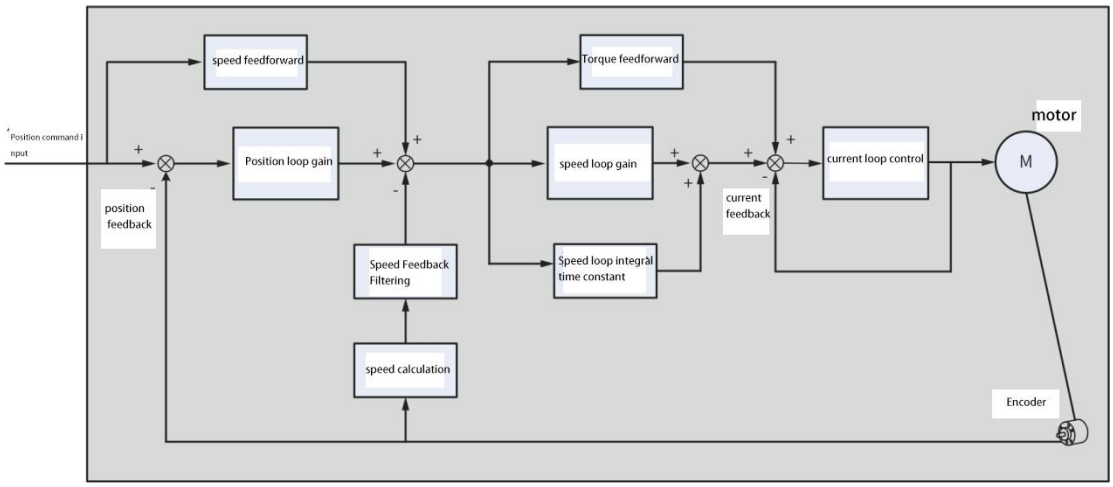

Figure 7-7 Basic control block diagram of manual gain

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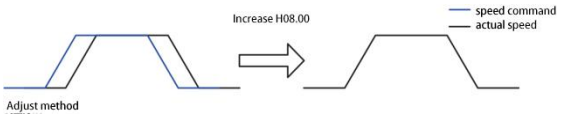
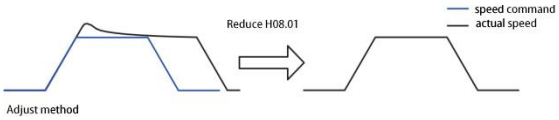
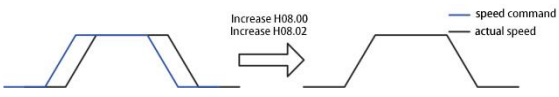
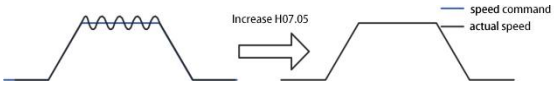
The principle of gain adjustment in the entire servo control system is that the closer it is to the inner loop, the higher the response requirements, which means higher gain settings are needed. Especially for the innermost current loop, the gain typically needs to be at least 3 times higher than the outer velocity loop, as failure to do so may result in system instability. The default current loop gain of the servo drive has ensured sufficient responsiveness, generally no adjustment is required, only the position loop gain, speed loop gain and other auxiliary gains need to be adjusted. Therefore, when adjusting the gain in position control mode, in order to ensure the stability of the system, it is necessary to increase the gain of the speed loop while increasing the gain of the position loop, and ensure that the response of the position loop is lower than that of the speed loop.

The basic gain parameter adjustment method is as follows.

Table 7-7 Gain parameter adjustment instructions

step	parameter	name	Adjustment instructions
1	F08.00	speed loop gain	Parameter function: determine the highest frequency of the changing speed command that the speed loop can follow Rate. the premise that the load inertia ratio average value (F08.15) is set correctly, it can be considered as: Speed loop maximum following frequency = F08.00.  Adjustment method: ● In the range where noise and vibration do not generate, increasing this parameter can speed up the positioning time and bring better speed stability and followability.

			● If noise generate, reduce the parameter setting value. ● When vibrations occur, the "vibration suppression" function can be used to suppress the mechanical vibrations. This function allows addressing the vibration issue without compromising the velocity loop's tracking performance and responsiveness.
2	F08.01	Speed loop integration time constant	Parameter role: To eliminate velocity tracking static error, the goal is to ensure that the velocity feedback can fully follow the velocity setpoint within a certain timeframe, taking into account the maximum tracking capability of the velocity loop.  Adjustment method: It is recommended to configure the parameter according to the relationship of 500 ⩽ F08.00 * F08.01 ⩽ 1000. For example, if the velocity loop gain (F08.00) is configured as 50.0Hz, the recommended range for the velocity loop integral time constant (F08.01) is 10.0ms ⩽ F08.01 ⩽ 20.0ms. Lowering the setpoint can strengthen the integral effect and accelerate positioning time. However, setting the setpoint too small may induce mechanical vibrations, especially in scenarios with significant velocity sampling delay. Conversely, excessively large integral time constants can slow down the convergence of velocity deviation, resulting in a longer time to eliminate the velocity deviation. When F08.01= 1000.0ms, the integral becomes ineffective.
step	parameter	name	Adjustment instructions
3	F08.02	Position loop gain	Parameter role: Determine the highest frequency of changing position commands that the position loop can follow. The highest following frequency of the position loop = F08.02.  Adjustment method: Adjust according to positioning time. Increasing this parameter can speed up the positioning time, andImprove the ability of the motor to resist external disturbances when it is stationary. If the setting value is too high, the system may become unstable and oscillate.it is generally recommended to configure the position loop gain to be 1.5 times or higher than

			the velocity loop gain.
4	F07.05	Torque command filter time constant	Parameter role: Filtering the system helps to eliminate high-frequency noise and suppress high-frequency vibrations.  Adjustment method: Increase F08.00 When vibration occurs, you can suppress the vibration by adjusting F07.05, specifically See "Vibration Suppression" for settings . The larger the time constant for torque command filtering, the better the suppression effect on high-frequency noise and vibrations. However, it may also result in a decrease in the response of the current loop. Additionally, setting this parameter too large can lead to low-frequency vibrations in the system, especially when the position and velocity loop gains are configured to be high. In such cases, it is advisable to reduce the F07.05 parameter appropriately. To suppress vibrations during stopping, you can try increasing F08.00 and reducing F07.05.

☆Associated parameters:

parameter	name	setting range	unit	Function	Setting method	take effect time	factory set up
F08.00	speed loop gain	1~3000	Hz	Set the size of the speed loop proportional gain.	run settings	Effective immediately	40
F08.01	Speed loop integral time constant	0.1~1000.0	ms	Set the integral time constant of the velocity loop.	run settings	Effective immediately	20.0
F08.02	Position loop gain	1~1000	Hz	Set the size of the proportional gain of the position loop.	run settings	Effective immediately	40
F07.05	Torque command filtering time constant	1.00~50.00	ms	Set the size of the torque command filter time constant.	run settings	Effective immediately	1.00

7.3.2 Gain switching

The gain switching function can be triggered by the internal status of the servo or external DI. Valid only in position and speed control modes. Using the gain switch, it can play the following roles:

● It can be switched to a lower gain when the motor is stationary (servo enabled) to suppress vibration.

● It is possible to switch to a higher gain when the motor is stationary to shorten the positioning time.

● It can be switched to a higher gain when the motor is running to obtain better command tracking performance.

● Different gain settings can be switched through external signals according to the conditions of load equipment.

This functionality enables the switching between the first set of gains (F08.00~F08.02, F07.05) and the second set of gains (F08.03~F08.05, F07.06). The conditions for switching should be configured using the parameter F08.72.

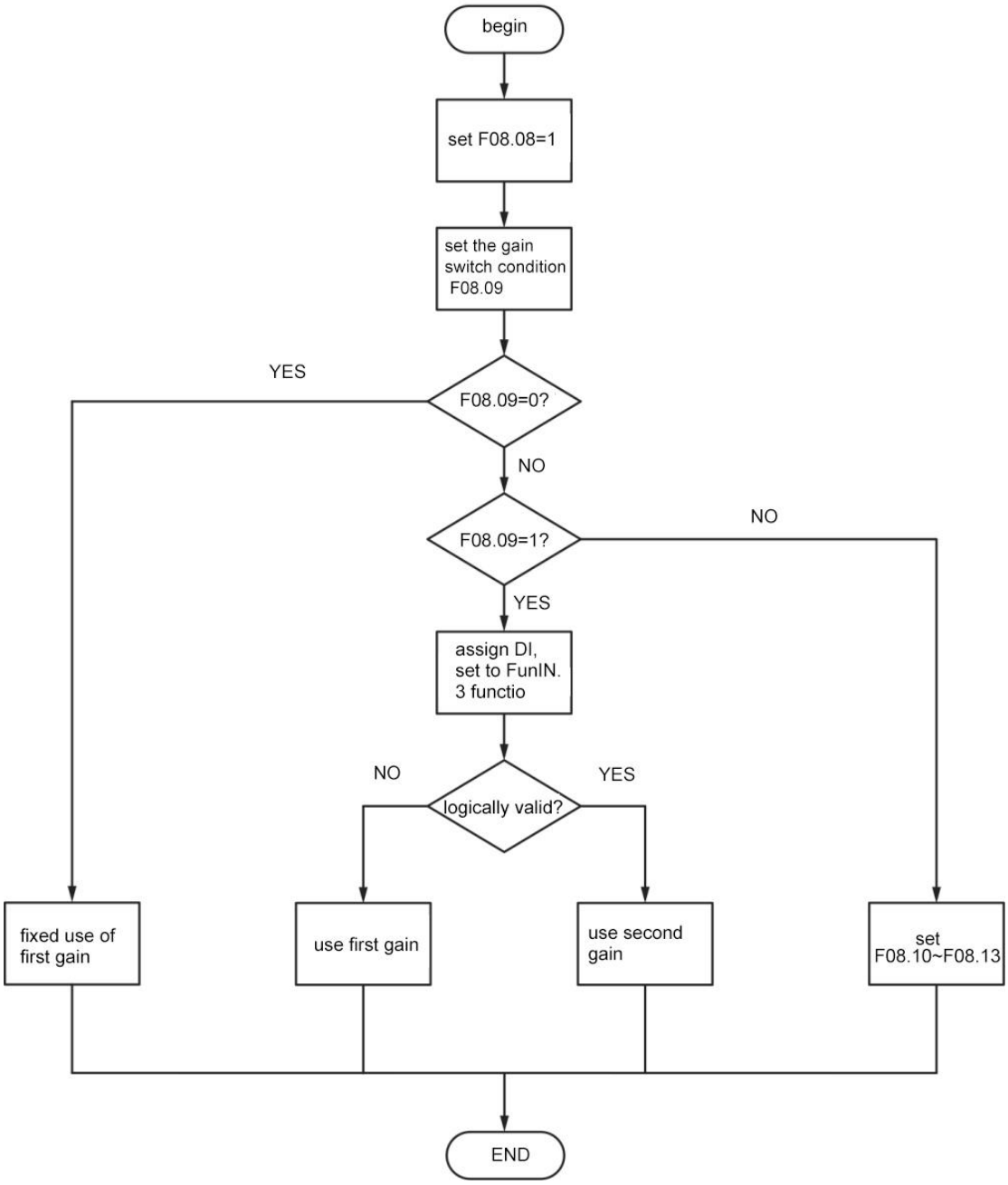


Figure 7-8 F0 8.08=0 gain switching flow chart

F08.08=1

first gain (F08.00~F08.02, F07.05) and the second gain (F08.03~ F08.05,F07.06) can be realizedswitching, and the switching conditions should be set through F08.09.

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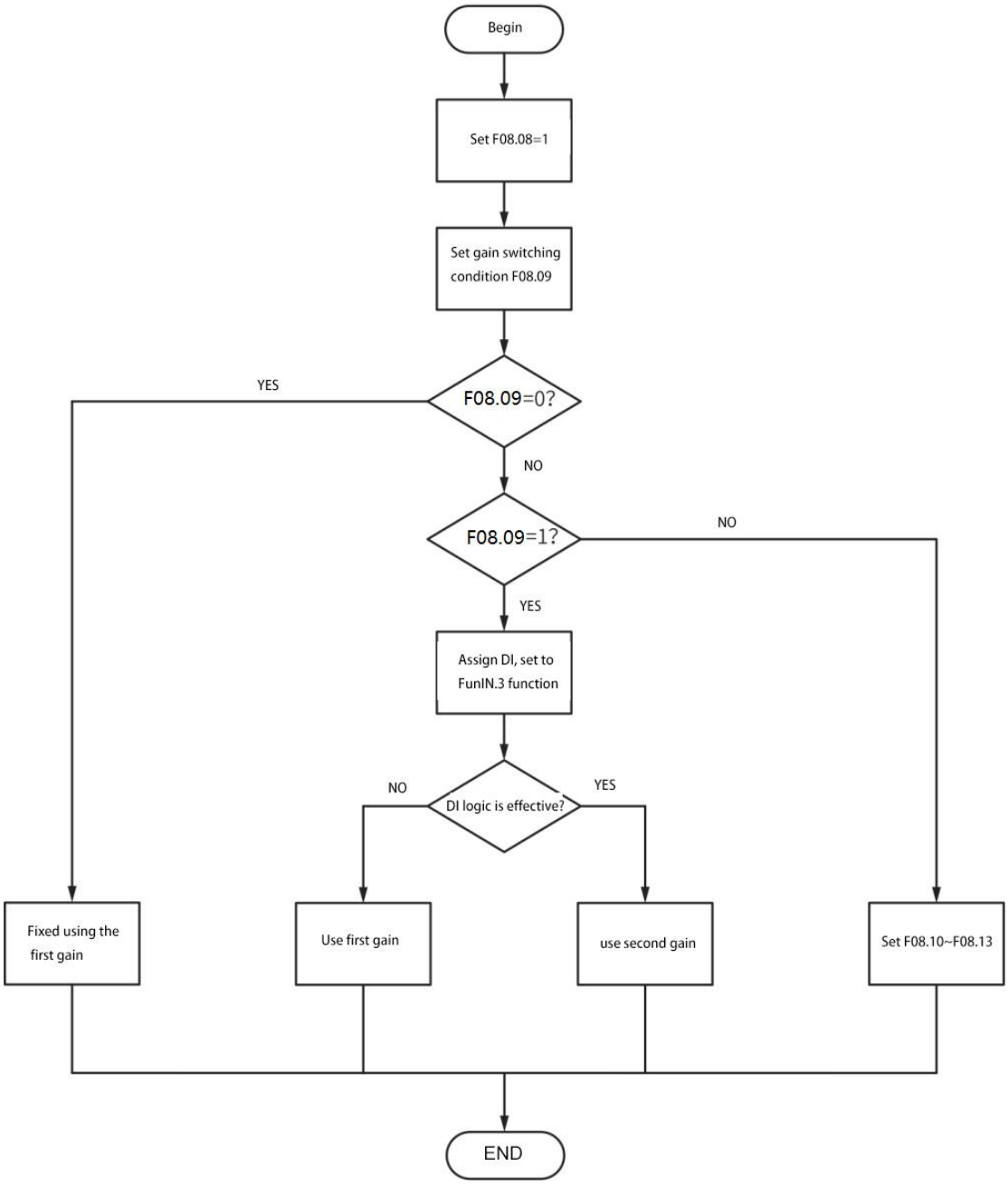

Figure 7-9F08.08=1 gain switching flow chart

The second gain switching condition has 11 modes in total. The schematic diagrams and related parameters of different modes are shown in the table below.

Table 7-8 Description of Gain Switching Conditions

Gain switching condition setting			Related parameters		
F08.72	condition	schematic diagram	delay (F08.10)	switch level (F08.11)	switching time lag (F08.12)
0	The first gain is fixed	-	invalid	invalid	invalid

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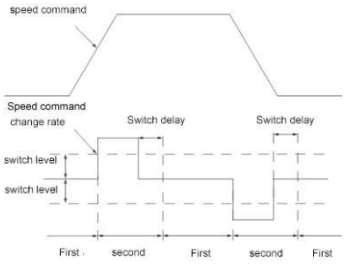
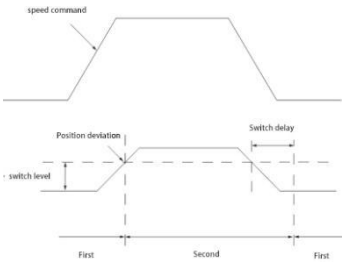
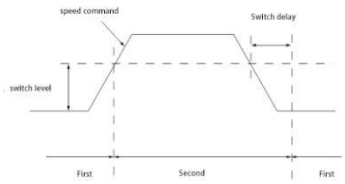
1	The second gain is fixed	-	invalid	invalid	invalid
2	Use external DI for to switch	-	invalid	invalid	invalid
Gain switching condition setting			Related parameters		
F08.72	condition	schematic diagram	delay (F08.10)	switch level (F08.11)	switch level hysteresis (F08.12)
3	speed command frequency pulse		valid	Valid (0.1kpps)	Valid (0.1kpps)
4	Position deviation		valid	valid(encoder unit)	valid(encoding device unit)
5	actual speed		valid	valid(rpm)	valid(rpm)

Notice

Delay time F08.10" is only valid when the second gain is switched to the first gain.

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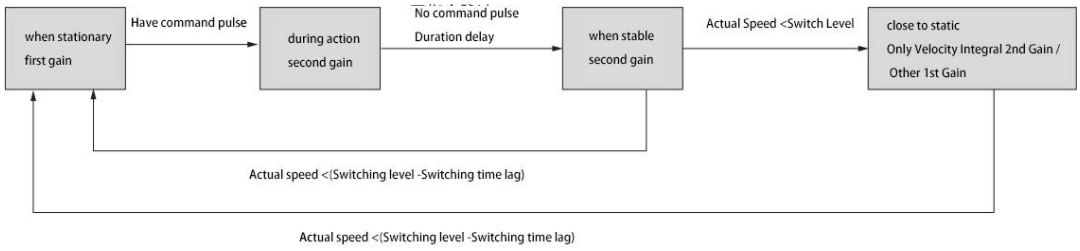

☆Associated parameters:

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parameter	name	setting range	unit	Function	Setting Mode	effective time	factory setting
F08.72	Gain switching condition selection	0 - The first gain is fixed 1 - The second gain is fixed 2 - Use external DI to switch 3 - Instruction pulse frequency 4 -Pulse deviation 5 -Motor Speed Feedback	-	Set the conditions for gain switching	run settings	Effective immediately	1
F08.10	Gain switching delay time	0~3000	1ms	Set the delay time for gain switching	run settings	Effective immediately	5.0
F08.11	Gain switching level	0~32767	0.1kpps	Set the level of gain switching	run settings	Effective immediately	100
F08.12	Gain switch level hysteresis.	0~32767	0.1kpps	Set the hysteresis of the gain switch level.	run settings	Effective immediately	5
F08.13	Gain switching time	0~3000	ms	Set the gain switch time.	run settings	Effective immediately	5

7.3.3 Position command filtering

name	Function	Applications	The effect of filtering too much
Pulse input pin filtering	Inaccurate number of received servo pulses caused by interference is prevented.	The system wiring is not standardized. Environmental interference is strong.	The number of pulses received by the servo is less than the number of pulses sent by the host computer.
Position command filtering	Position command filtering is to filter the position command (encoder unit) after the electronic gear ratio frequency frequency or frequency multiplication, so as to make the motor run more smoothly and reduce the impact on the machine.	The position command output by the host computer is not processed with acceleration and deceleration. Pulse command frequency is low. When the electronic gear ratio is more than 10 times.	The delay of the response increases.

`

parameter	name	setting range	unit	Function	Setting Mode	effective time	factory setting
F05.70	Filtering strength of the command pulse input signal.	0 ~ 31 The larger the value, the larger the filter time constant	-	Digital filtering of pulse input signals PULS and SIGN signals	run settings	Effective immediately	1
F05.04	Time constant for exponential smoothing filter of position command.	0 ~ 1000	ms	Exponential smoothing filter for position command helps achieve smoother motor operation and reduces mechanical shock.	Shutdown setting	power on again	0
F05.06	Time constant for linear smoothing filter of position command.	0 ~ 256	ms	position command linear filter makes the motor run more smoothly and reduces the impact on the machine.	Shutdown setting	power on again	0

7.3.3.1 Pluse input Signal filtering

Parameter F05.70 is used to set the digital filtering for pulse input signals PULS and SIGN. A higher value corresponds to a larger time constant for filtering, resulting in stronger noise suppression. However, it may lead to a reduction in the maximum supported input frequency. The default value sets the maximum pulse input frequency to 1000kHz (kpps).

Pulse input signal filtering is used to eliminate noise on the signal line and prevent counting errors. If there is a phenomenon of inaccurate movement due to inaccurate counting, you can increase the parameter value appropriately to address it.

7.3.3.2 Smoothing filter

As shown in the figure below, the parameter F0 5.04 is to smooth and filter the command pulse, with exponential acceleration and deceleration. The filter will not lose the input pulse, but there will be command delay phenomenon. When set to 0, the filter has no effect. The parameter value represents the time from 0 frequency to 63.2% of the position command

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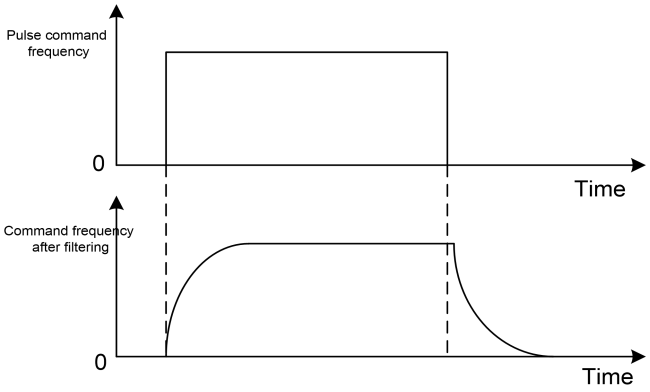
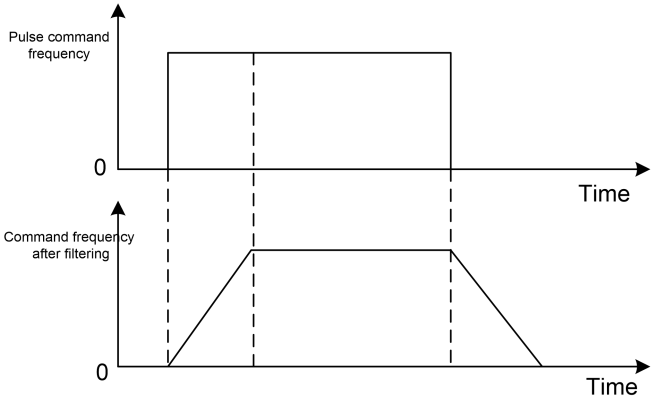
frequency.



As shown in the figure below, the parameter F05.06 is to smooth and filter the command pulse, with linear acceleration and deceleration. When set to 0, the filter has no effect. The parameter value represents the time from 0 frequency to 100% position command frequency.



The filter smoothes the input pulse frequency. This filter is used in situations where the upper controller has no acceleration/deceleration function, the electronic gear ratio is relatively large, and the command frequency is low.

7.3.4 Feedforward gain

speed feedforward

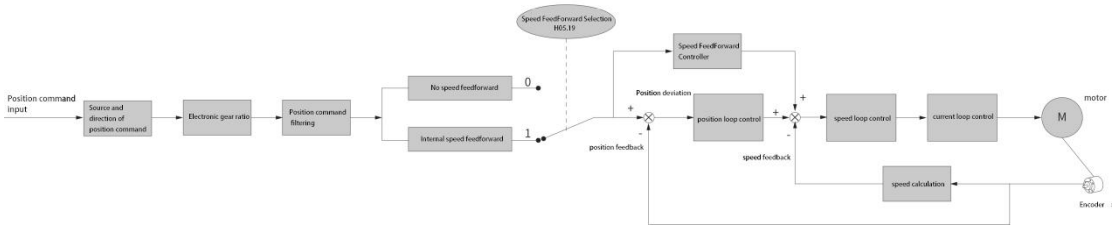


Figure 7-10 Speed feedforward control operation diagram

Velocity feedforward can be applied to position control mode function. Using the speed feedforward function can greatly improve system tracking performance, reduce position following deviation, and improve system response capability.

`

Operation steps of speed feedforward function:

1. Set the source of the speed feedforward signal.

Setting parameter F08.19 (speed feedforward gain) to a non-zero value enables the speed feedforward functionality, and the corresponding signal source is selected.

parameter	name	set value	Remark
F08.19	Speed Feedforward Gain	0 - No speed feedforward	-
		Non-zero value. - internal speed feedforward	The speed information corresponding to the position command (encoder unit) is used as the source of the speed feedforward signal.

2. Set the speed feedforward parameters.

Including speed feedforward gain (F08.19) and speed feedforward filter time constant (F08.18) .

parameter	name	Adjustment instructions
F08.18	Speed feed-forward filter time constant	 Parameter role:
F08.19	Speed Feedforward Gain	● Increasing the velocity feedforward gain (F08.19) can improve the system's responsiveness and reduce tracking error. However, if the gain is set too high, it may lead to velocity overshoot and position overshoot. ● Reducing the velocity feedforward filter time constant (F08.18) can suppress velocity overshoot during acceleration and deceleration. Increasing the F08.18 parameter can help mitigate noise and jitter caused by long position command update cycles or insufficient command smoothness. Adjustment method: ● During the adjustment process, you can begin by setting a fixed value for F08.18 and then iteratively adjust F08.19 until you achieve satisfactory tracking performance. Once F08.19 is fixed, you can then proceed to iteratively adjust F08.18. After both parameters have been individually tuned, you can perform overall fine-tuning to achieve an even more satisfactory tracking performance.

7.3.5 Pseudo-differential feedforward control

In non-torque control mode, pseudo-differential regulation control (Pseudo - Differential - Forward - FeedbackControl, referred to as PDFF control), to adjust the speed loop control mode.

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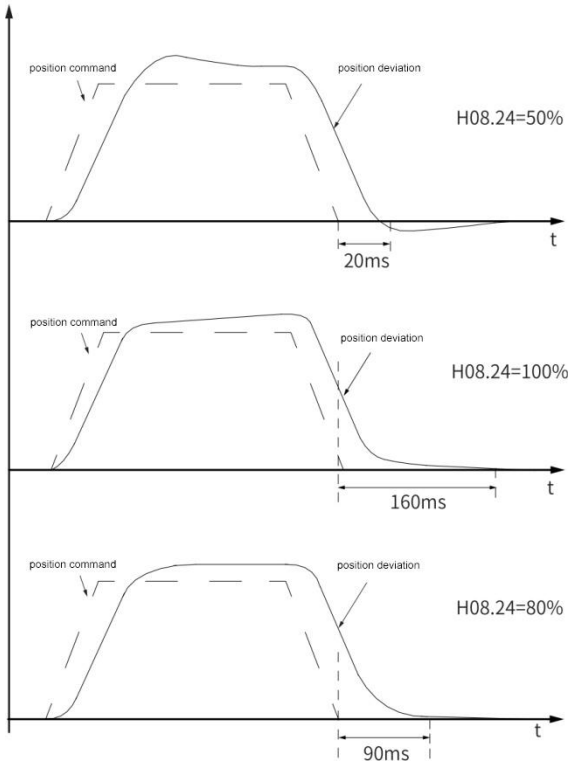

Figure 7-11 Pseudo-differential adjustment control example

Pseudo-differential feedforward control adjusts the speed loop control method to enhance the anti-interference ability of the speed loop and improve the followability of the speed command.

parameter	name	Adjustment instructions
F06.65	Pseudo-differential feed-forward control coefficient	Parameter role: ● In non-torque control mode, it serves as an auxiliary control method for the speed loop to enhance the system's disturbance rejection capability and improve its tracking performance. ● If the setting of F06.65 is too small, the response of the speed loop will be slow. ● When there is overshoot in the speed feedback, gradually decrease the value of F06.65 from 100.0 until a certain set value is reached, at which point the pseudo-differential feedforward control will take effect. ● When F06.65=100.0, the speed loop control method remains unchanged, and it is the default proportional integral control.

7.3.6 Torque disturbance observation

In non-torque control mode, the disturbance observation function can be used.

Disturbance Observer

The disturbance observer can effectively observe external medium and low frequency disturbances, compensate the torque command through the disturbance observation value, and improve the anti-disturbance performance and response ability of the system. The functional block diagram of the disturbance observer is shown in the figure below:

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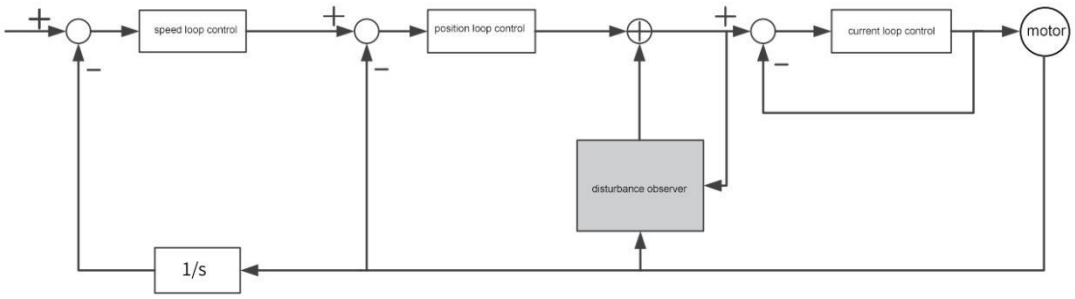

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1/s: Integral link.

parameter	name	Adjustment instructions
F08.88	Disturbance Observation Gain	The higher the value, the faster the response to disturbance, but too high is prone to vibration .

☆Associated parameters

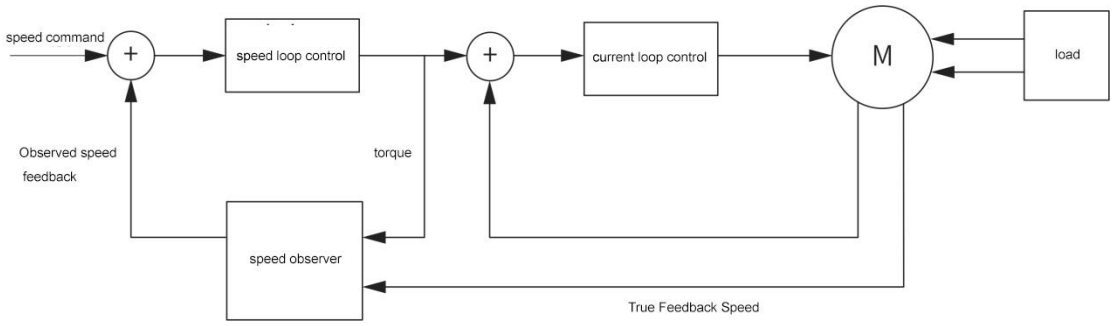
parameter	name	Setting range	unit	function	Setting method	effective time	factory setting
F08.88	Disturbance Observation Gain	0~1200	1Hz	Set the disturbance observer gain	run settings	effective immediately	400
F08.87	Disturbance Observation Compensation Coefficient	0~1000	1%	Compensation percentage of observed compensation value	run settings	effective immediately	0

7.3.7 Velocity Observer

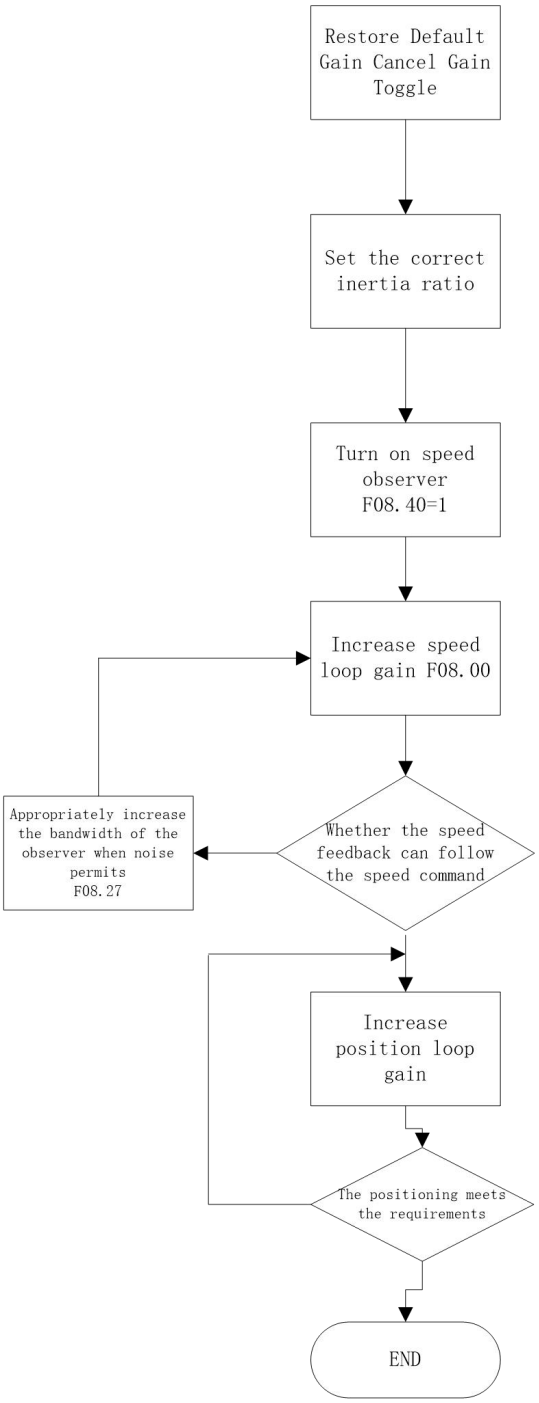
The speed observer is used to compensate for the speed feedback by observing it and is primarily suitable for applications where the load inertia changes are small. The speed observer filters the sampled values of the speed feedback, removing high-frequency noise. Additionally, it compensates for the lag caused by insufficient sampling resolution and communication delays, effectively improving the system's response capability. It also allows for an effective increase in the gain of the speed loop without introducing vibrations.

The block diagram of the speed observer is shown in the following figure:

`



Debugging steps



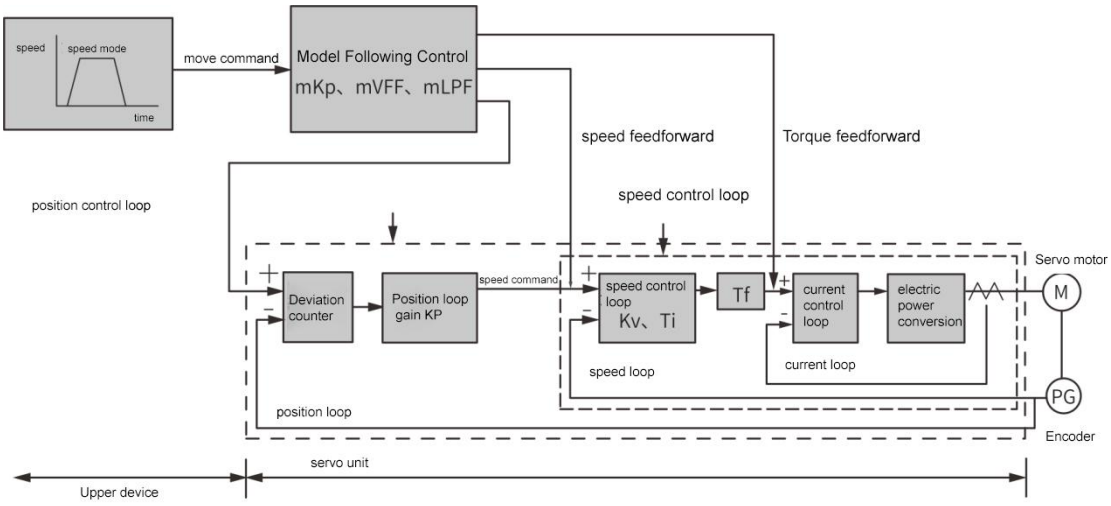
Associated parameters

parameter	name	smallest unit	setting range	Factory default	Setting method	Effective method
F08.00	speed loop gain	0.1Hz	1~20000	400	run settings	Effective immediately
F09.57	Speed observation cut-off frequency	1Hz	10~1000	120	run settings	Effective immediately
F09.58	Velocity Observed Inertia Correction	1%	10~10000	150	run settings	Effective immediately
F08.40	Enable speed observation	1	0~1	0	run settings	Effective immediately

7.3.8 Model Tracking

The model tracking control function is only applicable to position control mode, and its main purpose is to shorten the positioning time and reduce tracking errors throughout the entire tracking process.

The block diagram of the model following control is shown below:



Kp: position loop gain (F08.02)

Kv: speed loop gain (F08.00)

Ti: speed loop integral time constant (F08.01)

Tf: torque command filter time constant (F07.05)

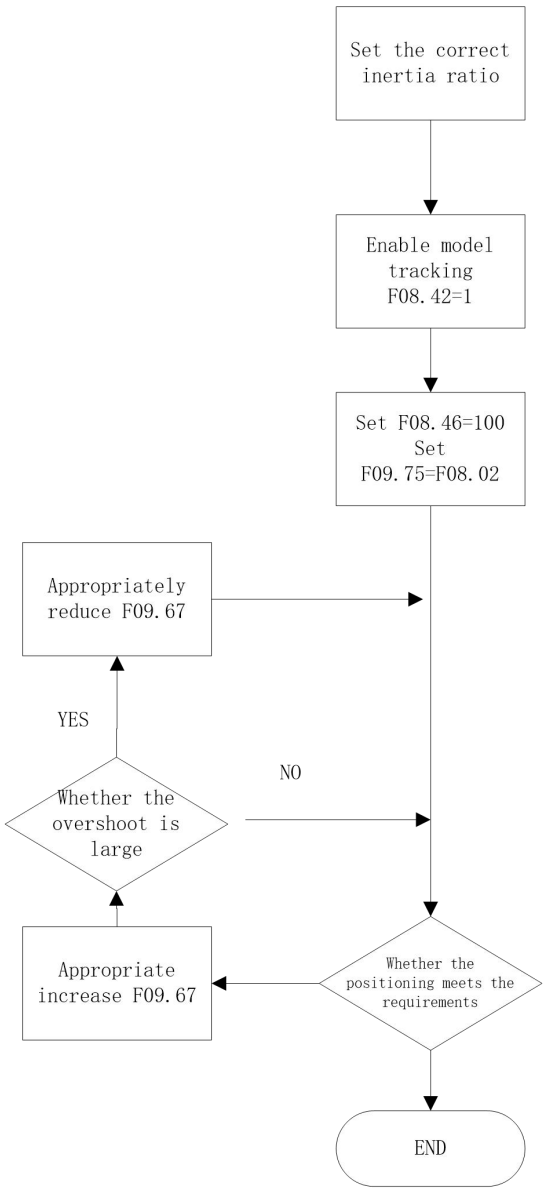
mKp: Model tracking control gain (F09.67)

Mvff: model tracking control speed feedforward compensation (F08.46)

mLPF: model filter time

Debugging steps

`



Associated parameters

parameter	name	smallest unit	setting range	Factory default	Setting method	Effective way
F08.02	Position loop gain	0.1Hz	1~1000	40	run settings	Effective immediately
F08.42	Model Control Enable	1	0~1	0	Shutdown setting	Effective immediately
F09.67	Model gain	1Hz	10~2000	40	run settings	Effective immediately
F09.68	model feedforward ratio	1%	50~200	100	run settings	Effective immediately

7.4 Parameter adjustment in different control modes

Control modes are generally divided into position mode, speed mode and torque mode, and the parameters that need to be adjusted are different in different control modes.

7.4.1 Parameter adjustment in position mode

Through inertia identification, the load inertia ratio F0 8.15 is obtained.

Gain parameters in position mode:

● First gain:

parameter	name	Function	Defaults
F07.05	Torque command filter time constant	Set the torque command filter time constant.	1.0 ms
F08.00	speed loop gain	Set the speed loop proportional gain.	40Hz
F08.01	Speed loop integral time constant	Set the integral time constant of the speed loop.	20.0ms
F08.02	Position loop gain	Set the position loop proportional gain.	40Hz

● Second gain:

parameter	name	Function	Defaults
F07.06	Second torque command filter time constant	Set torque command filter time constant	1. 0 ms
F08.03	Second speed loop gain	Set the speed loop proportional gain	40Hz
F08.04	Integral time constant of the second speed loop	Set the integral time constant of the speed loop	20.00ms
F08.05	Second position loop gain	Set the position loop proportional gain	40Hz
F08.72	Gain switching condition selection	Set the conditions for gain switching	0
F08.10	Gain switching delay time	Set the delay time for gain switching	5ms
F08.11	Gain switching level	Set the level of gain switching	100
F08.12	Gain switching level return difference	Set the gain switching level return difference	5
F08.13	Position gain switching time	Set the switching time of the position loop gain	5ms

● Common gain

parameter	name	Function	Defaults
F08.18	Speed feed-forward filter time constant	Set the filter time constant of the speed feedforward signal.	1.00ms
F08.19	speed Feedforward Gain	Set the speed feedforward gain.	0%
F06.66	Speed feedback low-pass filter time constant	time constant of the low-pass filter for speed feedback	1.00ms
F06.65	Pseudo-differential feed-forward	Sets the coefficients for the PDFF controller.	100%

`

	control coefficient		
F08.88	Torque disturbance observer gain	Set theTorque disturbance observer gain	400Hz
F08.87	Torque disturbance compensation coefficient	Set the Torque disturbance compensation coefficient	0%
F08.78	Low frequency resonance suppression mode selection	Set the mode of low frequency resonance suppression.	0
F08.79	Low frequency resonance period	Set the period of the low frequency resonance suppression filter.	0ms
F08.77	Low frequency resonance compensation coefficient	Set the compensation coefficient of the low frequency resonance suppression filter .	1 .0
F08.76	Judgment threshold of low frequency resonance position deviation	Set position fluctuations above the number of pulses to be considered low frequency resonances.	5

The initial values of the first gain (or the second gain) and the common gain are obtained through automatic gain adjustment.

Manually fine-tune the following gains:

parameter	name	Function
F07.05	Torque command filter time constant	Set the torque command filter time constant.
F08.00	speed loop gain	Set the speed loop proportional gain.
F08.01	Speed loop integral time constant	Set the integral time constant of the speed loop.
F08.02	Position loop gain	Set the position loop proportional gain.
F08.19	speed Feedforward Gain	Set the speed feedforward gain.

7.4.2 Parameter adjustment in speed mode

The parameter adjustment in the speed control mode is the same as that in the position control mode, except for the position loop gain (F08.02, F08.05) . Refer to 7.4.1

7.4.3 Parameter adjustment in torque mode

The parameter adjustment in torque control mode needs to be distinguished according to the following situations:

● When the actual speed reaches the speed limit value, the adjustment method is the same as "7.4.2 Parameter adjustment in speed mode ".

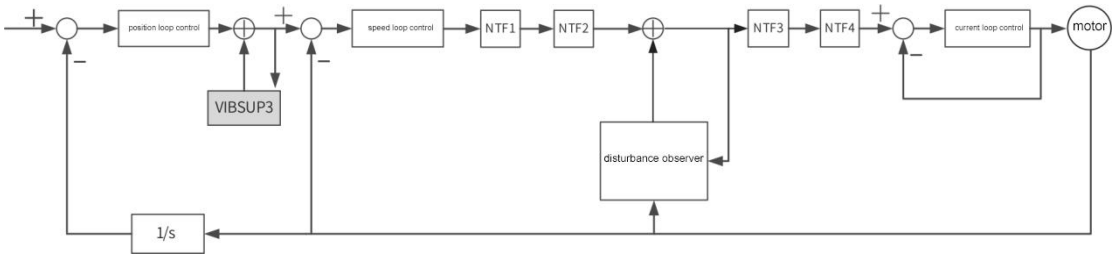
● The actual speed does not reach the speed limit value, except for the position speed loop gain and the speed loop integral time constant, the adjustment method is the same

`

"7.4.2 Parameter adjustment in speed mode ".

7.5 Vibration suppression

The block diagram for vibration suppression is shown below:



in:

● NTF1~4: 1st to 4th notch filter.

● VIBSUP3: medium and low frequency vibration suppression.

● 1/s: Integral link.

☆Associated parameters:

parameter	name	Factory default	unit	minimum value	maximum value	Setting method	Effective way
F08.53	Medium and low frequency vibration suppression frequency	100	Hz	50	2000	run settings	Effective immediately
F08.54	Medium and low frequency vibration suppression damping coefficient	150	1%	0	300	run settings	Effective immediately
F08.56	Medium and low frequency vibration suppression compensation coefficient	100	1%	0	1000	run settings	Effective immediately

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●Medium and low frequency vibration suppression frequency: Set the vibration frequency that needs to be suppressed.

●Medium and low frequency vibration suppression damping coefficient: Set the damping percentage of medium and low frequency vibration suppression.

●Medium and low frequency vibration suppression compensation coefficient: set the compensation percentage of medium and low frequency vibration.

`

7.5.1 Mechanical resonance suppression

The mechanical system has a certain resonant frequency. When the servo gain increases, resonance may occur near the mechanical resonant frequency, resulting in the gain not being able to continue to increase.

There are two ways to suppress mechanical resonance: torque command filter (F07.05) and notch filter.

Torque command filtering (F07.05)

By setting the filter time constant, the torque command is attenuated in the high-frequency band above the cut-off frequency to achieve the purpose of suppressing mechanical resonance.

Filter cutoff frequency fc(Hz)=1÷[2π× F07.05(ms)×0.001].

Notch filter

A notch filter suppresses mechanical resonance by reducing the gain at a specific frequency. After the notch filter is set correctly, the vibration can be effectively suppressed, and you can try to continue to increase the servo gain. The principle of the notch filter is shown in the figure below.

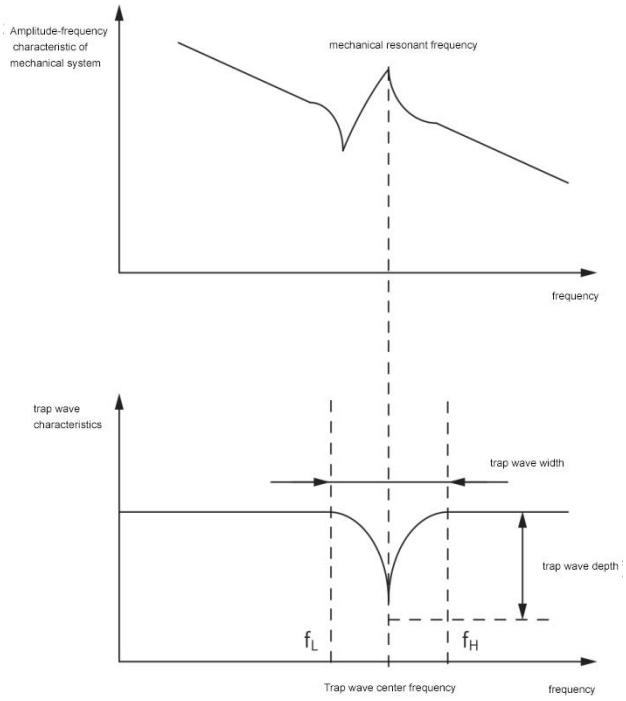

Figure 7-13 Suppression principle of notch filter

There are 4 sets of notch filters in the servo drive, and each set of notch filters has 3 parameters, which are notch filter frequency, width level and depth level. The third and fourth groups of notch filters are manual notch filters, and the parameters are manually set by the user; the first and second groups of notch filter parameters can be set manually or configured as an adaptive notch filter (bit0 and bit1 of F09.97 are respectively configured as 1), at this time each parameter is automatically set by the driver.

Table 7-9 Description of notch filter parameters

`

project	Manual/adaptive notch filter		Manual/adaptive notch filter	
	The first set of notch filters	The second set of notch filters	The third set of notch filters	The fourth set of notch filters
frequency	F09.12	F09.15	F09.18	F09.21
Quality factor	F09.13	F09.16	F09.19	F09.22
Depth level	F09.14	F09.17	F09.20	F09.23

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●When "Frequency" is the default value of 5000Hz, the notch filter is invalid.

● If the notch filter needs to be used due to resonance, please use the adaptive notch filter first. Adaptive notch filter not working or not working well, try manual notch filter again

Figure 7-14 Steps for using the notch filter

● Steps to use adaptive notch filter:

1.Set F09.97 (Adaptive Notch Filter Mode Selection) to 1 or 3 based on the number of resonance points. When the 0th bit is configured as 1, the first group of adaptive notch filters is activated. When the 1st bit is configured as 1, the second group of adaptive notch filters is activated.

2. When resonance occurs, you can first set the 0th bit of F09.97 to 1, enabling one adaptive notch filter. After adjusting the gain, if a new resonance occurs, you can then set the 1st bit of F09.97 to 1, activating two adaptive notch filters.

3. During servo operation, the parameters of the first or second set of notch filters are automatically updated. If resonance is effectively suppressed, indicating the success of the adaptive notch filters, you can wait for the servo to run stably for a period of time. Then, when F09.02 is set to 0, the parameters of the adaptive notch filters are fixed to the last updated values. This step prevents incorrect parameter values from being updated due to inadvertent actions during servo operation, which could exacerbate vibrations. When the 4th bit of F09.97 is set to 1, the parameters of the first set of adaptive notch filters are automatically saved and switched to manual notch filters after successfully detecting and suppressing vibrations. Similarly, when the 5th bit of F09.97 is set to 1, the parameters of the second set of adaptive notch filters are automatically saved and switched to manual notch filters after successfully detecting and suppressing vibrations. By configuring these two bits, the adaptive notch filters can be automatically deactivated after suppressing the vibration points.

4. If the vibration cannot be eliminated for a long time, please turn off the servo enable in time.

5. If there are more than 2 resonance frequencies, the adaptive notch filter cannot meet the demand, and the manual notch filter can be used at the same time. It is also possible to use all 4 notch filters as manual notch filters (F09.97=0).

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● When using the adaptive notch filter, if the servo enable is OFF within 30 minutes, the notch filter parameters will not be stored in the corresponding parameters.

● When the resonance frequency is below 300Hz, the effect of the adaptive notch filter will be reduced.

● Steps to use the manual notch filter:

1. Analyze the resonance frequency.

2. When using a manual notch filter, it is necessary to set the frequency of the notch filter to the actual resonance frequency. How to get resonance frequency:

■ Obtained from "Mechanical Characterization Analysis" of the FRECON Drive Commissioning Platform.

■ Calculate the resonant frequency from the phase current of the motor displayed on the oscilloscope interface of the FRECON drive debugging platform.

■ By setting F09.97 to enable the adaptive notch filters, during servo operation, the resonance frequency is automatically tested and the test results are saved in F09.12 and F09.15.

3. Input the resonance frequency obtained in step 1 into the notch filter parameters of the selected group, and input the width

`

level and depth level of the notch filter in this group at the same time.

4. If the resonance is suppressed, it means that the notch filter has achieved the effect, you can continue to adjust the gain, after the gain is increased, if there is a new resonance, repeat steps 1~2.

5. If the vibration cannot be eliminated for a long time, please turn off the servo enable in time.

● Notch filter width class

The notch filter width grade is used to express the ratio of the notch filter width to the center frequency of the notch filter:

$$\text{Notch Filter Width Grade} = \frac{f_H - f_L}{f_T}$$

Figure 7-15

in:

f T : The center frequency of the notch filter, that is, the mechanical resonance frequency.

f H - f L : The width of the notch filter, indicating - the frequency bandwidth of the amplitude attenuation rate of 3dB relative to the center frequency of the notch filter. The corresponding relationship is shown in the figure below. Generally keep the default value of 2.

● Notch filter depth level

The notch filter depth level represents the ratio between the input and output at the center frequency. When the notch filter depth level is set to 0, the input can pass through completely at the center frequency. When the notch filter depth level is set to 60, the input is mostly blocked at the center frequency. Therefore, as the notch filter depth level is increased, the depth of the notch becomes deeper, resulting in stronger suppression of mechanical resonance. However, this may also lead to system instability, so caution should be exercised when using higher depth levels.

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If there is no obvious peak in the amplitude-frequency characteristic curve obtained by using the mechanical characteristic analysis tool, and vibration actually occurs, the vibration may not be mechanical resonance, but caused by reaching the limit gain of the servo. This kind of vibration cannot be suppressed by the notch filter, it can only be improved by reducing the gain or reducing the filter time of the torque command.

The specific corresponding relationship is shown in the figure below:

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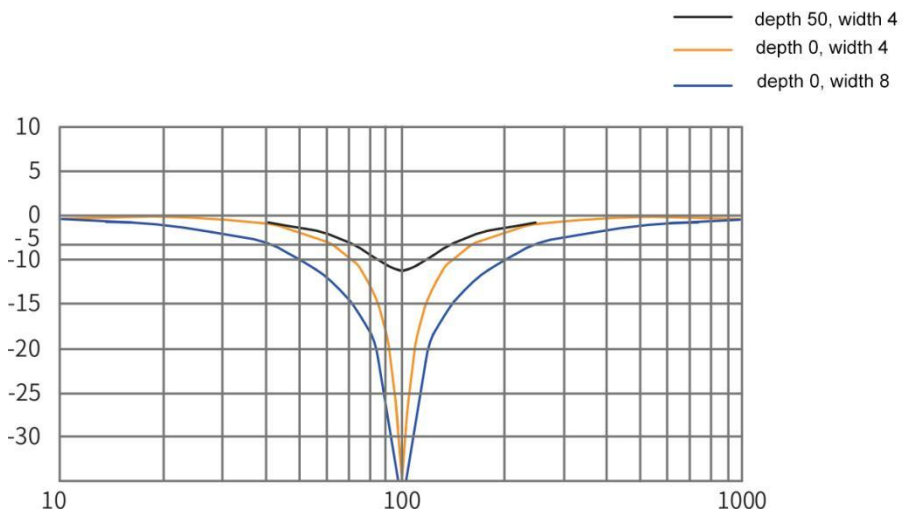

Figure 7-16 Notch Filter Frequency Characteristics

☆Associated parameters:

parameter	name	setting range	Function	Setting method	effective time	factory setting
F09.97	Adaptive notch filter mode selection	When Bit0 is set to 1, the first group of adaptive notch filter parameters are updated in real time according to the vibration situation. When Bit1 is set to 1, the second group of adaptive notch filters is valid, and the parameters are updated in real time according to the vibration situation. When Bit4 is set to 1, the first group of adaptive notch filters successfully detects and suppresses the vibration, automatically saves the vibration suppression related parameters and exits the adaptive mode. When Bit5 is set to 1, the second group of adaptive notch filters successfully detects and suppresses the vibration, automatically saves the vibration suppression related parameters and exits the adaptive mode.	Set the mode of the adaptive notch filter	run settings	Effective immediately	0
F09.12	The first set of notch filter frequencies	50~5000	Set the frequency of the first set of	run settings	Effective immediately	5000

			notch filters			
F09.13	First set of notch filter width grades	1~100	Sets the width level of the first set of notch filters	run settings	Effective immediately	7
F09.14	First set of notch filter depth grades	0~60	Set the attenuation level of the first set of notch filters	run settings	Effective immediately	0
F09.15	Second set of notch filter frequencies	50~5000	Set the frequency of the second set of notch filters	run settings	Effective immediately	5000
F09.16	Second set of notch filter quality factor	1~100	Sets the width level of the second set of notch filters	run settings	Effective immediately	7
F09.17	Second set of notch filter depth grades	0~60	Set the attenuation level of the second set of notch filters	run settings	Effective immediately	0
F09.18	The third set of notch filter frequencies	50~5000	Set the frequency of the third set of notch filters	run settings	Effective immediately	5000
F09.19	The third set of notch filter quality factor	1~100	Sets the width level of the third set of notch filters	run settings	Effective immediately	7
F09.20	The third set of notch filter depth grades	0~60	Set the attenuation level of the third set of notch filters	run settings	Effective immediately	0

F09.21	The fourth set of notch filter frequencies	50~5000	Set the frequency of the fourth notch filter	run settings	Effective immediately	5000
F09.22	The fourth set of notch filter quality factor	1~100	Set the width level of the fourth set of notch filters	run settings	Effective immediately	7
F09.23	The fourth set of notch filter depth grades	0~60	Set the attenuation level of the fourth set of notch filters	run settings	Effective immediately	0

7.5.2 Tail end low frequency suppression

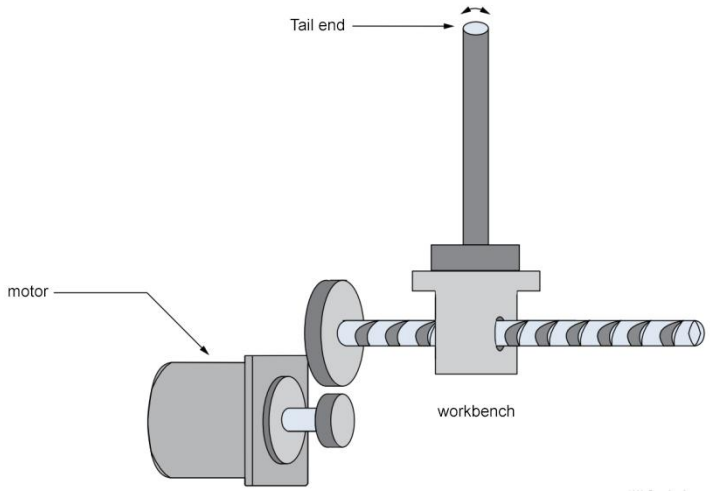

Figure 3-17Schematic diagram of the low-frequency vibration mechanism at the tail end

If the end of the mechanical load is long and heavy, it is prone to end vibration during emergency stop, which will affect the positioning effect. The frequency of this kind of vibration is generally within 100Hz, which is lower than the mechanical resonance frequency in "7.5.1 Mechanical resonance suppression" , so it is called low - frequency resonance. This vibration can be effectively reduced by the low-frequency resonance suppression function.

First, set F08.78 to 2, the driver will find the resonance frequency by itself, and observe the suppression effect, if it is not obvious, you can increase the value of F08.77 . Or use the oscilloscope function of the FRECONdrive debugging platform to collect the waveform of the position deviation of the motor in the positioning state, and calculate the fluctuation period of the position deviation , which is the low-frequency resonance period ; then, manually input F08.79 (low-frequency resonance period). Observe that after using the low-frequency resonance suppression filter, the low-frequency resonance suppression is

effective.

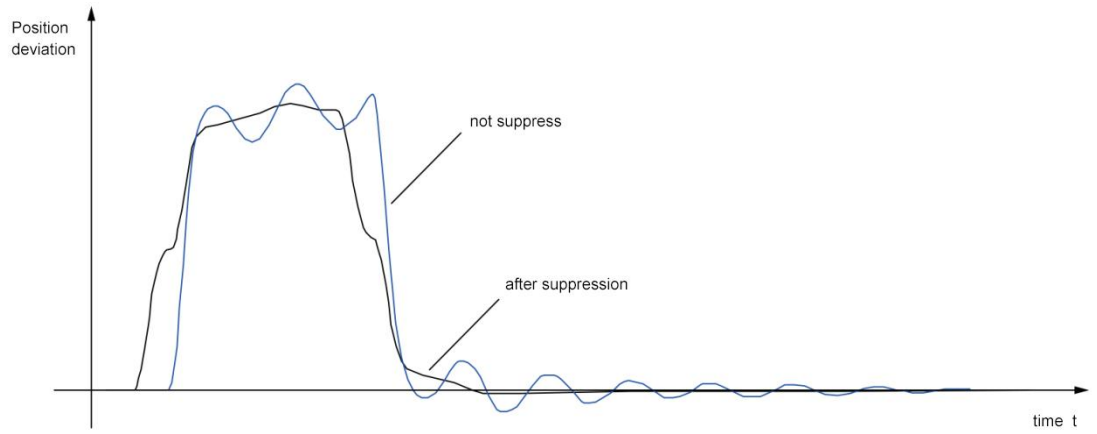

Figure 3-19 Low -frequency resonance suppression effect diagram

☆Associated parameters:

parameter	name	setting range	unit	Function	Setting method	Effective way	factory setting
F08.78	Tail end shake suppression switch	0 ~2		0-invalid 1-Manually set the vibration period 2-Automatic identification of vibration cycle	run settings	Effective immediately	0
F08.79	Tail end bassProduction cycle	0~1000	Ms	Set the period of low frequency resonance suppression	run settings	Effective immediately	0
F08.77	Tail end low-frequency suppression period	1.0~1000	0.1	Set the low frequency resonance suppression level	run settings	Effective immediately	1.0

Chapter 8 Troubleshooting

8.1 Fault and warning handling during run

8.1.1 List of faults and warnings

Fault and Warning Classification

The faults and warnings of the servo drive are graded according to the degree of severity, which can be divided into threelevels,category 1, category 2, category 3, serious, etc.Level: Category 1 > Category 2 > Category 3, the specific classification is as follows:

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●Type 1 (referred to as NO.1) Non-resettable faults.

● Type 1 (referred to as NO.1) reset faults.

● Type 2 (referred to as NO.2) reset faults.

● Type 3 (referred to as NO.3) reset warning.

Among them, "resettable" means that the panel stops the fault display state by giving a "reset signal".

Specific operation: Use DI function 2 (FunIN.2: ALM - RST, fault and warning reset) and set it to be logically valid to stop the fault display on the panel.

● Reset method for No.1 and No.2 resettable faults: first turn off the servo enable signal (S - ON is set to OFF), and then use DI function 2.

● Reset method of NO.3 resettable warning: use DI function 2.

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● For some faults or warnings, it can only be reset after the cause has been eliminated by changing the settings, but resetting does not mean that the changes will take effect.

● For changes that need to be powered on again ((L1, L2/L1 L2 L3/L1C L2C)), the control power must be turned on again.

● For changes that require a shutdown to take effect, the servo enable must be turned off. After the change takes effect, the servo drive can run normally.

☆Associated function number:

coding	name	function name	Function
FunIN.2	ALM- RST	Fault and warning reset signals	According to the type of alarm, the servo can continue to work after some alarms are reset. When assigned to low-speed DI, the effective level change must be kept for more than 3ms, otherwise the fault reset function will be invalid. Do not assign the fault reset function to the fast DI, otherwise the function will be invalid. ● invalid, does not reset faults and warnings. ● valid,, resets faults and warnings.

Fault and warning records

The servo drive has a fault record function, which can record the name of the latest 10 faults and warnings and the state parameters of the servo drive when the fault or warning occurs. If repeated faults or warnings have occurred for the last 5 times, the fault or warning code and drive status will only be recorded once.

After the fault or warning is reset, the fault record will still save the fault and warning. Use "system parameter initial function" (F02.31=1or 2) to clear fault and warning records.

By monitoring the parameter F0b.33, you can select the number n of faults or warnings from the current fault. F0b.34 can check the n+1th fault or warning name, and F0b.35~ F0b.42 can check the corresponding n+1th fault or warning name. It is

`

the state parameter of the servo drive when a fault or warning occurs. For details of the parameters, please refer to "Parameter Description". When no fault occurs, F0b.34 on the panel will display "Er.000".

When viewing F0b.34 (n+1 fault or warning name) through the panel, the panel displays "Er.xxx", and "xxx" is the fault or warning code;When reading F0b.34 through the FRECON drive debugging platform software or communication, the decimal data of the code is read, which needs to be converted into hexadecimal data to reflect the real fault or warning code, forexample:

The panel displays fault or warning "Er.xxx"	F0 b.34 (hexadecimal)	illustrate
Er.101	0101	0: Type 1 non-reset fault 101: Fault code
Er.130	2130	2: Type 1 reset fault 130: fault code
Er.121	6121	6: Type 2 reset fault 121: Fault code
Er.110	E110	E: Type 3 reset warning 110: warning code

List of faults and warnings

The servo drive can output the current highest level fault or warning code.

"Fault code output" refers to setting the three DO terminals of the servo drive to DO functions 12, 13, and 14, among which FunOUT.12: ALMO1 (the first digit of the alarm code, AL1 for short), FunOUT.13: ALMO2 (alarm The second digit of the code, referred to as AL2), FunOUT.14: ALMO3 (the third digit of the alarm code, referred to as AL3). When different faults occur, the levels of the 3 DO terminals will change.

Table 8-1 Category 1 (NO.1) non-resettable fault list

show	fault name	Fault type	Can it be reset	coded output		
				AL3	AL2	AL1
Er.101	The internal parameters of the servo are abnormal	NO.1	no	1	1	1
Er.102	Programmable Logic Fault	NO.1	no	1	1	1
Er.103	Programmable Logic Device Verification Error	NO.1	no			
Er.108	Parameter storage failure	NO.1	no	1	1	1
Er.109	software security check error	NO.1	no			
Er.120	product match failure	NO.1	no	1	1	1
Er.124	Auxiliary encoder setting error	NO.1	no			
Er.126	Power board communication failure	NO.1	no			
Er.136	The data verification error in the motor ROM or the parameters are not stored	NO.1	no	1	1	1

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Er.201	Overcurrent 2	NO.1	no	1	1	0
Er.611	overtorque	NO.1	no			
Er.627	Dynamic braking failure	NO.1	no			
Er.653	Module temperature alarm	NO.1	no			
Er.735	Encoder multi-turn count overflow	NO.1	no	1	1	1
Er.739	Encoder identification error	NO.1	no			
Er.740	Encoder interference	NO.1	no	1	1	1
Er.741	Pulse encoder signal error	NO.1	no			
Er.742	Pulse encoder count error	NO.1	no			
Er.743	Pulse encoder Z signal lost	NO.1	no			
Er.744	Encoder overspeed	NO.1	no			
Er.745	Encoder overheating	NO.1	no			
Er.800	Current sampling error	NO.1	no			
Er.A33	Encoder data exception	NO.1	no	0	1	0
Er.A34	Encoder loopback verification exception	NO.1	no	0	1	0
Er.A35	Encoder frame data error	NO.1	no			
Er.A36	Encoder EEPROM read error	NO.1	no			

Table 8-2 Type 1 (NO.1) reset fault table

show	fault name	Fault type	Can it be reset	coded output		
				AL3	AL2	AL1
Er.207	D/Q axis current overflow fault	NO.1	yes	1	1	0
Er.400	Main circuit voltage overvoltage	NO.1	yes	0	1	1
Er.410	Main circuit voltage undervoltage	NO.1	yes	0	1	1
Er.500	excessive speed	NO.1	yes	0	1	0
Er.610	drive overload	NO.1	yes	0	0	0
Er.620	Motor overload	NO.1	yes	0	0	0
Er.650	radiator overheating	NO.1	yes	0	0	0
Er.B00	Position deviation is too large	NO.1	yes	1	0	0
Er.B01	Position error overflow	NO.1	yes			

Table 8-3 Type 2 (NO.2) reset fault list

show	fault name	Fault type	Can it be reset	coded output		
				AL3	AL2	AL1
Er.420	Main circuit electrical phase loss	NO.2	yes	1	1	1
Er.430	Control voltage undervoltage	NO.2	yes	0	1	1
Er.660	Excessive vibration	NO.2	yes	0	0	0
Er.731	Encoder battery failure	NO.2	yes	1	1	1
Er.939	Motor power line disconnected	NO.2	yes	1	0	0

Table 8-4 Type3 (NO.3) resettable warning table

show	fault name	Fault type	Can it be reset	coded output		
				AL3	AL2	AL1
Er.651	fan failure	NO.3	yes			
Er.652	Module temperature warning	NO.3	yes			

`

Er.730	Encoder battery warning	NO.3	yes	1	1	1
Er.920	Brake resistor overload	NO.3	yes	1	0	1
Er.924	Bleed pipeover temperature warning	NO.3	yes	1	0	1
Er.950	forward overtravel warning	NO.3	yes	0	0	0
Er.952	reverse overtravel warning	NO.3	yes	0	0	0
Er.954	Drive disabled exception	NO.3	yes			

8.1.2 Common troubleshooting methods

● Er.100: Communication handshake between FPGA and MCU is abnormal

cause of occurrence:

■ FPGA or MCU-related hardware is damaged, resulting in the inability to establish communication between MCU and FPGA.

reason	confirmation method	Treatment measures
The communication handshake between FPGA and MCU is abnormal	The fault is still reported after turning on the power several times.	Replace the servo drive.

●Er.103: PLD verification error

cause of occurrence:

The verification of the communication content between MCU and FPGA is wrong.

reason	confirmation method	Treatment measures
FPGA and MCU communication content verification error	The fault is still reported after turning on the power several times.	Replace the servo drive.

● Er.108: Parameter storage failure

cause of occurrence:

■ Unable to write parameter value to EEPROM.

■ Unable to read parameter value from EEPROM.

reason	confirmation method	Treatment measures
1. Parameter writing is abnormal.	After changing a parameter, power on again, check See if the parameter value is saved.	Not saved, and the fault still occurs after multiple power-on, the drive needs to be replaced.
2. Parameter reading is abnormal.		

● Er.109: Software safety check error

cause of occurrence:

Non-manufacturer's official factory products

reason	confirmation method	Treatment measures
Software security verification failed	The fault is still reported after turning on the power several times.	Contact the manufacturer

● Er.120: Product matching failure

cause of occurrence:

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The rated current of the motor is greater than the rated current of the drive.

reason	confirmation method	Treatment measures
2. The power level of the motor and the drive does not match.	Confirm whether the driver model (F01.02) matches the bus motor model (F00.05).	Replace mismatched product.

● Er.124: Auxiliary encoder setting error

cause of occurrence:

Servo auxiliary encoder is not turned on

reason	confirmation method	Treatment measures
1. The auxiliary encoder is not turned on	F02.68 The encoder selected by the driver axis associated encoder setting parameter is not associated with the current axis	Check the following parameter settings F02.66 2nd encoder related servo selection parameter F02.67 3rd encoder related servo selection parameter

● Er.126: Power board communication failure

cause of occurrence:

The drive fails to obtain power board information

reason	confirmation method	Treatment measures
1. The connection between the main control board and the power board is faulty	Fault is still reported after checking the connecting wires and terminals	The drive needs to be replaced.
2. The link between the main control board and the power board is faulty	Fault still reported after turning on the power several times	drive needs to be replaced

● Er.136: The data verification error in the ROM of the motor encoder or the parameters are not saved

cause of occurrence:

When the driver reads the parameters in the ROM area of the encoder, it finds that the parameters are not stored, or the parameter setting values are wrong.

reason	confirmation method	Treatment measures
1. The parameters in the ROM area of the encoder are wrong .	Check the relevant parameters of the motor to see if they correspond to the nameplate of the motor .	If a parameter error is found, the relevant motor parameters must be rewritten .

● Er.201: Overcurrent 2

cause of occurrence:

Hardware detected overcurrent.

reason	confirmation method	Treatment measures

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2. The braking resistor is too small or short-circuited.	● If the built-in braking resistor is used (F02.25=0), confirm whether P⊕ and D are reliably connected with wires, and if so, measure the resistance value between C and D. ● If an external braking resistor is used (F02.25=1/2), measure the resistance value of the external braking resistor between P⊕ and C. ● Please refer to "SD300P Series Servo Selection Manual" for the braking resistor specifications.	● If the built-in braking resistor is used and the resistance value is "0", adjust to use an external braking resistor (F02.25=1/2), and remove the wire between P⊕ and D. The resistance and power of the resistor can be selected from The specifications of the built-in braking resistors are the same. ● If an external braking resistor is used, the resistance value is less than F02.21. For the specification of the braking resistor, please refer to "SD300P Series Servo Selection Manual". Replace with a new resistor and reconnect it between P⊕ and C. ● Be sure to set F02.26 (power of external braking resistor) and F02.27 (resistance value of external braking resistor) to be consistent with the parameters of the actual external braking resistor.
3. The motor cable is in poor contact.	Check whether the connections at both ends of the drive power cable and the UVW side of the drive in the motor cable are loose.	Tighten any loose or disconnected wires.
4. Ground the motor cable.	After making sure that the drive power cable and motor cable are firmly connected, measure whether the insulation resistance between the UVW terminal of the drive and the ground wire (PE) is in the mega-ohm (MΩ) level.	Replace the motor when the insulation is bad.
5. Motor UVW cableshort circuit.	Unplug the motor cable, check whether there is a short circuit between the UVW and the motor cable, and whether there is a burr in the wiring.	Connect the motor cables correctly.
6. The motor is burnt out.	Unplug the motor cable and measure whether the resistance between U and V,W of the motor cable is balanced.	If unbalanced, replace the motor.
9. Drive failure.	Unplug the motor cable, power on again and still report fault.	Replace the servo drive.

● Er.611: Overtorque

cause of occurrence:

Drive detects torque output overload

reason	confirmation method	Treatment measures
1. An unexpected load increase occurs	Check mechanical load	Adjust the appropriate load

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2. The torque output overload detection parameter setting is abnormal	check parameters	Check the following parameter settings: F0A.50 forward torque overload alarm threshold F0A.50 reverse torque overload alarm threshold F0A.50 torque overload alarm duration threshold

● Er.627: Dynamic braking fault

cause of occurrence:

Onboard dynamic brake relay status error

reason	confirmation method	Treatment measures
The state of the onboard dynamic brake relay is inconsistent with the expected control state	The fault is still reported after turning on the power several times.	Replace the servo drive.

● Er.653: Module temperature alarm

cause of occurrence:

Drive module temperature too high

reason	confirmation method	Treatment measures
1. The ambient temperature is too high.	Measure the ambient temperature.	Improve the cooling conditions of the servo drive and reduce the ambient temperature.
2. After overload, reset the overload fault by turning off the power, and repeat it several times.	Check the fault record (set F0b.33, check F0b.34), whether there is an overload fault or warning (Er.610,Er.620, Er.630, Er.650, Er.909, Er.920, Er. 922).	Change the fault reset method, wait for 30s after overloading and then reset. Increase the drive and motor capacity, increase the acceleration and deceleration time, and reduce the load.
3. The fan is broken.	Whether the fan is running during operation.	Replace the servo drive.
4. The installation direction of the servo driver and the distance between it and other servo drivers are unreasonable.	Confirm whether the installation of the servo driver is reasonable.	Install according to the installation standard of the servo drive.
5. The servo driver is faulty.	After 5 minutes of power failure and restarting, the failure is still reported.	Replace the servo drive.

● Er.735: Encoder multi-turn count overflow

cause of occurrence

The drive reads that the multi-turn count overflow detection flag inside the encoder is set

reason	confirmation method	Treatment measures
Encoder multi-turn count overflow	F0A.36	

● Er.739: Encoder identification error

cause of occurrence

The drive automatically recognizes the encoder type error

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reason	confirmation method	Treatment measures
1. Encoder wiring error	Check encoder wiring	The encoder is wired correctly
2. The encoder type does not support	Confirm whether the encoder type supports	Change the encoder type in the encoder support list

● Er.740: Encoder interference

cause of occurrence:

Encoder communication error.

reason	confirmation method	Treatment measures
1. The encoder wiring is wrong.	Check encoder wiring.	Rewire according to the correct wiring diagram.
2. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
3. Encoder failure.	Replace the encoder cable that can be used normally. If the fault does not occur after the replacement, it means that the original encoder cable is damaged.	Replace the normal encoder cable. If not, the encoder itself has a big problem, and the servo motor needs to be replaced.

● Er.741: Pulse encoder signal error

cause of occurrence:

Pulse encoder signal error

reason	confirmation method	Treatment measures
1. The encoder wiring is wrong.	Check encoder wiring.	Rewire according to the correct wiring diagram.
2. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
3. Poor grounding or interference	Check ground wires and sources of interference	Properly grounded and away from sources of interference
4. Encoder failure.	Replace the encoder cable that can be used normally. If the fault does not occur after the replacement, it means that the original encoder cable is damaged.	Replace the normal encoder cable. If not, the encoder itself has a big problem, and the servo motor needs to be replaced.

● Er.742: Pulse encoder counting error

cause of occurrence:

Pulse encoder count error

reason	confirmation method	Treatment measures
1. The encoder wiring is wrong.	Check encoder wiring.	Rewire according to the correct wiring diagram.
2. The encoder cable is	Check whether the on-site vibration is too	Rewire and make sure the encoder terminals are

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loose.	large, causing the encoder cable to loosen, or vibration damages the encoder.	firmly connected.
3. Poor grounding or interference	Check ground wires and sources of interference	Properly grounded and away from sources of interference
4. Encoder failure.	Encoder lines and poles are wrong Encoder Z signal error Encoder damaged	Replace the encoder or need to replace the servo motor.

● Er.743: Pulse encoder Z signal lost

cause of occurrence:

Pulse encoder Z signal lost

reason	confirmation method	Treatment measures
1. Encoder failure.	Check the encoder Z signal.	Replace encoder.
2. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
3. Encoder signal receiving circuit failure	The fault is still reported after turning on the power several times.	Replace the servo drive

● Er.744: Encoder overspeed

cause of occurrence:

The drive reads that the internal overspeed detection flag of the encoder is set

reason	confirmation method	Treatment measures
The motor rotation speed exceeds the encoder internal overspeed detection threshold		

● Er.745: Encoder overheating

cause of occurrence:

The driver reads that the internal overheating detection flag of the encoder is set

reason	confirmation method	Treatment measures
Encoder internal temperature exceeds detection threshold		

● Er.800: Current sampling error

cause of occurrence:

The drive reads the three-phase current sampling value abnormally

reason	confirmation method	Treatment measures
1. The connecting line between the main control board and the power board is faulty	Fault is still reported after checking the connecting wires and terminals	Replace the servo drive.
2. Current sampling part of the circuit	The fault is still reported after turning	Replace the servo drive.

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failure	on the power several times.	

● Er.A33: Encoder data is abnormal

cause of occurrence:

The internal counting of the encoder is abnormal.

reason	confirmation method	Treatment measures
1. The serial encoder counts incorrectly.	If the fault is still reported after turning on the power several times, the encoder is faulty.	Replace the servo motor.

● Er.A34: Encoder feedback verification exception

cause of occurrence:

The encoder feedback data verification is abnormal.

reason	confirmation method	Treatment measures
1. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
2. Encoder failure.	Replace the encoder cable that can be used normally. If the fault does not occur after the replacement, it means that the original encoder cable is damaged.	Replace the normal encoder cable. If not, the encoder itself has a big problem, and the servo motor needs to be replaced.

● Er.A35: encoder frame data error

cause of occurrence:

Encoder returns data frame error.

reason	confirmation method	Treatment measures
1. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
2. Encoder failure.	Replace the encoder cable that can be used normally. If the fault does not occur after the replacement, it means that the original encoder cable is damaged.	Replace the normal encoder cable. If not, the encoder itself has a big problem, and the servo motor needs to be replaced.

● Er.A36: Encoder EEPROM reading error

cause of occurrence:

Encoder EEPROM read error.

reason	confirmation method	Treatment measures
1. The encoder cable is loose.	Check whether the on-site vibration is too large, causing the encoder cable to loosen, or vibration damages the encoder.	Rewire and make sure the encoder terminals are firmly connected.
2. Encoder EEPROM failure.	Replace the encoder cable that can be used normally. If the fault does not occur after the replacement, it means that the original encoder cable is damaged.	Replace the normal encoder cable. If not, the encoder itself has a big problem, and the servo motor needs to be replaced.

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●Er.400: main circuit overvoltage

cause of occurrence:

The DC bus voltage between P⊕ and N⊖ exceeds the fault value:

■ 220V driver: normal value: 310V, fault value: 420V.

■ 380V driver: normal value: 540V, fault value: 760V.

reason	confirmation method	Treatment measures
1. Main circuit input voltage too high.	Check the drive input power specifications, and measure whether the input voltage on the drive side of the main circuit cable meets the following specifications: ● 220V driver: ● Effective value: 220V - 240V ● Allowable deviation: -10%~+10%(198V~264V) ● 380V driver: ● Effective value: 380V - 440V ● Allowable deviation: -10%~+10% (342V~484V)	Replace or adjust the power supply according to the specifications on the left.
2. The power supply is in an unstable state, or has been affected by lightning.	Monitor whether the drive input power is affected by lightning strikes, measure whether the input power is stable, and meet the above specifications.	After connecting the surge suppressor, then connect the control power and the main circuit power. If the failure still occurs, replace the servo driver.
3. The braking resistor fails.	● If the built-in braking resistor is used (F02.25=0), confirm whether P⊕ and D are reliably connected with wires, and if so, measure the resistance value between C and D. ● If an external braking resistor is used (F02.25=1/2), measure the resistance value of the external braking resistor between P⊕ and C. ● Please refer to the "Selection Manual" for the specifications of the braking resistor.	● If the resistance value is "∞" (infinity), the braking resistor is internally disconnected. ● If the built-in braking resistor is used, adjust it to use an external braking resistor (F02.25=1/2), and remove the wire between P⊕ and D, and the resistance value of the resistor can be selected to be consistent with the built-in braking resistor,The power of the resistor must not be less than the built-in braking resistor. ● If an external braking resistor is used, replace it with a new one and reconnect it between P⊕ and C. ● Be sure to set F02.26 (power of external braking resistor) and F02.27 (resistance value of external braking resistor) to be consistent with the parameters of the actual external braking resistor.

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4. The resistance value of the external braking resistor is too large, and the maximum braking energy cannot be completely absorbed.	Measure the resistance value of the external braking resistor between P⊕ and C, and compare it with the recommended value.	Replace the external braking resistor with the recommended value, and reconnect it between P⊕ and C. Be sure to set F02.26 (power of external braking resistor) and F02.27 (resistance value of external braking resistor) to be consistent with the parameters of the actual external braking resistor.
5.The motor is running in the state of rapid acceleration and deceleration, and the maximum braking energy exceeds the absorbable value.	Confirm the acceleration and deceleration time during operation, measure the DC bus voltage between P⊕ and NΘ, and confirm whether the voltage exceeds the fault value during the deceleration section.	First, ensure that the input voltage of the main circuit is within the specification range, and second, increase the acceleration and deceleration time if allowed.
6. There is a large deviation in the sampling value of the bus voltage.	Observe whether the parameter F0b.26 (bus voltage value) is in the following range: ● 220V drive: F0b.26 > 420V ● 380V drive: F0b.26 > 760V Check if the detected DC bus value between P⊕ and NΘ is close to the displayed value of F0b.26.	Consult our technical support.
7. The servo driver is faulty.	After several times of power off, the main circuit power was reconnected, and the failure was still reported.	Replace the servo drive.

● Er.410: main circuit undervoltage

cause of occurrence:

DC bus voltage below fault value:

■ 220V driver: normal value: 310V, fault value: 200V.

■ 380V driver: normal value: 540V, fault value: 380V.

reason	confirmation method	Treatment measures
1. The main circuit power supply is unstable or power loss.	Check the drive input power supply specifications, and measure whether the input voltage of the non-driver side and the drive side of the main circuit cable meet the following specifications: ● 220V driver: ● Effective value: 220V - 240V ● Allowable deviation: - 10%~+10%(198V~264V) ● 380V driver: ● Effective value: 380V - 440V ● Allowable deviation: - 10%~+10%(342V~484V) All three phases need to be measured.	Increase power capacity
2. Power outage occurs instantaneously.		

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3. The power supply voltage decreases during operation.	Monitor the input power supply voltage of the drive, and check whether other settings are turned on too much for the power supply of the same main circuit, resulting in insufficient power supply capacity and voltage drop.	
4. In case of phase loss, the drive that should be input with 3-phase power supply actually operates with single-phase power supply.	Check whether the wiring of the main circuit is correct and reliable, and check whether the parameter F0A.00 phase loss fault detection is shielded.	Replace the cable and connect the main circuit power cable correctly: Single phase: L1 L2 Three-phase: L1 L2 L3/RST
5. The servo driver is faulty.	Observe whether the parameter F0b.26 (bus voltage value) is in the following range: ● 220V driver: F0 b.26<200V ● 380V drive: F0 b.26<380V After several times of power off, the main circuit power is reconnected and the failure is still reported.	Replace the servo drive.

● Er.500: Overspeed

cause of occurrence:

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

reason	confirmation method	Treatment measures
1. The UVW phase sequence of the motor cable is wrong.	Check whether the two ends of the power cable of the drive correspond to the UVW end of the motor cable and the UVW end of the drive.	Wiring according to the correct UVW phase sequence.
2. F0A.08 parameter setting error.	Check whether the overspeed fault threshold is lower than the maximum motor speed required for actual operation: fault threshold = 1.2 times the maximum motor speed (F0A.08 = 0). fault threshold = F0A.08(F0A.08≠0, andF0A.08<1.2 times the maximum speed of the motor).	Reset the overspeed fault threshold according to mechanical requirements.
5. The servo driver is faulty.	After power on again, the fault still occurs.	Replace the servo drive.

● Er.600: Inertia identification failed

cause of occurrence:

■ IF vibration cannot be suppressed. The notch filter parameters (F09.12~F09.23) can be manually set to eliminate vibration.

■ The identification value fluctuates too much. When Etune is operating, increase the maximum operating speed, reduce the acceleration and deceleration time, and shorten the stroke of the screw mechanism.

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■ The mechanical connection of the load is loose and the mechanism is eccentric. Please check the mechanical failure.

■ During the identification process, there is an alarm that causes the operation to be interrupted. Execute again after eliminating the alarm.

■ The vibration of the load with large inertia cannot be suppressed. It is necessary to increase the acceleration and deceleration time first to ensure that the motor current is not saturated.

● Er.610: Drive overload

cause of occurrence:

The drive has accumulated too much heat and has reached the failure threshold.

●Er.620: Motor overload

cause of occurrence:

The motor has accumulated too much heat and has reached the fault threshold.

reason	confirmation method	Treatment measures
1. Motor wiring and encoder wiring are wrong or defective.	Compare the correct "wiring diagram" to check the wiring between the motor, driver and encoder.	● Connect cables according to the correct wiring diagram. ● Prioritize the use of standard cables provided by our company. ● When using self-made cables, make and connect them according to the hardware wiring guide.
2. The load is too heavy, the effective torque output by the motor exceeds the rated torque, and the motor continues to run for a long time.	Verify the overload characteristics of the motor or drive. Check whether the drive average load rate (F0b.12) is greater than 100.0% for a long time.	● Replace the large-capacity drive and matching motor. ● Reduce the load and increase the acceleration and deceleration time.
3. Acceleration and deceleration are too frequent or the load inertia is large.	Calculate the mechanical inertia ratio or perform inertia identification, check the inertia ratio F08.15. Confirm the single operation cycle when the servo motor runs in a cycle.	Increase the acceleration and deceleration time in a single operation.
4. The gain adjustment is not appropriate or the rigidity is too strong.	Observe whether the motor vibrates and the sound is abnormal during operation.	Please refer to "SD300P Series Servo Function Manual" to readjust the gain.
5. The driver or motor model is set incorrectly.	For SD300P series products: check bus motor model F00.05 and driver model F01.02.	Check the nameplate of the drive, refer to the supporting relationship in the "SD300P Series Servo Selection Manual", set the correct drive model (F01.02) and update the motor model to the matching model.

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6. The motor is blocked due to mechanical factors, resulting in excessive load during operation.	The commissioning platform or panel display driven by FRECON confirms the running command and motor speed (F0b.00): ● Running command in position mode: F0b.13 (input position command counter). ● Running command in speed mode: F0b.01 (speed command). ● Running command in torque mode: F0b.02 (internal torque command). Confirm that in the corresponding mode, whether the running command is not 0, but the motor speed is 0.	Exclude mechanical factors.
7. The servo driver is faulty.	After power off, power on again, still report failure.	Replace the servo drive.

After 30s after overload, the fault can be cleared or the power can be restarted.

● Er.640: Junction temperature is too high

cause of occurrence:

The estimated temperature of the driver IGBT and diode is too high and has reached the fault threshold F0A.38.

reason	confirmation method	Treatment measures
1. The ambient temperature is too high.	Measure the ambient temperature.	Improve the cooling conditions of the servo drive and reduce the ambient temperature.
2. After overload, reset the overload fault by turning off the power, and repeat it several times.	Check the fault record (set F0b.33, check F0b.34), whether there is an overload fault or warning (Er.610, Er.620, Er.630,Er.650, Er.909, Er.920, Er.922).	Change the fault reset method, wait for 30s after overloading and then reset. Increase the drive and motor capacity, increase the acceleration and deceleration time, and reduce the load.
3. The fan is broken.	Whether the fan is running during operation.	Replace the servo drive.
4. The installation direction of the servo driver and the distance between it and other servo drivers are unreasonable.	Confirm whether the installation of the servo driver is reasonable.	Install according to the installation standard of the servo drive.
5. The servo driver is faulty.	After 5 minutes of power failure and restarting, the failure is still reported.	Replace the servo drive.

● Er.650: Radiator overheating

cause of occurrence:

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

reason	confirmation method	Treatment measures
1. The ambient temperature is too high.	Measure the ambient temperature.	Improve the cooling conditions of the servo drive and reduce the ambient temperature.
2. After overload, reset the overload fault by turning off the power, and repeat it several times.	Check the fault record (setF0b.33, check F0b.34), whether there is an overload fault or warning (Er.610, Er.620,Er.630,Er.650, Er.909, Er.920,Er.922).	Change the fault reset method, wait for 30s after overloading and then reset. Increase the drive and motor capacity, increase the acceleration and deceleration time, and reduce the load.
3. The fan is broken.	Whether the fan is running during operation.	Replace the servo drive.
4. The installation direction of the servo driver and the distance between it and other servo drivers are unreasonable.	Confirm whether the installation of the servo driver is reasonable.	Install according to the installation standard of the servo drive.
5. The servo driver is faulty.	After 5 minutes of power failure and restarting, the failure is still reported.	Replace the servo drive.
6. The driver model is set incorrectly.	Check whether the value of F01.02 is consistent with the type on the nameplate. Check the driver model (F01.02), see the matching table in the "Selection Manual" to see if there is such a driver model.	The drive number does not exist. According to the drive nameplate, please refer to the matching table in the "SD300P Series Servo Selection Manual" to set the correct drive model.

● Er.660: Excessive vibration

cause of occurrence:

It is a fault alarm for excessive vibration or long vibration time. After this fault occurs, the original resonance point will be cleared.

■ Setting F08.58=1 can shield the alarm caused by excessive vibration separately.

■ Setting F08.58=2 can shield the alarm caused by excessive vibration and long vibration time.

● Er.731: Encoder battery failure

cause of occurrence:

The encoder battery voltage of the absolute encoder is lower than 3.0V.

reason	confirmation method	Treatment measures
1. During a power outage, the battery is not connected.	Confirm whether it is connected during power off	Set F0d.20=1 to clear the fault.
2. The encoder battery voltage is too low.	Measure battery voltage.	Replace with a new battery with matching voltage.

●Er.733: Encoder multi-turn count error

cause of occurrence:

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Encoder multi-turn count error.

reason	confirmation method	Treatment measures
1. Encoder failure.	Set F0d.20=1 to clear the fault, and Er.733 still occurs after power on again.	Replace the motor.

●Er.735: Encoder multi-turn count overflow

Detect encoder multi-turn count overflow.

reason	confirmation method	Treatment measures
1. When F0d.20=1, detect encoder multi-turn count overflow.	-	Set F0d.20=1 to clear the fault and power on again.

●Er.939: The motor power line is disconnected

cause of occurrence:

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

reason	confirmation method	Treatment measures
The motor power line is broken.	whether there is a difference of more than 5 times between the effective value of the phase current (F0b.24) and the internal torque command (F0b.02), and the actual motor speed (F0b.00) is less than 1/4 of the rated speed of the motor.	Check the wiring of the motor power cable, rewire it, and replace the cable if necessary.

●Er.B00: The position deviation is too large

cause of occurrence:

position control mode, the position deviation is greater than the set value of F0A.10.

reason	confirmation method	Treatment measures
1. The UVW output of the driver is out of phase or the phase sequence is wrongly connected.	Carry out a test run of the motor without load and check the wiring.	Rewire according to the correct wiring, or replace the cable.
2. The UVW output of the driver is disconnected or the encoder is disconnected.	Check wiring.	Rewiring, the servo motor power cable and driver power cable UVW must correspond one by one. Replace with a new cable if necessary, and ensure its reliable connection.

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3. The motor is blocked due to mechanical factors.	The commissioning platform or panel display driven by FRECON confirms the running command and motor speed (F0b.00): ● Running command in position mode: F0b.13 (input position command counter) ● Running command in speed mode: F0b.01 (speed command) ● Running command in torque mode: F0b.02 (internal torque command) Confirm that in the corresponding mode, whether the running command is not 0, but the motor speed is 0.	Check for mechanical factors.
4. The gain of the servo drive is low.	Check the position loop gain and speed loop gain of the servo drive: First gain: F08.00~ F08.02 Second gain: F08.03~F08.05	Please refer to the "Adjustment" chapter of "SD300P Series Servo Function Manual" for manual gain adjustment or automatic gain adjustment.
5. The input pulse frequency is higher.	When the position command source is pulse command, whether the input pulse frequency is too high. Acceleration and deceleration time is 0 or too small.	Reduce the position command frequency or reduce the electronic gear ratio. When the upper computer is used to output position pulses, a certain acceleration time can be set in the upper computer. If the upper computer cannot set the acceleration and deceleration time, you can increase the position command smoothing parameter F05.04, F05.06.
6. Compared with the operating conditions, the fault value (F0A.10) is too small.	Confirm whether the position deviation fault value (F0A.10) is set too small.	Increase the setting value of F0A.10.
7. Servo driver/motor failure.	Monitor the running waveform through the oscilloscope function of the FRECON drive debugging platform: position command, position feedback, speed command, torque command.	If the position command is not zero but the position feedback is always zero, please replace the servo driver/motor.

8.1.3 Common processing methods for warnings

Er.601: Back to the original point failed

cause of occurrence:

When using the origin return function (F05.30=1~5), the origin is not found within the time set by F05.35.

reason	confirmation method	Treatment measures

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1. The origin switch is faulty.	● It is always searching at high speed and not at low speed during origin return. ● After the high-speed search of origin return, it is always in the reverse low-speed search process.	● If you are using hardware DI, confirm that DI function 31 has been set in group 3 of F0 , and then check the wiring of the DI terminal. When manually changing the logic of the DI terminal, monitor whether the driver receives the corresponding DI level change through F0 b.03. If not, it means that the wiring of the DI switch is wrong; if it is, it means that there is an error in the homing operation. Please refer to the "Homing Function" chapter in the "SD300P Series Servo Function Manual" to operate this function correctly. ● If the virtual DI is used, please check whether the VDI usage process is correct.
2. The time limit for finding the origin is too short.	Check whether the time set by F05.35 is too small.	Increase F05.35.
3. The speed of searching the origin switch signal at high speed is too small.	Check the distance between the starting position of returning to zero and the origin switch, and judge whether the speed value set by F05.32 is too small, resulting in too long time to find the origin switch.	Increase F05.32.

●Er.730: Encoder battery warning

cause of occurrence:

The encoder battery voltage of the absolute encoder is lower than 3.0V.

reason	confirmation method	Treatment measures
1. The encoder battery voltage of the absolute encoder is lower than 3.0V.	Measure battery voltage.	Replace the battery that matches the voltage

●Er.900: DI emergency brake

cause of occurrence:

The logic of the DI terminal corresponding to DI function 34 (FunIN.34: brake, Emergency) is valid.

reason	confirmation method	Treatment measures
DI function 34: brake, is triggered.	Check DI function 34: EmergencyStop brake, and whether the corresponding DI terminal logic is set is valid.	Check the operation mode and confirm the safety,Cancel the DI brake valid signal.

●Er.909: Motor overload warning

cause of occurrence:

For 60Z series 0.2kW and 0.4kW motors, the accumulated heat of the motor is too high and reaches the warning value.

reason	confirmation method	Treatment measures

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1. Motor wiring and encoder wiring are wrong or bad.	Compare the correct wiring diagram to check the wiring between the motor, driver, and encoder.	● Connect cables according to the correct wiring diagram. ● Prioritize the use of standard cables from FRECON. ● When using self-made cables, make and connect them according to the hardware wiring guide.
2. The load is too heavy, the effective torque output by the motor exceeds the rated torque, and the motor continues to run for a long time.	Verify the overload characteristics of the motor or drive. Check whether the average load rate (F0b.12) of the drive is greater than 100.0% for a long time.	● Replace the large-capacity drive and matching motor. ● Reduce the load and increase the acceleration and deceleration time.
3. Acceleration and deceleration are too frequent or the load inertia is too large.	Check the mechanical inertia ratio or perform inertia identification, check the inertia ratio F0 8.15. Confirm the single operation cycle when the servo motor runs in a cycle.	Increase the acceleration and deceleration time.
4. The gain adjustment is inappropriate or the rigidity is too strong.	Observe whether the motor vibrates and the sound is abnormal during operation.	Please refer to the "Adjustment" chapter in "SD300P Series Servo Function Manual" to readjust the gain.
5. The driver or motor model is set incorrectly.	For SD300P series products: check bus motor model F00.05 and driver model F01.02.	Check the drive nameplate, refer to the matching table in "SD300P Series Servo Selection Manual", set the correct drive model (F01.02) and motor model to update to the matching model.
6. The motor is blocked due to mechanical factors, resulting in excessive load during operation.	Use the FRECON drive debugging platform or panel to view the running command and motor speed (F0b.00): ● Running command in position mode: F0b.13 (input position command counter) ● Running command in speed mode: F0b.01 (speedcommand) ● Running command in torque mode: F0b.02 (internal torque command) Confirm whether in the corresponding mode, the running command is not 0 or very large, but the motor speed is 0.	Exclude mechanical factors.
7. The servo driver is faulty.	After power off, power on again.	If the fault is still reported after power on again, please replace the servo driver.

●Er.920: Braking resistor overload alarm

cause of occurrence:

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The accumulated heat of the braking resistor is greater than the set value.

reason	confirmation method	Treatment measures
1. The wiring of the external braking resistor is bad, disconnected or disconnected.	Remove the external braking resistor, and directly measure whether the resistance value of the resistor is "∞" (infinity).	Replace with a new external braking resistor, and connect it between P⊕ and C after the resistance value of the measured resistor is consistent with the nominal value.
	Measure whether the resistance value between P⊕ and C is "∞" (infinity).	Select a good cable, and connect the two ends of the external braking resistor between P⊕ and C respectively.
2. When using the built-in braking resistor, the cable between the power terminals P⊕ and D is short-circuited or disconnected.	Measure whether the resistance value between P⊕ and D is "∞" (infinity).	Connect P⊕ and D directly with a good cable.
3. When using an external braking resistor, the selection of F02.25 (braking resistor setting) is wrong.	Check the F02.25 parameter value.	Correctly set F02.25: ● F02.25=1 (use external resistance, natural cooling). ● F02.25=2 (use external resistance, forced air cooling).
4. When using an external braking resistor, The actual selected braking resistance value is too large.	Measure the actual resistance value of the external resistor between P⊕ and C, and compare it with the braking resistor specification table to see if it is too large.	Please refer to the braking resistor specification table in the "SD300P Series Servo Selection Manual" to select a resistor with a suitable resistance value.
5. F02.27 (resistance value of external braking resistor) is greater than the actual resistance value of external braking resistor.	Check whether the F02.27 parameter value is greater than the actual resistance value of the external resistor between P⊕ and C.	The setting of F02.27 is consistent with the actual selection of external resistance
6. The input voltage of the main circuit exceeds the specification range.	Measure whether the input voltage at the driver side of the main circuit cable meets the following specifications: ● 220V driver: ● Effective value: 220V~240V ● Allowable deviation: -10%~+10%(198V~264V) ● 380V driver: ● Effective value: 380V~440V ● Allowable deviation: -10%~+10%(342V~484V)	According to the specifications on the left, adjust or replace the power supply.
7. The load moment of inertia ratio is too large.	Please refer to the "inertia recognition" chapter in the "SD300P Series Servo Function Handbook"	Choose a large-capacity external braking resistor, and set F0 2.26 to be

	for rotating inertia recognition; or according to mechanical parameters, manually comput the total mechanical inertia. Whether the actual load inertia ratio exceeds 30.	consistent with the actual value. Choose a large-capacity servo drive. If possible, reduce the load. If possible, increase the acceleration and deceleration time. If possible, increase the interval of servo cycle deceleration.
8. The motor speed is too high, the deceleration process is not completed within the set deceleration time, and it is in a continuous deceleration state during periodic motion	Check the speed curve of the motor during periodic motion to check whether the motor is in a deceleration state for a long time.	
9. The capacity of the servo drive or the capacity of the braking resistor is insufficient	Check the speed curve of the single cycle of the motor to calculate whether the maximum braking energy can be completely absorbed.	
10. Servo drive failure	-	Replace with a new servo driver.

●Er.924: Discharge pipe average power alarm

cause of occurrence:

The average power of the discharge pipe exceeds the set value and alarms .

●Er.950: Forward overtravel warning

cause of occurrence:

The logic of the DI terminal corresponding to DI function 14 (FunIN.14: POT, positive overtravel switch) is valid.

reason	confirmation method	Treatment measures
1. DI function 14: Prohibit forward drive, the terminal logic is valid.	Check whether the DI terminal in group F03 is set to DI function 14. Check whether the DI terminal logic of the corresponding bit of input signal monitoring (F0b.03) is valid.	Check the operation mode, and under the premise of ensuring safety, give a negative command or rotate the motor to make the logic of the "positive overtravel switch" terminal invalid.
2. The drive position feedback is at the positive software position limit.	Check whether the position feedback F0b.17 is near F0A.41 (forward overtravel). Check whether F0A.40 has set the software limitfunction.	Reasonably plan the drive command to ensure that the load stroke is within the soft limit range.

●Er.952: Reverse overtravel warning

cause of occurrence:

The logic of the DI terminal corresponding to DI function 15 (FunIN.15: NOT, reverse overtravel switch) is valid.

reason	confirmation method	Treatment measures
1. DI function 15: Reverse driving is prohibited, and the terminal logic is valid.	Check whether the DI terminal in group F03 is set to DI function 15. Check whether the logic of the DI terminal corresponding to the input signal monitoring (F0b.03) is valid.	Check the operation mode, and under the premise of ensuring safety, give a forward command or rotate the motor to make the logic of the "reverse overtravel switch" terminal invalid.
2. The drive position feedback is at the reverse software position limit value.	Check whether the position feedback F0b.17 is near F0A.43 (reverse	Properly plan the drive instructions to ensure that the load stroke is within the

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	overtravel). Check whether F0A.40 has set the software limit function.	soft limit range.

●Er.990: Input phase loss warning

cause of occurrence:

Single-phase operation is allowed for drives below 1kW, but the power input phase loss fault and warning (F0A.00) is enabled.

reason	confirmation method	Treatment measures
When F0A.00=1 (power supply input phase loss protection selection: enable fault and warning), for a 0.75kW three-phase driver (driver model F01.02=5), it is allowed to operate under single-phase power supply and connect to single-phase power supply , a warning will be issued.	Confirm whether it is a three-phase drive that allows single-phase operation.	If it is actually a three-phase drive, and the main circuit power line is connected to the three-phase power supply, and the warning is still reported, it should be handled according to Er.420. If it is actually a three-phase specification driver and allows single-phase operation, and the power line of the main circuit the warning is still reported after connecting to single-phase power supply, set F0A.00 to 0.

Chapter 9 Parameter description

9.1 F00 group servo motor parameters

F00.08	name	encoder type			Setting method	Shutdown setting	correlation model	all
	setting range	0 ~9	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2008 Setting instructions: 0: auto identify edcoder 1: Tamagawa 2.5M absolute encoder, 23-bit and below resolution 2: reserve 3: reserve 4: reserve 5: reserve 6: reserve								

7: Tamagawa 2.5M absolute encoder, 25-bit and above resolution 8: Tamagawa 4M absolute encoder, 25-bit and above resolution 9: Tamagawa 5M absolute encoder, 25-bit and above resolution

F00.11	name	rated current			Setting method	Shutdown setting	correlation model	all
	setting range	0.1~400.0	unit	A	Effective way	power on again	factory setting	2.7
contact address: 0x200b Setting instructions: Set the motor rated current.								

F00.12	name	Rated torque			Setting method	Shutdown setting	correlation model	all
	setting range	0.1~400.0	unit	N m	Effective way	power on again	factory setting	1.3
contact address: 0x200c Setting instructions: Set the rated torque of the motor.								

F00.13	name	Maximum torque percentage			Setting method	Shutdown setting	correlation model	all
	setting range	0 ~1000	unit	%	Effective way	power on again	factory setting	300
contact address: 0x200d Setting instructions: Set the maximum torque percentage of the motor, if the maximum torque is 3 times of the rated torque, then set F00.13 to 300								

F00.14	name	Rated speed			Setting method	Shutdown setting	correlation model	all
	setting range	1~10000	unit	rpm	Effective way	power on again	factory setting	3000
contact address: 0x2014 Setting instructions: Set the rated speed of the motor.								

F00.15	name	Percentage of maximum speed	Setting method	Shutdown setting	correlation model	all

	setting range	0 ~300	unit	%	Effective way	power on again	factory setting	200
contact address: 0x200f Setting instructions: Set the motor maximum speed percentage. Setting method: maximum speed÷rated speed×F00.15								

F00.16	name	Moment of inertia			Setting method	Shutdown setting	correlation model	all
	setting range	0.001~32.767	unit	10^-3 kgcm2	Effective way	power on again	factory setting	0
contact address: 0x2010 Setting instructions: Set the moment of inertia of the motor								

F00.17	name	Number of motor pole pairs			Setting method	Shutdown setting	correlation model	all
	setting range	1~50	unit	Opposite	Effective way	power on again	factory setting	5
contact address: 0x2011 Setting instructions: Number of pole pairs = pole ÷ 2								

F00.18	name	Stator phase resistance			Setting method	Shutdown setting	correlation model	all
	setting range	0.01~327.67	unit	Ω	Effective way	power on again	factory setting	1.72
contact address: 0x2012 Setting instructions: Phase resistance = line resistance ÷ 2								

F00.19	name	Stator phase inductance Lq			Setting method	Shutdown setting	correlation model	all
	setting range	0.01 ~327.67	unit	mH	Effective way	power on again	factory setting	5.80
contact address: 0x2013 Setting instructions: -								

F00.20	name	Stator phase inductance L d			Setting method	Shutdown setting	correlation model	all
	setting range	0.01~327.67	unit	mH	Effective way	power on again	factory setting	5.80
contact address: 0x2014 Setting instructions: -								

F00.21	name	Line Back EMF Coefficient			Setting method	Shutdown setting	correlation model	all
	setting range	1~32767	unit	V /krpm	Effective way	power on again	factory setting	33
contact address: 0x2015 Setting instructions: -								

F00.28	name	Encoder zero offset			Setting method	Shutdown setting	correlation model	all
	setting range	-360.0 ~ 360.0	unit	Spend	Effective way	power on again	factory setting	123.0
contact address: 0x201c Setting instructions: Store the result of angle identification.								

F00.31	name	Encoder resolution			Setting method	Shutdown setting	correlation model	all
	setting range	4~31	unit	-	Effective way	power on again	factory setting	twenty three
contact address: 0x201f Setting instructions: Set the encoder resolution to set the number of digits, not the resolution ration. For example, the resolution of a 17-bit encoder is 131072, here you need to set the plane 17 instead of 131072.								

F00.45	name	2nd encoder type			Setting method	Shutdown setting	correlation model	all
	setting range	1~31	unit	-	Effective way	power on again	factory setting	1 0
contact address:								

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0x2045 Setting instructions: The setting method is the same as F00.08

F00.52	name	Line number of the first pulse encoder			Setting method	Shutdown setting	correlation model	all
	setting range	1000~10000	unit	-	Effective way	power on again	factory setting	2500
contact address: 0x202d Setting instructions: Set the line number of the first pulse encoder, the actual resolution is "line number * 4"								

F00.53	name	1st pulse encoder rotation direction			Setting method	Shutdown setting	correlation model	all
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2035 Setting instructions: 0: same phase 1: invert								

F00.54	name	Line number of the 2nd pulse encoder			Setting method	Shutdown setting	correlation model	all
	setting range	1000~10000	unit	-	Effective way	power on again	factory setting	2500
contact address: 0x2036 Setting instructions: Set the line number of the second pulse encoder, the actual resolution is "line number * 4"								

F00.55	name	Rotation direction of the 2nd pulse encoder			Setting method	Shutdown setting	correlation model	all
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2037 Setting instructions: 0: same phase 1: invert phase								

F00.56	name	Motor UVW line sequence	Setting method	Shutdown	correlation	all

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						setting	model	
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2038 Setting instructions: Set the motor UVW line sequence, the meaning of the parameters is as follows 0: UVW line sequence 1: UWV line sequence								

F00.57	name	Encoder multi-turn bit			Setting method	Shutdown setting	correlation model	all
	setting range	0~24	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2039 Setting instructions: Set the number of digits of the multi-turn value of the encoder, which needs to be set for certain types of encoders.								

F00.58	name	Motor 1 parameter source			Setting method	Shutdown setting	correlation model	all
	setting range	0~1	unit	-	Effective way	power on again	factory setting	1
contact address: 0x203A Setting instructions: 0: Motor 1 parameters come from the encoder 1: Motor 1 parameters come from the parameter table								

F00.61	name	Motor 2 parameter source			Setting method	Shutdown setting	correlation model	all
	setting range	0~1	unit	-	Effective way	power on again	factory setting	1
contact address: 0x203d Setting instructions: 0: Motor 2 parameters come from the encoder 1: Motor 2 parameters come from the parameter table								

9.2 F01 group drive parameters

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F01.00	name	MCU software version number			Setting method	show	correlation model	all
	setting range	-	unit	-	Effective way	-	factory setting	-
contact address: 0x2064 Setting instructions: Display the MCU software version number								

F01.02	name	Servo drive model			Setting method	show	correlation model	all
	setting range	-	unit	-	Effective way	-	factory setting	-
contact address: 0x2066 Setting instructions: Display the serial number of the servo drive								

F01.30	name	Rated DC voltage			Setting method	Shutdown setting	correlation model	all
	setting range	1~3000	unit	V	Effective way	power on again	factory setting	300
contact address: 0x2082 Setting instructions:								

F01.31	name	Current sensor gain			Setting method	Shutdown setting	correlation model	all
	setting range	1~20000	unit	1/A	Effective way	power on again	factory setting	2048
contact address: 0x2083 Setting instructions:								

F01.32	name	IPM maximum current			Setting method	Shutdown setting	correlation model	all
	setting range	0.1~400.0	unit	A	Effective way	power on again	factory setting	5.0
contact address: 0x2084 Setting instructions: -								

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F01.33	name	IPM overload detection point			Setting method	Shutdown setting	correlation model	all
	setting range	1~100	unit	%	Effective way	power on again	factory setting	95
contact address: 0x2085 Setting instructions: -								

F01.34	name	IPM overload detection filter time constant			Setting method	Shutdown setting	correlation model	all
	setting range	0~32767	unit	the s	Effective way	power on again	factory setting	60
contact address: 0x2086 Setting instructions: -								

F01.35	name	IPM dead time			Setting method	Shutdown setting	correlation model	all
	setting range	1.0~10.0	unit	us	Effective way	power on again	factory setting	2.0
contact address: 0x2087 Setting instructions:								

F01.36	name	IPM minimum pulse width			Setting method	Shutdown setting	correlation model	all
	setting range	0.0~20.0	unit	us	Effective way	power on again	factory setting	4.0
contact address: 0x2088 Setting instructions:								

F01.37	name	PWM cycle time			Setting method	display	correlation model	all
	setting range	20.00 ~ 300.00	unit	us	Effective way	-	factory setting	125.00
contact address: 0x2089 Setting instructions:								

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F01.40	name	Overcurrent detection point			Setting method	Shutdown setting	correlation model	all
	setting range	1~32767	unit	-	Effective way	power on again	factory setting	16380
contact address: 0x208c Setting instructions:								

F01.41	name	Continuous times of overcurrent detection			Setting method	Shutdown setting	correlation model	all
	setting range	1~10000	unit	-	Effective way	power on again	factory setting	10
contact address: 0x208d Setting instructions:								

F01.42	name	power board maximum current			Setting method	Shutdown setting	correlation model	all
	setting range	0.1~400.0	unit	A	Effective way	power on again	factory setting	2.7
contact address: 0x208e Setting instructions:								

F01.43	name	Adaptive power of the power board			Setting method	Shutdown setting	correlation model	all
	setting range	0.01~300.00	unit	KW	Effective way	power on again	factory setting	1.50
contact address: 0x208f Setting instructions:								

F01.44	name	Rated current of power board			Setting method	Shutdown setting	correlation model	all
	setting range	0.1~400.0	unit	A	Effective way	power on again	factory setting	0.7
contact address: 0x2090 Setting instructions:								

F01.45	name	Bus voltage protection action time			Setting method	Shutdown setting	correlation model	all
	setting	0.01~40.00	unit	the s	Effective	power on	factory	3.00

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	range				way	again	setting	
contact address: 0x2091 Setting instructions:								

F01.51	name	Is dynamic braking onboard			Setting method	show	correlation model	all
	setting range	0~1	unit	-	Effective way	-	factory setting	0
contact address: 0x2097 Setting instructions:								

F01.52	name	Onboard NTC type			Setting method	show	correlation model	all
	setting range	0~255	unit	-	Effective way	-	factory setting	0
contact address: 0x2098 Setting instructions:								

F01.53	name	Power Board Current Sampling Bootstrap			Setting method	show	correlation model	all
	setting range	0~1	unit	-	Effective way	-	factory setting	0
contact address: 0x2099 Setting instructions:								

F01.54	name	Power board N TC temperature alarm point			Setting method	Shutdown setting	correlation model	all
	setting range	50~125	unit	-	Effective way	power on again	factory setting	120
contact address: 0x209a Setting instructions:								

F01.60	name	current loop gain			Setting method	Shutdown setting	correlation model	all
	setting range	1~600	unit	Hz	Effective way	power on again	factory setting	110
contact address: 0x20a0								

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Setting instructions:

F01.61	name	Current loop integral time constant			Setting method	Shutdown setting	correlation model	all
	setting range	1~1000	unit	%	Effective way	power on again	factory setting	10
contact address: 0x20a1 Setting instructions:								

F01.63	name	Overload feature point			Setting method	Shutdown setting	correlation model	all
	setting range	1~1000	unit	%	Effective way	power on again	factory setting	200
contact address: 0x20a3 Setting instructions:								

F01.64	name	Overload feature point duration			Setting method	Shutdown setting	correlation model	all
	setting range	1~30000	unit	10ms	Effective way	power on again	factory setting	1000
contact address: 0x20a4 Setting instructions:								

F01.65	name	I IT thermal overload point			Setting method	Shutdown setting	correlation model	all
	setting range	0~300	unit	%	Effective way	power on again	factory setting	112
contact address: 0x20a5 Setting instructions:								

F01.66	name	I IT thermal overload detection filter time constant			Setting method	Shutdown setting	correlation model	all
	setting range	0~32767	unit	the s	Effective way	power on again	factory setting	3000
contact address: 0x20a6 Setting instructions:								

F01.67	name	Moment of inertia unit multiple	Setting	Shutdown	correlation	all

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					method	setting	model	
	setting range	1~10000	unit	-	Effective way	power on again	factory setting	1
contact address: 0x20a7 Setting instructions:								

F01.68	name	Inductance unit multiple			Setting method	Shutdown setting	correlation model	all
	setting range	1~10000	unit	-	Effective way	power on again	factory setting	1
contact address: 0x20a8 Setting instructions:								

F01.70	name	Open loop running speed			Setting method	Shutdown setting	correlation model	all
	setting range	0~3000	unit	rpm	Effective way	power on again	factory setting	60
contact address: 0x20aa Setting instructions:								

F01.71	name	Open loop running current			Setting method	Shutdown setting	correlation model	all
	setting range	0~100	unit	%	Effective way	power on again	factory setting	20
contact address: 0x20ab Setting instructions:								

F01.72	name	Encoder to zero current			Setting method	Shutdown setting	correlation model	all
	setting range	0~500	unit	%	Effective way	power on again	factory setting	50
contact address: 0x20ac Setting instructions:								

F01.73	name	Encoder to zero high speed			Setting method	Shutdown setting	correlation model	all
	setting range	1~3000	unit	-	Effective way	power on again	factory setting	50

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contact address: 0x20ad Setting instructions:

F01.74	name	Encoder to zero low speed			Setting method	Shutdown setting	correlation model	all
	setting range	1~1000	unit		Effective way	power on again	factory setting	7
contact address: 0x20ae Setting instructions:								

F01.76	name	Encoder counting maximum error			Setting method	Shutdown setting	correlation model	all
	setting range	0~10000	unit	pulse	Effective way	power on again	factory setting	25
contact address: 0x20b0 Setting instructions:								

F01.77	name	Encoder disconnection detection times			Setting method	Shutdown setting	correlation model	all
	setting range	1~1000	unit	-	Effective way	power on again	factory setting	35
contact address: 0x20b1 Setting instructions:								

F01.80	name	Power board self-test voltage			Setting method	Shutdown setting	correlation model	all
	setting range	0~1000	unit	V	Effective way	power on again	factory setting	310
contact address: 0x20b4 Setting instructions:								

F01.81	name	Power board AD sampling value conversion voltage coefficient			Setting method	Shutdown setting	correlation model	all
	setting range	0~3000	unit	-	Effective way	power on again	factory setting	32
contact address: 0x20b5 Setting instructions:								

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F01.83	name	fan temperature point			Setting method	Run settings	correlation model	all
	setting range	25~125	unit	℃	Effective way	Effective immediately	factory setting	50
contact address: 0x20b7 Setting instructions:								

F01.85	name	Self-running cycle time in user mode			Setting method	Shutdown setting	correlation model	all
	setting range	10~32767	unit	ms	Effective way	power on again	factory setting	5000
contact address: 0x20b9 Setting instructions:								

F01.86	name	Self-running type			Setting method	Shutdown setting	correlation model	All
	setting range	0~2	unit		Effective way	power on again	factory setting	0
contact address: 0x20ba Setting instructions:								

9.3 F02 group Basic control parameters

F02.00	name	Control mode selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~6	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x20c8 Setting instructions: Select the control mode of the servo drive 0: position mode 1: speed mode 2: Torque mode 3.Position/speed mode, the operation mode is selected by the M1 SEL signal of DI M1 - SEL validspeed mode M1 - SEL invalid position mode								

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4: Position/torque mode, the operation mode is selected by the M1 - SEL signal of DI M1 - SEL validtorque mode M1 - SEL invalid position mode 5: Speed/torque mode, the operation mode is selected by the M1 - SEL signal of DI M1 - SEL valid torque mode M1 - SEL invalidspeed mode 6: Position/speed/torque mode (function waiting to be realized)

F02.01	name	Absolute value system selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~2	unit		Effective way	power on again	factory setting	0
contact address: 0x20c9 Setting instructions: Select the absolute position function of the first encoder of the drive 0: single-turn absolute value mode 1: Multi-turn absolute value mode 2: Incremental usage mode								

F02.03	name	Output pulse phase			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit		Effective way	power on again	factory setting	0
contact address: 0x20cb Setting instructions: When the pulse output function is used, the phase relationship between the output A-phase pulse and the B-phase pulse is set when the rotation direction of the motor remains unchanged. 0: A leads B 1: A lags B								

F02.09	name	Delay from brake output ON to command reception			Setting method	run settings	correlation model	PST
	setting range	0~1000	unit	m s	Effective way	Effective immediately	factory setting	0
contact address: 0x20d1 Setting instructions: After the servo drive is enabled, it starts to receive input commands, and within the delay time F02.09 from the brake output (BK) ON, the servo does not receive position/speed/torque commands								

F02.10	name	Static state, delay from brake output	Setting	run settings	correlation	PST

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		OFF to motor enable OFF			method		model	
	setting range	0~2000	unit	m s	Effective way	Effective immediately	factory setting	150
contact address: 0x20d2 Setting instructions: Set the delay time from the brake output (BK) OFF when the motor is in the enabled ON static state and the motor enters the enabled OFF state								

F02.11	name	Rotation state, the speed when the brake output is OFF			Setting method	run settings	correlation model	PST
	setting range	0~3000	unit	rpm	Effective way	Effective immediately	factory setting	100
contact address: 0x20d3 Setting instructions: Set the motor speed when the brake output (BK) is OFF when the motor is in the OFF rotation state								

F02.12	name	Rotation state, delay from servo enable OFF to brake output OFF			Setting method	run settings	correlation model	PST
	setting range	0~2000	unit	rpm	Effective way	Effective immediately	factory setting	0
contact address: 0x20d4 Setting instructions: When the motor is in the enabled ON rotation state, the brake output (BK) is OFF, and the delay time from the motor enable OFF								

F02.22	name	Rated power of built-in braking resistor			Setting method	Shutdown setting	correlation model	PST
	setting range	2~10000	unit	W	Effective way	power on again	factory setting	-
contact address: 0x20de Setting instructions: The built-in braking resistor power of the drive, the factory value is related to the drive model.								

F02.23	name	Built-in braking resistor value			Setting method	Shutdown setting	correlation model	PST
	setting range	10~750	unit	Ω	Effective way	power on again	factory setting	-
contact address: 0x20df								

Setting instructions: The built-in braking resistor value of the drive, the factory value is related to the drive model.

F02.25	name	Brake resistor setting			Setting method	run settings	correlation model	PST
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
0x20e1 Setting instructions: Set the use mode of the braking resistor of the drive, the factory value is related to the drive model. 0: Use the built-in braking resistor. 1: Use an external braking resistor								

F02.26	name	Rated power of external braking resistor			Setting method	Shutdown setting	correlation model	PST
	setting range	1~10000	unit	W	Effective way	power on again	factory setting	-
contact address: 0x20e2 Setting instructions: Set the power of the external braking resistor of the drive.								

F02.27	name	External braking resistor value			Setting method	Shutdown setting	correlation model	PST
	setting range	1~750	unit	Ω	Effective way	power on again	factory setting	-
contact address: 0x20e3 Setting instructions: Set the external braking resistor value of the drive.								

F02.30	name	user password			Setting method	Shutdown setting	correlation model	PST
	setting range	0~9999	unit		Effective way	power on again	factory setting	0
contact address: 0x20e6 Setting instructions: Set user password (function waiting to be realized).								

F02.31	name	System parameter initialization			Setting method	Shutdown setting	correlation model	PST
	setting	0~2	unit		Effective	power on	factory	0

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	range				way	again	setting	
contact address: 0x20e7 Setting instructions: The user restores the parameter to the factory value or clears the fault record 0: No operation. 1: Restore factory settings. 2: Clear fault records.								

F02.32	name	Panel default display function			Setting method	run settings	correlation model	PST
	setting range	0~99	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x20e8 Setting instructions: According to the settings, the panel can automatically switch to the monitoring parameter display mode (F0B group parameters), this parameter is used to set the intra-group bias of the F0B group parameters. When a non-existing F0B group parameter is set, the panel will not switch to F0B group parameter display.								

F02.40	name	CWL , CCWL direction prohibited way			Setting method	run settings	correlation model	P
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x20f0 Setting instructions: When setting the trigger CWL, CCWL limit, select the prohibition method. 0: limit the torque in this direction to 0 1: Forbid pulse input in this direction								

F02.41	name	Speed/torque corresponds to analog channel selection			Setting method	run settings	correlation model	ST
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x20f1 Setting instructions: Set the analog channel corresponding to the speed command and torque command. 0: AS1 channel and AS2 channel correspond to speed command and torque command respectively 1: AS1 channel and AS2 channel correspond to torque command and speed command respectively								

F02.44	name	Acceleration and deceleration time in	Setting	stop setting	correlation	PST

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		stop mode			method		model	
	setting range	0~10000	unit	m s	Effective way	Effective immediately	factory setting	1000
contact address: 0x20f4 Setting instructions: It takes effect when the stop mode F02.70 is set to 1, and sets the time for the motor to decelerate from 1000rpm to 0.								

F02.55	name	Regenerative braking voltage			Setting method	stop setting	correlation model	PST
	setting range	1~1000	unit	V	Effective way	power on again	factory setting	-
contact address: 0x20ff Setting instructions: The regenerative braking voltage value of the drive, the factory value is related to the drive model.								

F02.56	name	Maximum peak braking power			Setting method	stop setting	correlation model	PST
	setting range	5~10000	unit	W	Effective way	power on again	factory setting	-
contact address: 0x2100 Setting instructions: The maximum peak braking power of the drive, the factory value is related to the drive model.								

F02.57	name	Maximum average braking power			Setting method	stop setting	correlation model	PST
	setting range	5~10000	unit	W	Effective way	power on again	factory setting	-
contact address: 0x2101 Setting instructions: The maximum average braking power of the drive, the factory value is related to the drive model.								

F02.58	name	Peak braking power detection filter time constant			Setting method	stop setting	correlation model	PST
	setting range	0~32767	unit	10ms	Effective way	power on again	factory setting	-
contact address: 0x2102 Setting instructions:								

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The peak braking power detection filter time constant of the drive, the factory value is related to the drive model.

F02.59	name	Average brake power detection filter time constant			Setting method	stop setting	correlation model	PST
	setting range	0~32767	unit	the s	Effective way	power on again	factory setting	-
contact address: 0x2103 Setting instructions: The average braking power detection filter time constant of the drive, the factory value is related to the drive model.								

F02.61	name	Dynamic braking action waiting time			Setting method	Shutdown setting	correlation model	PST
	setting range	30~1000	unit	ms	Effective way	Effective immediately	factory setting	100
contact address: 0x2105 Setting instructions: Set the waiting time for the dynamic brake relay action								

F02.62	name	Dynamic braking action speed			Setting method	Shutdown setting	correlation model	PST
	setting range	0~100	unit	%	Effective way	Effective immediately	factory setting	50
contact address: 0x2106 Setting instructions: Set the percentage of motor rated speed as the dynamic braking action speed value.								

F02.64	name	Dynamic braking mode			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	%	Effective way	power on again	factory setting	0
contact address: 0x2108 Setting instructions: Set whether the dynamic braking function is valid, 0: The dynamic braking function does not take effect. 1: The dynamic braking function takes effect.								

F02.65	name	2nd encoder absolute value system selection	Setting method	Shutdown setting	correlation model	PST

	setting range	0~2	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2109 Setting instructions: Select the absolute position function of the first encoder of the drive 0: single-turn absolute value mode 1: Multi-turn absolute value mode 2: Incremental usage mode								

F02.66	name	2nd encoder related servo selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x210a Setting instructions: Set the axis number associated with the second encoder of the drive 0: The second encoder is off 1: The second encoder is associated with the current servo axis When the encoder is off, this encoder-related alarm will not be generated. This parameter is unavailable when the driver of the current model is not configured with the second encoder.								

F02.67	name	3rd encoder related servo selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x210b Setting instructions: Set the axis number associated with the third encoder of the drive 0: The 3rd encoder is off 1: The third encoder is associated with the current servo axis When the encoder is off, this encoder-related alarm will not be generated. This parameter is unavailable when the driver of the current model is not configured with the second encoder.								

F02.68	name	Drive axis associated encoder settings			Setting method	Shutdown setting	correlation model	PST
	setting range	0~2	unit	-	Effective way	power on again	factory setting	0
contact address: 0x210c Setting instructions:								

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Set the encoder associated with the drive axis

0: Servo shaft encoder information comes from the main encoder

1: The servo axis encoder information comes from the second encoder associated with this axis, and an error will be reported when F02.66 is set to 0.

2: The servo axis encoder information comes from the 3rd encoder associated with this axis, when F02.67 is set to 0, an error will be reported.

When the current model driver is not equipped with the second encoder, the maximum value of this parameter is 1.

When the current model driver is not configured with the first and second encoders, the maximum value of this parameter is 0.

F02.69	name	Position deviation clearing method			Setting method	run settings	correlation model	P
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x210d

Setting instructions:

When setting the position control mode, the DI signal clears the position deviation counter method

0: DI signal high level.

1: DI signal rising edge.

F02.70	name	emergency shutdown mode			Setting method	run settings	correlation model	PS
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x210e

Setting instructions:

Set the stop mode of the drive in the emergency stop mode through FunIN.34 (Emergency Stop).

0: The driver is directly enabled to OFF, and the motor stops freely.

1: The driver controls the motor to decelerate and stop according to the deceleration time set by F02.44.

F02.97	name	Ignore Drive Inhibit			Setting method	run settings	correlation model	PST
	setting range	0~3	unit	-	Effective way	Effective immediately	factory setting	3

contact address:

0x2129

Setting instructions:

Set whether the DI input forward drive prohibition CCWL signal and reverse drive prohibition CWL signal are valid. CCWL and CWL adopt normally closed switches. The motor can only run in this direction when the input is ON, and prohibit running in this direction when the input is OFF. Through this parameter, the CCWL and CWL signals can be ignored, and the motor can run when the drive prohibition signal is not connected.

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0: CWL use, CCWL use 1: CWL use, CCWL ignore 2: Ignored by CWL, used by CCWL 3: CWL ignore, CCWL ignore

F02.98	name	Force driver enable ON			Setting method	run settings	correlation model	PST
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212a Setting instructions: Set the driver to force enable ON 0: Driver enable ON is controlled by other conditions. 1: Force the driver to enable ON.								

F02.99	name	Wave recording output analog triangle wave data			Setting method	run settings	correlation model	PST
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212b Setting instructions: Set the waverecording output data 0: Wave recording output normal data. 1: Wave recording output analog triangle wave data.								

9.4 F03 group terminal input parameters

F03.00	name	DI1 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212c Setting instructions: Set DI1 function selection. The absolute value of the parameter indicates the function, please refer to chapter 4.1.4.1 for the function; the parameter symbol indicates the logic, the positive number indicates the positive logic, the negative number indicates the negative logic, ON means valid, OFF means invalid. The parameter value is a positive number: DI open circuit (OFF), DI conduction (ON) The parameter value is negative: DI open circuit (ON), DI conduction (OFF)								

F03.01	name	DI2 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212d Setting instructions: Set DI2 function selection, see F03.00 for detailed description.								

F03.02	name	DI3 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212e Setting instructions: Set DI3 function selection, see F03.00 for detailed description.								

F03.03	name	DI4 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x212f Setting instructions: Set DI4 function selection, see F03.00 for detailed description.								

F03.04	name	DI5 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2130 Setting instructions: Set DI5 function selection, see F03.00 for detailed description.								

F03.07	name	DI8 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2133 Setting instructions:								

Set DI8 function selection, see F03.00 for detailed description.

F03.08	name	DI9 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-59~59	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2134 Setting instructions: Set DI2 function selection, see F03.00 for detailed description.								

F03.10	name	DI1 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
contact address: 0x2136 Setting instructions: Set DI1 input filter time. The smaller the parameter value, the faster the signal response speed; the larger the parameter value, the slower the signal response speed, but the stronger the ability to filter out noise.								

F03.11	name	DI2 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
0x2137 Setting instructions: Set DI2 input filter time, see F03.10 description for details.								

F03.12	name	DI3 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
0x2138 Setting instructions: Set DI3 input filter time, see F03.10 description for details.								

F03.13	name	DI4 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0

contact address: 0x2139 Setting instructions: Set DI4 input filter time, see F03.10 description for details.

F03.14	name	DI5 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
0x213a Setting instructions: Set DI5 input filter time, see F03.10 description for details.								

F03.17	name	DI8 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
contact address: 0x213d Setting instructions: Set DI8 input filter time, see F03.10 description for details.								

F03.18	name	DI9 input filter time			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~100.0	unit	ms	Effective way	Effective immediately	factory setting	2.0
contact address: 0x213e Setting instructions: Set DI9 input filter time, see F03.10 description for details.								

F03.20	name	DI function is forced to be valid 1			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2140 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.0Pointless Bit1:FunIN.1(S-ON) Bit2: FunIN.2 (ALM-RST) Bit3: FunIN.3 (GAIN-SEL)								

Bit4: FunIN.4 Pointless

F03.21	name	DI function is forced to be valid 2			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2141 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.5 Pointless Bit1:FunIN.6 Pointless Bit2:FunIN.7 Pointless Bit3:FunIN.8 Pointless Bit4:FunIN.9 Pointless								

F03.22	name	DI function is forced to be valid 3			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2142 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0: FunIN.10(M1-SEL) Bit1: FunIN.11(M2-SEL) Bit2: FunIN.12(ZCLAMP) Bit3: FunIN.13(INHIBIT) Bit4: FunIN.14(P-OT)								

F03.23	name	DI function is forced to be valid 4			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2143 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.15(N-OT) Bit1: FunIN.16(P-CL) Bit2: FunIN.17(N-CL)								

Bit3: FunIN.18Pointless Bit4: FunIN.19Pointless

F03.24	name	DI function is forced to be valid 5			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2144 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.20 Pointless Bit1:FunIN.21 Pointless Bit2:FunIN.22 Pointless Bit3:FunIN.23 Pointless Bit4:FunIN.24(GEAR-SEL)								

F03.25	name	DI function is forced to be valid 6			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2145 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.25 Pointless Bit1:FunIN.26 Pointless Bit2:FunIN.27(DIR-SEL) Bit3:FunIN.28 Pointless Bit4:FunIN.29 Pointless								

F03.26	name	DI function is forced to be valid 7			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2146 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.30 Pointless Bit1:FunIN.31(HomeSwitch) Bit2:FunIN.32(HomingStart) Bit3:FunIN.30 Pointless								

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Bit4:FunIN.34(EmergencyStop)

F03.27	name	DI function is forced to be valid 8			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2147 Setting instructions: Set by Bit, 1 means that the corresponding DI function is forced to be valid, as shown below. Bit0:FunIN.35(ClrPosErr) Bit1:FunIN.36 Pointless Bit2:FunIN.37(PulseInhibit) Bit3:FunIN.38 Pointless Bit4:FunIN.39 Pointless								

F03.28	name	DI function is forced to be valid 9			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2148 Setting instructions: Set the DI function to be forced to be valid, as shown below. Bit0:FunIN.40 Pointless Bit1:FunIN.41 Pointless Bit2:FunIN.42 Pointless Bit3:FunIN.43(SP1) Bit4:FunIN.44(SP2)								

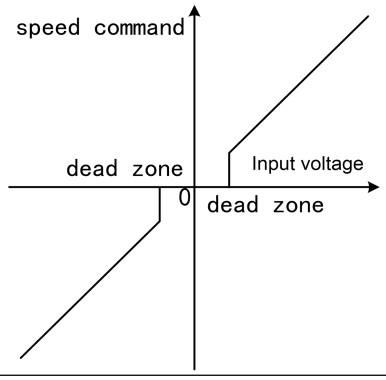
F03.29	name	DI function is forced to be valid 10			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x2149 Setting instructions: Set the DI function to be forced to be valid, as shown below. Bit0:FunIN.45(SP3) Bit1:FunIN.46(TRQ1) Bit2:FunIN.47(TRQ2) Bit3:FunIN.48 Pointless Bit4:FunIN.49(PC)								

F03.30	name	DI function is forced to be valid 11			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x214a Setting instructions: Set the DI function to be forced to be valid, as shown below. Bit0:FunIN.50 Pointless Bit1:FunIN.51 Pointless Bit2:FunIN.52 Pointless Bit3:FunIN.53 Pointless Bit4:FunIN.54 Pointless								

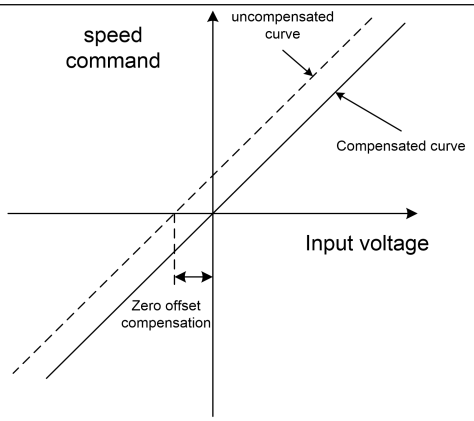
F03.31	name	DI function is forced to be valid 12			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x214b Setting instructions: Set the DI function to be forced to be valid, as shown below. Bit0:FunIN.55 Pointless Bit1:FunIN.56 Pointless Bit2:FunIN.57 Pointless Bit3:FunIN.58 Pointless Bit4:FunIN.59 Pointless								

F03.32	name	DI function is forced to be valid 13			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x214c Setting instructions: Set the DI function to be forced to be valid, as shown below. Bit0: Temporarily meaningless Bit1: Temporarily meaningless Bit2: Temporarily meaningless Bit3: Temporarily meaningless Bit4: Temporarily meaningless								

F03.51	name	AS1 analog command filter time constant			Setting method	Shutdown setting	correlation model	ST
	setting range	0.20~50.00	unit	ms	Effective way	power on again	factory setting	0.20
contact address: 0x215f Setting instructions: Set the low-pass filter time constant of the AS1 analog command. The larger the setting, the slower the response of the input analog command, which is beneficial to reduce the high-frequency noise interference; the smaller the setting, the faster the response of the input analog command, but the greater the high-frequency noise interference.								

F03.53	name	AS1 analog instruction dead zone			Setting method	Shutdown setting	correlation model	ST
	setting range	0~13000	unit	mV	Effective way	power on again	factory setting	0.0
contact address: 0x2161 Setting instructions: Set the absolute value of the AS1 analog input dead zone range, and force the input command to be 0 when the input analog voltage value is within the positive and negative dead zone range. The schematic diagram of speed command dead zone is as follows:  								

F03.54	name	AS1 analog command zero offset compensation			Setting method	Shutdown setting	correlation model	ST
	setting range	-1500.0~1500.0	unit	mV	Effective way	power on again	factory setting	0.0
contact address: 0x2162 Setting instructions: Set the zero offset compensation amount of AS1 analog input, the actual instruction is to input analog input minus this parameter value. The schematic diagram of speed command zero offset compensation is as follows:								



The analog zero offset compensation function can be triggered by setting F0D.10 = 1, and this parameter is automatically set

F03.56	name	AS2 analog command filter time constant			Setting method	Shutdown setting	correlation model	ST
	setting range	0.20~50.00	unit	ms	Effective way	power on again	factory setting	0.20

contact address:

0x2164

Setting instructions:

Set the low-pass filter time constant of the AS2 analog command. The larger the setting, the slower the response of the input analog command, which is beneficial to reduce the high-frequency noise interference. The smaller the setting, the faster the response of the input analog command, but the greater the high-frequency noise interference.

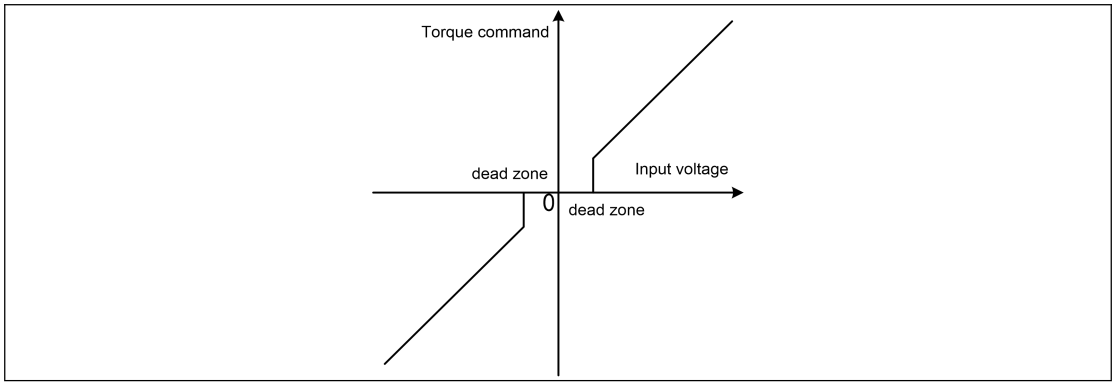
F03.58	name	AS2 analog command dead zone			Setting method	Shutdown setting	correlation model	ST
	setting range	0~13000	unit	mV	Effective way	power on again	factory setting	0.0

contact address:

0x2166

Setting instructions:

Set the absolute value of the AS2 analog input dead zone range, and force the input command to be 0 when the input analog voltage value is within the positive and negative dead zone range. The schematic diagram of torque command dead zone is as follows:



F03.59	name	AS2 analog command zero offset compensation			Setting method	Shutdown setting	correlation model	ST
	setting range	-1500.0~1500.0	unit	mV	Effective way	power on again	factory setting	0.0

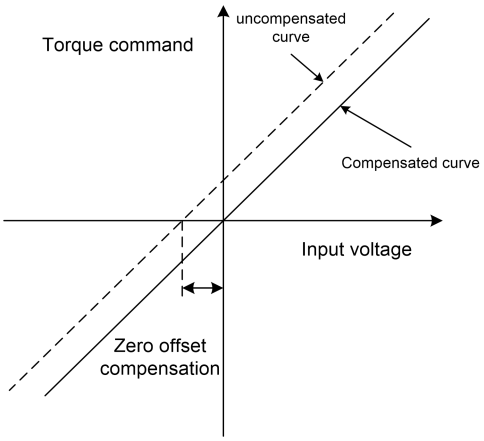
contact address:

0x2167

Setting instructions:

Set AS2 analog input zero offset compensation amount, the actual command is input analog minus this parameter value.

The schematic diagram of torque command zero offset compensation is as follows:



The analog zero offset compensation function can be triggered by setting F0D.10 = 2, this parameter is automatically set,

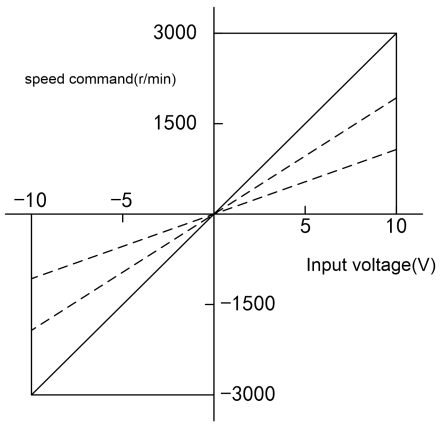
F03.80	name	Analog speed command gain			Setting method	run settings	correlation model	S
	setting range	10~3000	unit	rpm/V	Effective way	Effective immediately	factory setting	300

contact address:

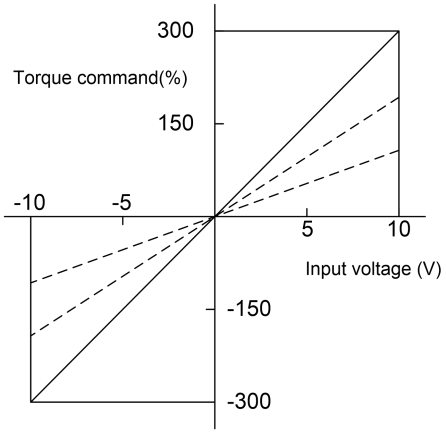
0x217c

Setting instructions:

Set the proportional relationship between the analog input voltage and the analog speed command, the analog input range is -10V~10V. The schematic diagram of the speed command gain is as follows:



F03.81	name	Analog torque command gain			Setting method	run settings	correlation model	T
	setting range	1~300	unit	%/V	Effective way	Effective immediately	factory setting	30
contact address: 0x217d Setting instructions: Set the proportional relationship between the analog input voltage and the analog torque command, the analog input range is -10V~10V. The schematic diagram of torque command gain is as follows:								



9.5 F04 group terminal output parameters

F04.00	name	DO1 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-41~41	unit	-	Effective way	Effective immediately	factory setting	0
contact address:								

0x2190 Setting instructions: Set DO1 function selection. The absolute value of the parameter indicates the function, please refer to chapter 4.1.4.2 for the function; the parameter symbol indicates the logic, the positive number indicates the positive logic, the negative number indicates the negative logic, ON outputs 1, and OFF outputs 0. The parameter value is a positive number: ON (DO conduction), OFF (DO cut-off) The parameter value is a negative number: ON (DO off), OFF (DO on)

F04.01	name	DO2 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-41~41	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2191 Setting instructions: Set DO2 function selection, see F04.00 for detailed description.								

F04.02	name	DO3 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-41~41	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2192 Setting instructions: Set DO3 function selection, see F04.00 for detailed description.								

F04.03	name	DO4 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-41~41	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2193 Setting instructions: Set DO4 function selection, see F04.00 for detailed description.								

F04.04	name	DO5 terminal function selection			Setting method	Shutdown setting	correlation model	PST
	setting range	-41~41	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2194 Setting instructions:								

Set DO5 function selection, see F04.00 for detailed description.

F04.10	name	DO output is forced to be valid			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x219a Setting instructions: Set the D0 output to be forced to be valid, as shown below. Bit0: 1 (DO1 is forced to output the content of Bit0 of F04.20), 0 (DO1 outputs the internal function state) Bit1: 1 (DO2 is forced to output the content of Bit1 of F04.20), 0 (DO2 outputs the internal function status) Bit2: 1 (DO3 is forced to output the content of Bit2 of F04.20), 0 (DO3 outputs the internal function state) Bit3: 1 (DO4 is forced to output the content of Bit3 of F04.20), 0 (DO4 outputs the internal function state) Bit4: 1 (DO5 is forced to output the content of Bit4 of F04.20), 0 (DO5 outputs the internal function state)								

F04.20	name	DO output forced content			Setting method	Shutdown setting	correlation model	PST
	setting range	00000~11111	unit	-	Effective way	Effective immediately	factory setting	00000
contact address: 0x21a4 Setting instructions: Set D0 to output forced content as shown below. Bit0: 1 (DO1 output 1), 0 (DO1 output 0) Bit1: 1 (DO2 output 1), 0 (DO2 output 0) Bit2: 1 (DO3 output 1), 0 (DO3 output 0) Bit3: 1 (DO4 output 1), 0 (DO4 output 0) Bit4: 1 (DO5 output 1), 0 (DO5 output 0)								

9.6 Group F05 position control parameters

F05.01	name	Pulse command input terminal selection			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x21f5 Setting instructions: Set the path of high and low pulse frequency in position control mode. 0: Low speed, single-ended input frequency up to 200K, differential input frequency up to 500K.								

1: High speed, the maximum frequency of differential input is 4M

F05.02	name	Number of position commands per motor revolution			Setting method	Shutdown setting	correlation model	P
	setting range	1~1048576	unit	P/r	Effective way	power on again	factory setting	10000
contact address: 0x21f6 Setting instructions: Set the number of position commands required for one revolution of the motor.								

F05.04	name	Exponential smoothing filter time of position command			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	ms	Effective way	power on again	factory setting	0

contact address:

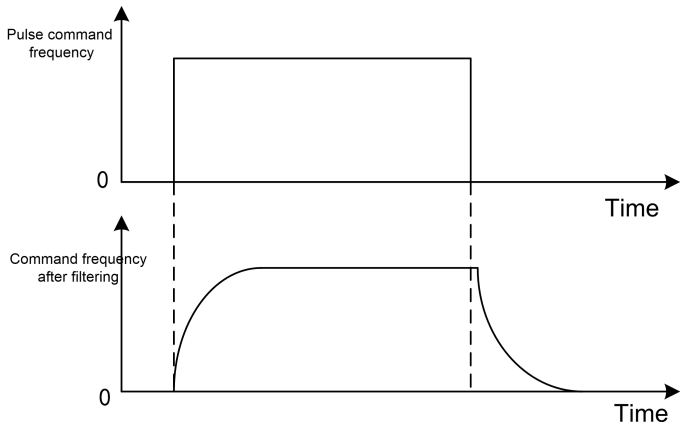
0x21f8

Setting instructions:

Set the position command exponential smoothing filter time, and perform exponential acceleration and deceleration smoothing filtering on the command pulse. After filtering, the position command is as follows:

This filter is used to:

1. The upper controller has no acceleration and deceleration functions;
2. The electronic gear is relatively large (N/M>10);
3. The command frequency is low;
4. When the motor is running, there are step jumps and unsteady phenomena.



The filter has no effect on the total number of position commands, but it will cause command delay. When it is set to 0, the filter will not work.

F05.06	name	Position command linear filter time			Setting method	run settings	correlation model	P
	setting range	0~256	unit	ms	Effective way	Effective immediately	factory setting	0

contact address:

0x21fa

Setting instructions:

Set the linear filter time of the position command, the position command after filtering is as follows:

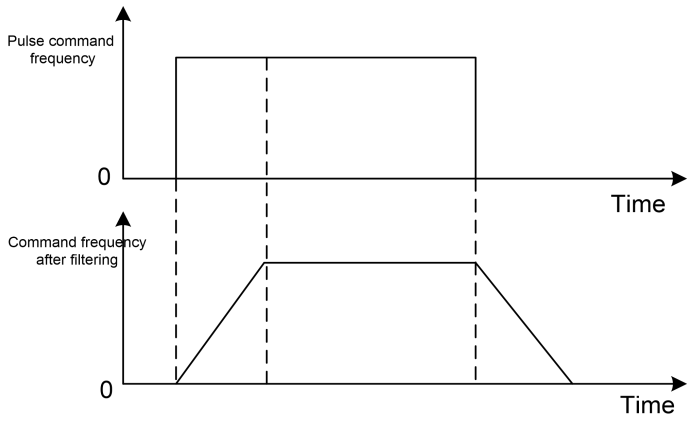
This filter is used to:

1. The upper controller has no acceleration and deceleration functions;

2. The electronic gear is relatively large (N/M>10);

3. The command frequency is low;

4. When the motor is running, there are step jumps and unsteady phenomena.



The filter has no effect on the total number of position commands, but it will cause command delay. When it is set to 0, the filter will not work.

F05.07	name	Electronic gear ratio 1 molecule			Setting method	Shutdown setting	correlation model	P
	setting range	1~1073741824	unit	-	Effective way	power on again	factory setting	1

contact address:

0x21fb

Setting instructions:

Set the numerator of the electronic gear ratio of the first group for the division or multiplication of the command unit position command.

F05.09	name	Electronic gear ratio 1 denominator			Setting method	Shutdown setting	correlation model	P
	setting range	1~1073741824	unit	-	Effective way	power on again	factory setting	1

contact address:

0x21fd

Setting instructions:

Set the denominator of the first group of electronic gear ratio for command unit position command division or multiplication.

F05.11	name	Electronic gear ratio 2 molecules	Setting	Shutdown	correlation	P

					method	setting	model	
	setting range	1~1073741824	unit	-	Effective way	power on again	factory setting	1
contact address: 0x21ff Setting instructions: Set the numerator of the second group of electronic gear ratio for the command unit position command division or multiplier.								

F05.13	name	Electronic gear ratio 2 denominator			Setting method	Shutdown setting	correlation model	P
	setting range	1~1073741824	unit	-	Effective way	power on again	factory setting	1
0x2201 Setting instructions: Set the denominator of the second group of electronic gear ratio for command unit position command division or multiplication.								

F05.15	name	Command pulse input method			Setting method	Shutdown setting	correlation model	P
	setting range	0~2	unit	-	Effective way	power on again	factory setting	0
contact address: 0x2203 Setting instructions: Set the command pulse input form. 0: pulse and direction 1: Forward and reverse pulse 2: quadrature pulse								

F05.17	name	Encoder pulse output lines			Setting method	Shutdown setting	correlation model	P
	setting range	1~16384	unit	-	Effective way	power on again	factory setting	2500
contact address: 0x2205 Setting instructions: Set the number of pulses output by the pulse output terminal for one revolution of the motor, that is, the number of pulse outputs = (F05.17) x 4.								

F05.21	name	Positioning complete range			Setting method	Shutdown setting	correlation model	P
	setting	0~32767	unit	P	Effective	Effective	factory	10

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	range				way	immediately	setting	
contact address: 0x2209 Setting instructions: Set the positioning completion pulse range in the position control mode of the driver. When the position deviation counter count value is less than or equal to the F05.21 parameter setting value, the DO output positioning completion is ON, otherwise it is OFF. The comparator has hysteresis function, which is set by parameter F05.91.								

F05.22	name	Locating Proximity Range			Setting method	Shutdown setting	correlation model	P
	setting range	0~32767	unit	P	Effective way	Effective immediately	factory setting	500
contact address: 0x220a Setting instructions: Set the positioning approach pulse range in the position control mode of the driver. When the position deviation counter count value is less than or equal to the F05.22 parameter setting value, the DO output positioning approach is ON, otherwise it is OFF. The comparator has hysteresis function, which is set by parameter F05.93.								

F05.30	name	Origin return enable mode			Setting method	Shutdown setting	correlation model	P
	setting range	1~3	unit		Effective way	Effective immediately	factory setting	1
contact address: 0x2212 Setting instructions: Set the origin return enable mode 0: Triggered by the high level of the DI input FunIN.32 (HomingStart) signal; 1: Triggered by the rising edge of the DI input FunIN.32 (HomingStart) signal; 2: Automatically execute when power on.								

F05.31	name	Return to origin operation mode			Setting method	Shutdown setting	correlation model	P
	setting range	1~40	unit		Effective way	Effective immediately	factory setting	1
contact address: 0x2213 Setting instructions: To set the origin return action mode, please refer to the chapter 6.8 Origin Return to set it up. When it is set to the unplanned mode, the origin return function will not run.								

F05.32	name	High-speed search origin switch signal speed			Setting method	Shutdown setting	correlation model	P
	setting range	1~3000	unit	r/min	Effective way	Effective immediately	factory setting	500
contact address: 0x2214 Setting instructions: Set the speed of searching for the reference point signal in the first step during the Origin return operation. Please refer to chapter 6.8 Origin Return.								

F05.33	name	Low speed search origin switch signal speed			Setting method	Shutdown setting	correlation model	P
	setting range	1~3000	unit	r/min	Effective way	Effective immediately	factory setting	50
contact address: 0x2215 Setting instructions: Set the speed of searching the origin switch signal in the second step during the Origin return operation. Please refer to chapter 6.8 Origin Return.								

F05.34	name	Acceleration and deceleration time for searching origin			Setting method	Shutdown setting	correlation model	P
	setting range	0~30000	unit	ms	Effective way	Effective immediately	factory setting	0
contact address: 0x2216 Setting instructions: Set the acceleration and deceleration time for searching the origin switch signal in the first step and the second step in the homing process. Please refer to chapter 6.8 Origin Return.								

F05.36	name	Offset of mechanical origin			Setting method	Shutdown setting	correlation model	P
	setting range	-1073741824 ~ 1073741824	unit	pulse	Effective way	Effective immediately	factory setting	0
contact address: 0x2218 Setting instructions: Set the offset of the mechanical origin during the origin return process, and the pulse resolution is fixed at 65536/turn. Please refer to chapter 6.8 Origin Return								

F05.41	name	Z pulse output polarity selection	Setting	Shutdown	correlation	P

					method	setting	model	
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x221d Setting instructions: Set the level when the pulse output Z signal is valid. 0: positive polarity 1: negative polarity								

F05.70	name	Command pulse input signal filtering			Setting method	Shutdown setting	correlation model	P
	setting range	0~31	unit	-	Effective way	power on again	factory setting	0
contact address: 0x223a Setting instructions: Set the filter value of command pulse input signal. It is used to filter out the noise on the signal line. The larger the value, the larger the filter time constant and the corresponding decrease in the maximum pulse input frequency.								

F05.72	name	Command pulse input direction signal polarity			Setting method	Run settings	correlation model	P
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x223c Setting instructions: Set the polarity of command pulse input direction signal. 0: SIGN forward 1: SIGN reverse								

F05.73	name	Command pulse input signal logic			Setting method	Shutdown setting	correlation model	P
	setting range	0~3	unit	-	Effective way	power on again	factory setting	0
contact address: 0x223d Setting instructions: Set the command pulse input signal logic to adjust the counting edge and counting direction. 0: PULS forward, SIGN forward 1: PULS reverse, SIGN forward 2: PULS forward, SIGN reverse 3: PULS reverse, SIGN reverse								

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F05.75	name	Command pulse input signal filter mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit	-	Effective way	power on again	factory setting	0
contact address: 0x223f Setting instructions: Set the command pulse input signal filter mode. 0: PULS and SIGN signals are filtered at the same time 1: Only filter the PULS signal, and not filter the SIGN signal								

F05.87	name	Origin in-position delay			Setting method	Shutdown setting	correlation model	P
	setting range	0~3000	unit	ms	Effective way	Effective immediately	factory setting	50
contact address: 0x224b Setting instructions: Set the delay time after reaching the origin, let the motor stop completely, after the delay is completed, the DO output FunOUT.16 (HomeAttain) will turn ON.								

F05.88	name	Origin return completion signal delay			Setting method	Shutdown setting	correlation model	P
	setting range	1~3000	unit	ms	Effective way	Effective immediately	factory setting	100
contact address: 0x224c Setting instructions: Set the effective time of FunOUT.16 (HomeAttain) after origin return is completed, applicable to the case of F05.30 = 2 or 3,								

F05.89	name	Origin return instruction execution mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x224d Setting instructions: After the origin return is completed, the instruction execution mode: 0: Wait for the FunOUT.16 (HomeAttain) signal to turn OFF after returning to the origin,Then execute the command 1: Execute the command immediately after the origin return is completed								

F05.91	name	Positioning complete return	Setting	Shutdown	correlation	P

		difference			method	setting	model	
	setting range	0~32767	unit	P	Effective way	Effective immediately	factory setting	5
contact address: 0x224f Setting instructions: Set the positioning completion return difference in the position control mode of the drive.								

F05.93	name	Positioning close to return difference			Setting method	Shutdown setting	correlation model	P
	setting range	0~32767	unit	P	Effective way	Effective immediately	factory setting	50
contact address: 0x2251 Setting instructions: Set the positioning close to return difference in the position control mode of the drive.								

F05.95	name	Z pulse output width selection			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit	P	Effective way	power on again	factory setting	0
contact address: 0x2253 Setting instructions: Set the active level width of the pulse output Z signal. 0: 1 times A pulse width 1: 4 times A pulse width								

9.7 Group F06 speed control parameters

F06.04	name	JOG jog speed setting value			Setting method	Shutdown setting	correlation model	S
	setting range	0~7500	unit	rpm	Effective way	Effective immediately	factory setting	100
contact address: 0x225c Setting instructions: Set the JOG running speed of the drive.								

F06.05	name	Speed command ramp acceleration time			Setting method	Shutdown setting	correlation model	S
	setting	0~30000	unit	ms	Effective	Effective	factory	0

	range				way	immediately	setting	
0x225d Setting instructions: Set the time for the speed command to accelerate from 0 to 1000rpm.								

F06.06	name	Speed command ramp deceleration time			Setting method	Shutdown setting	correlation model	S
	setting range	0~30000	unit	ms	Effective way	Effective immediately	factory setting	0
contact address: 0x225e Setting instructions: Set the time for the speed command to decelerate from 1000rpm to 0.								

F06.07	name	Maximum speed limit			Setting method	Shutdown setting	correlation model	S
	setting range	0~7500	unit	rpm	Effective way	Effective immediately	factory setting	5000
contact address: 0x225f Setting instructions: In the speed control mode, set the limit value of the speed command, which has nothing to do with the direction of rotation.								

F06.15	name	Zero speed detection threshold			Setting method	Shutdown setting	correlation model	S
	setting range	0~1000	unit	rpm	Effective way	Effective immediately	factory setting	10
contact address: 0x2267 Setting instructions: Set the zero speed detection point in the speed control mode of the drive. When the motor speed is less than or equal to the F06.15 parameter setting value, DO outputs zero speed ON, otherwise it is OFF. The comparator has return difference function, which is set by parameter F06.88.								

F06.18	name	Speed reached signal threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	-5000~5000	unit	rpm	Effective way	Effective immediatel y	factory setting	500
contact address: 0x226a Setting instructions: Set the speed arrival detection point in the speed control mode of the drive. When the motor speed exceeds the F06.18								

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parameter setting value, DO output speed arrival is ON, otherwise it is OFF.

The comparator has return difference function, which is set by parameter F06.85.

The comparator has a polarity setting function, which is set by parameter F06.86. For details, please refer to the description of F06.86.

F06.59	name	Source of speed command			Setting method	run settings	correlation model	S
	setting range	0~5	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x2293

Setting instructions:

Set the source of the speed command in the speed control mode of the drive.

0: Analog speed command.

1: Internal speed command, input SP2 and SP1 from DI to select internal speed parameters, | SP2 | SP1 | signal description is as follows:

00: Internal speed 1, F06.80 parameter value is speed command

01: Internal speed 2, F06.81 parameter value is speed command

10: Internal speed 3, F06.82 parameter value is speed command

11: Internal speed 4, F06.83 parameter value is speed command

2: Analog speed command + internal speed command, input SP2 and SP1 from DI to select analog speed command or internal speed parameter, | SP2 | SP1 | signal description is as follows.

00: Analog speed command, the analog value is used as the speed command

01: Internal speed 2, F06.81 parameter value is speed command

10: Internal speed 3, F06.82 parameter value is speed command

11: Internal speed 4, F06.83 parameter value is speed command

3: Automatically set when JOG speed command

4: Function reserved.

5: Automatically set when demonstrating velocity commands.

F06.60	name	Analog speed command direction			Setting method	run settings	correlation model	S
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x2294

Setting instructions:

Set the direction of the analog speed command in the speed control mode of the drive.

0: Analog positive voltage -> forward speed command, analog negative voltage -> reverse speed command.

1: Analog positive voltage -> reverse speed command, analog negative voltage -> forward speed command.

F06.61	name	Analog speed command polarity	Setting method	run settings	correlation model	S

	setting range	0~2	unit	-	Effective way	Effective immediatel y	factory setting	0
contact address: 0x2295 Setting instructions: Set the polarity of the analog speed command in the speed control mode of the drive. 0: both positive and negative analog voltages are valid 1: Analog positive voltage is valid, and negative voltage forces the speed command to be 0. 2: The analog negative voltage is valid, and the positive voltage forces the speed command to be 0.								

F06.65	name	Speed loop PDFF control coefficient			Setting method	run settings	correlation model	S
	setting range	0~100	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x2299 Setting instructions: Sets the PDFF coefficients for the speed regulator of the drive and selects the speed controller structure. 0: IP adjuster 1~99: PDFF adjuster 100: PI adjuster When the parameter value is too large, the system has high frequency response; when the parameter value is too small, the system has high stiffness; when the parameter value is medium, both frequency response and stiffness are taken into account.								

F06.66	name	Speed detection filter time constant			Setting method	run settings	correlation model	S
	setting range	0.01~50.00	unit	ms	Effective way	Effective immediately	factory setting	2.00
contact address: 0x229a Setting instructions: Set the filter time constant of the drive speed feedback filter. The larger the parameter value, the smoother the detection, too large may cause noise; the smaller the parameter value, the faster the detection response, too small may cause oscillation.								

F06.80	name	internal speed 1			Setting method	run settings	correlation model	S
	setting range	-5000~5000	unit	rpm	Effective way	Effective immediatel y	factory setting	0
contact address:								

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0x22a8 Setting instructions: Set the internal speed command 1 of the drive.

F06.81	name	internal speed 2			Setting method	run settings	correlation model	S
	setting range	-5000~5000	unit	rpm	Effective way	Effective immediately	factory setting	0
contact address: 0x22a9 Setting instructions: Set the internal speed command 2 of the drive.								

F06.82	name	internal speed 3			Setting method	run settings	correlation model	S
	setting range	-5000~5000	unit	rpm	Effective way	Effective immediately	factory setting	0
contact address: 0x22aa Setting instructions: Set the internal speed command 3 of the drive.								

F06.83	name	internal speed 4			Setting method	run settings	correlation model	S
	setting range	-5000~5000	unit	rpm	Effective way	Effective immediately	factory setting	0
contact address: 0x22ab Setting instructions: Set the internal speed command 4 of the drive.								

F06.85	name	speed difference			Setting method	Shutdown setting	correlation model	PST
	setting range	0~5000	unit	rpm	Effective way	Effective immediately	factory setting	30
contact address: 0x22ad Setting instructions: Set the speed arrival return difference in the speed control mode of the drive,Used in conjunction with parameter F06.18								

F06.86	name	speed to polarity			Setting method	Shutdown setting	correlation model	PST
	setting	0~1	unit	-	Effective	Effective	factory	0

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	range				way	immediately	setting	
contact address: 0x22ae Setting instructions: Set the speed arrival polarity in the speed control mode of the drive. 0: F06.18 > 0 speed detection regardless of direction 1: F06.18 > 0 only detect positive speed F06.18 < 0 only detect negative speed								

F06.88	name	Zero speed detection hysteresis			Setting method	Shutdown setting	correlation model	S
	setting range	0~5000	unit	rpm	Effective way	Effective immediatel y	factory setting	30
contact address: 0x22b0 Setting instructions: Set the zero speed detection return difference in the speed control mode of the drive.								

F06.90	name	Zero fixed mode selection			Setting method	Shutdown setting	correlation model	S
	setting range	0~1	unit	-	Effective way	Effective immediatel y	factory setting	0
contact address: 0x22b2 Setting instructions: Set the implementation mode of the driver's zero position fixation mode. When the following conditions are met, the zero position fixed mode is turned on; when any of the conditions are not met, normal speed control is performed: speed control mode DI input zero fixed signal ON The speed command is lower than F06.15 When the zero position fixed mode is enabled, the meaning of F06.90 parameter is as follows: 0: The motor position is fixed at the moment when the function is turned on. At this time, the internal position control is connected, and even if the rotation occurs due to external force, it will return to the zero fixed point. 1: When the function is turned on, the speed command is forced to be 0, and the internal speed is still controlled, and the rotation may occur due to external force.								

9.8 Group F07 torque control parameters

F07.05	name	Torque command filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	0.01~50.00	unit	ms	Effective way	Effective immediately	factory setting	1.00
contact address: 0x22c1 Setting instructions: Set the time constant of the drive torque command low-pass filter can suppress the vibration caused by the machine. The larger the value, the better the vibration suppression effect. If it is too large, the response will slow down and cause oscillation; the smaller the value, the faster the response. When the load inertia is small, a smaller value can be set, and when the load inertia is large, a larger value can be set.								

F07.06	name	2nd torque command filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	0.01~50.00	unit	ms	Effective way	Effective immediately	factory setting	1.00
contact address: 0x22c2 Setting instructions: Setting the time constant of the drive's second torque command low-pass filter can suppress the vibration caused by the machine. The larger the value, the better the vibration suppression effect. If it is too large, the response will slow down and cause oscillation; the smaller the value, the faster the response. When the load inertia is small, a smaller value can be set, and when the load inertia is large, a larger value can be set.								

F07.07	name	Torque limit source			Setting method	Shutdown setting	correlation model	PST
	setting range	0~2	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x22c3 Setting instructions: Sets the drive torque limit source. 0: Basic torque limit, the source of limit parameters is determined by DI input P-CL and N-CL respectively Forward rotation limit, P-CL is valid: F07.11 parameter value is used as the forward rotation torque limit value P-CL is invalid: F07.09 parameter value is used as forward torque limit value Reverse limit, N-CL is valid: F07.12 parameter value is used as reverse torque limit value N-CL is invalid: F07.10 parameter value is used as reverse torque limit value								

1: On the basis of the basic torque limit, it is also limited by the analog torque command, and the analog torque command limit does not distinguish between forward and reverse rotation.

2: On the basis of the basic torque limit, it is also limited by the internal torque command, where the internal torque command is selected by DI input, and does not distinguish between forward and reverse rotation.

If multiple limits occur, the final limit value is the limit value with the smallest absolute value. Even if the set value exceeds the maximum torque allowed by the system, the actual torque will be limited within the maximum torque.

F07.09	name	Internal Forward Torque Limit			Setting method	Shutdown setting	correlation model	PST
	setting range	0~500	unit	%	Effective way	Effective immediately	factory setting	300
contact address: 0x22c5 Setting instructions: Set the internal forward torque limit of the drive, and it will take effect in any torque limit mode.								

F07.10	name	Internal reverse torque limit			Setting method	Shutdown setting	correlation model	PST
	setting range	-500~0	unit	%	Effective way	Effective immediately	factory setting	-300
contact address: 0x22c6 Setting instructions: Set the internal reverse torque limit of the drive, and it will take effect in any torque limit mode.								

F07.11	name	External forward torque limit			Setting method	Shutdown setting	correlation model	PST
	setting range	0~500	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x22c7 Setting instructions: Set the internal forward torque limit of the drive, and the F07.11 parameter takes effect when the DI input forward torque limit is ON. When the limit is valid, the actual torque limit is the minimum value among the maximum overload capacity allowed by the system, internal forward torque limit, and external forward torque limit.								

F07.12	name	External reverse torque limit			Setting method	Shutdown setting	correlation model	PST
	setting range	-500~0	unit	%	Effective way	Effective immediately	factory setting	-100
contact address: 0x22c8								

Setting instructions:

Set the internal reverse torque limit of the drive, and the F07.12 parameter takes effect when the DI input reverse torque limit is ON.

When the limit is valid, the actual torque limit is the maximum overload capacity allowed by the system, the minimum value of the internal reverse torque limit and the external reverse torque limit

F07.17	name	Speed limit source selection			Setting method	Shutdown setting	correlation model	T
	setting range	0~2	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x22cd

Setting instructions:

When setting the torque control mode of the drive, the source of the speed limit.

0: basic speed limit

During forward rotation, it is limited by F07.63 parameter.

When reversing, it is limited by F07.63 parameter.

1: Based on the basic speed limit, it is also limited by the analog speed command.

2: On the basis of the basic speed limit, it is also limited by the internal speed command. The internal speed command is selected by DI input SP2 and SP1 to select the internal speed parameter. The | SP2 | SP1 | signal is explained as follows.

00: Internal speed 1, F06.80 parameter value is speed limit value

01: Internal speed 2, F06.81 parameter value is the speed limit value

10: Internal speed 3, F06.82 parameter value is speed limit value

11: Internal speed 4, F06.83 parameter value is speed limit value

If multiple limits occur, the final limit value is the limit value with the smallest absolute value. Even if the set value exceeds the maximum speed allowed by the system, the actual speed will be limited within the maximum speed.

F07.59	name	Source of torque command			Setting method	Shutdown setting	correlation model	T
	setting range	0~2	unit	-	Effective way	Effective immediately	factory setting	0

contact address:

0x22f7

Setting instructions:

Set the source of the torque command in the torque control mode of the drive.

0: Analog torque command.

1: Internal torque command, DI inputs TRQ2, TRQ1 to select internal torque parameters, | TRQ2 | TRQ1 | signal description is as follows:

00: Internal torque 1, F07.80 parameter value is torque command

01: Internal torque 2, F07.81 parameter value is torque command

10: Internal torque 3, F07.82 parameter value is torque command

11: Internal torque 4, F07.83 parameter value is torque command

2: Analog torque command + internal torque command, the analog torque command or internal torque parameter is selected by DI input.

00: Internal torque 1, the analog quantity is used as the torque command

01: Internal torque 2, F07.81 parameter value is torque command

10: Internal torque 3, F07.82 parameter value is torque command

11: Internal torque 4, F07.83 parameter value is torque command

F07.60	name	Analog torque command direction			Setting method	Shutdown setting	correlation model	T
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x22f7 Setting instructions: Set the direction of the analog torque command in the torque control mode of the drive. 0: Positive analog voltage -> forward torque command, negative analog voltage -> reverse torque command. 1: Analog positive voltage -> reverse torque command, analog negative voltage -> positive torque command.								

F07.61	name	Analog torque command polarity			Setting method	Shutdown setting	correlation model	T
	setting range	0~2	unit	-	Effective way	Effective immediately	factory setting	0
0x22f9 Setting instructions: Set the polarity of the analog torque command in the torque control mode of the drive. 0: both positive and negative analog voltages are valid 1: The analog positive voltage is valid, and the negative voltage forces the torque command to be 0. 2: The analog negative voltage is valid, and the positive voltage forces the torque command to be 0.								

F07.62	name	Speed limit during torque control			Setting method	Shutdown setting	correlation model	T
	setting range	0~5000	unit	rpm	Effective way	Effective immediately	factory setting	3000
contact address: 0x22fa Setting instructions: Set the speed limit value in the torque control mode of the drive. It can prevent overspeed under light load.								

F07.80	name	Internal Torque 1			Setting method	run settings	correlation model	T
	setting range	-300~300	unit	%	Effective way	Effective immediately	factory setting	0
contact address:								

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0x230c Setting instructions: Set the internal torque command 1 of the drive.

F07.81	name	Internal Torque 2			Setting method	run settings	correlation model	T
	setting range	-300~300	unit	%	Effective way	Effective immediately	factory setting	0
contact address: 0x230d Setting instructions: Set the internal torque command 2 of the drive.								

F07.82	name	Internal Torque 3			Setting method	run settings	correlation model	T
	setting range	-300~300	unit	%	Effective way	Effective immediately	factory setting	0
contact address: 0x230e Setting instructions: Set the internal torque command 3 of the drive.								

F07.83	name	Internal Torque 4			Setting method	run settings	correlation model	T
	setting range	-300~300	unit	%	Effective way	Effective immediately	factory setting	0
0x230f Setting instructions: Set the internal torque command 4 of the drive.								

F07.84	name	Torque arrival signal threshold			Setting method	run settings	correlation model	PST
	setting range	-300~300	unit	%	Effective way	Effective immediately	factory setting	0
contact address: 0x2310 Setting instructions: Set the torque arrival detection point in the drive torque control mode. When the motor torque exceeds the F07.84 parameter setting value, DO output torque arrival is ON, otherwise it is OFF. The comparator has return difference function, which is set by parameter F07.85. The comparator has a polarity setting function, which is set by parameter F07.86. For details, please refer to the description of F07.86.								

F07.85	name	Torque reaches return difference			Setting method	Shutdown setting	correlation model	PST
	setting range	0~300	unit	%	Effective way	Effective immediately	factory setting	5
0x2311 Setting instructions: Set the torque arrival return difference in the torque control mode of the drive.								

F07.86	name	Torque reach polarity			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2312 Setting instructions: Set the torque arrival polarity in the torque control mode of the drive. 0: F07.84 > 0 speed detection regardless of direction 1: F07.84 > 0 only detect positive torque F07.84 < 0 Only detect negative torque								

9.9 F08 group gain parameters

F08.00	name	speed loop gain			Setting method	run settings	correlation model	PS
	setting range	1~3000	unit	Hz	Effective way	Effective immediately	factory setting	40
contact address: 0x2320 Setting instructions: Set the proportional gain of the speed regulator. This parameter determines the response of the speed loop. The larger the value, the faster the response of the speed loop. If it is too large, it will easily cause vibration and noise. If the over-rotation inertia ratio is set correctly, the parameter value is equal to the speed response bandwidth.								

F08.01	name	Speed loop integral time constant			Setting method	run settings	name	PS
	setting range	1.0~1000.0	unit	ms	Effective way	Effective immediatel y	setting range	20.0
contact address: 0x2321 Setting instructions:								

Set the integral time constant of the speed regulator. The smaller the parameter value, the smaller the speed control error,increase rigidity, If it is too small, it will easily cause vibration and noise.

When it is set to the maximum value, it means that the integral is cancelled, and the speed regulator is a P controller.

F08.02	name	Position loop gain			Setting method	run settings	correlation model	PS
	setting range	1~1000	unit	1/s	Effective way	Effective immediately	factory setting	40
contact address: 0x2322 Setting instructions: Set the proportional gain of the position regulator. This parameter determines the response of the position loop. Increasing the parameter value can reduce the position following error and improve the rigidity. But setting too much will cause oscillation and overshoot.								

F08.00, F08.01, F08.02 and F07.05 are called the first gain.

F08.03	name	2nd speed loop gain			Setting method	run settings	correlation model	PS
	setting range	1~3000	unit	Hz	Effective way	Effective immediately	factory setting	40
contact address: 0x2323 Setting instructions:								

F08.04	name	Integral time constant of the second speed loop			Setting method	run settings	correlation model	PS
	setting range	1.0~1000.0	unit	ms	Effective way	Effective immediately	factory setting	20.0
contact address: 0x2324 Setting instructions:								

F08.05	name	2nd position loop gain			Setting method	run settings	correlation model	PS
	setting range	1~1000	unit	1/s	Effective way	Effective immediately	factory setting	40
contact address: 0x2325 Setting instructions:								

F08.02, F08.03, F08.04 and F07.06 are called the second gain.

For details about gain switching, please refer to the description of gain switching (7.3.2) .

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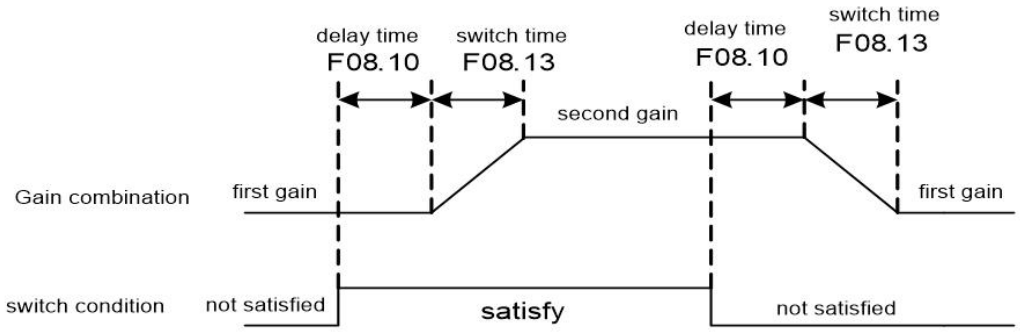
F08.10	name	Gain switching delay time			Setting method	run settings	correlation model	PST
	setting range	0~3000	unit	ms	Effective way	Effective immediately	factory setting	5
contact address: 0x232a Setting instructions: Set the delay time from when the gain switching condition is satisfied to the start of switching. If the switching condition is not met during the delay stage, the switching will be canceled.								



F08.11	name	Gain switching level			Setting method	run settings	correlation model	PST
	setting range	0~32767	unit	-	Effective way	Effective immediately	factory setting	100
contact address: 0x232b Setting instructions: Set the level that satisfies the gain switching condition, and the setting value and unit are different for different switching conditions. The comparator has return difference function, which is set by parameter F08.12. When F08.72 is set to 3, the meaning of F08.11 parameter indicates the command pulse frequency, the unit is 0.1kHz When F08.72 is set to 4, the meaning of F08.11 parameter means pulse deviation, the unit is pulse When F08.72 is set to 5, the meaning of F08.11 parameter indicates the motor speed, the unit is rpm								

F08.12	name	Gain switching time lag			Setting method	run settings	correlation model	PST
	setting range	0~32767	unit	-	Effective way	Effective immediately	factory setting	5
contact address: 0x232c Setting instructions:								

Set the time lag that satisfies the gain switching condition.

F08.13	name	Position gain switching time			Setting method	run settings	correlation model	PST
	setting range	0~3000	unit	ms	Effective way	Effective immediately	factory setting	5
contact address: 0x232d Setting instructions: set the linear smoothing time for switching from the current gain combination to the target gain combination, which can avoid the impact caused by sudden parameter changes.								

F08.15	name	Load moment of inertia ratio			Setting method	Shutdown setting	correlation model	PST
	setting range	0.0~200.0	unit	times	Effective way	power on again	factory setting	1.0
contact address: 0x232f Setting instructions: Set the ratio of the moment of inertia of the mechanical load (converted to the motor shaft) to the moment of inertia of the motor rotor.								

F08.18	name	Speed feed-forward filter time constant			Setting method	Shutdown setting	correlation model	P
	setting range	0.20~50.00	unit	ms	Effective way	power on again	factory setting	1.00
contact address: 0x2332 Setting instructions: Set the filter time constant for speed feedforward to increase the stability of feedforward control.								

F08.19	name	Velocity Feedforward Gain			Setting method	Shutdown setting	correlation model	P
	setting range	0~100	unit	%	Effective way	power on again	factory setting	0
contact address: 0x2333 Setting instructions: Set the gain for speed feedforward. Increasing the parameter can reduce the position tracking error during position control and improve the position control response. If it is too large, the system will be unstable and oscillation will easily occur.								

F08.40	name	speed observer enable	Setting method	Shutdown setting	correlation model	P

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	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2348 Setting instructions: Sets whether the velocity observer is enabled. 0: Disable speed observer, speed feedback source and filter. 1: Turn on the speed observer, the speed feedback source and the observer.								

F08.42	name	Model Following Control Mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~3	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x234a Setting instructions: Set the model tracking control mode, which is suitable for position control, and select appropriate parameters according to different loads to improve the response of the system. 0: Model tracking is disabled. 1: For rigid loads. 2: reserved 3: Universal type.								

F08.46	name	Model Tracking Velocity Compensation Feedforward			Setting method	Shutdown setting	correlation model	P
	setting range	0~100	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x234e Setting instructions: Set the model tracking speed compensation feedforward, which is applicable to modes 1~3. The larger the parameter value, the greater the speed loop feedforward effect, and it will cause noise if it is too large.								

F08.51	name	Model Tracking Velocity Compensation Feedforward Filter Time			Setting method	Shutdown setting	correlation model	P
	setting range	0.10~50.00	unit	ms	Effective way	Effective immediately	factory setting	0.50
contact address: 0x2353 Setting instructions: Set the model tracking speed compensation feed-forward filter time, which is suitable for mode 3. The larger the parameter value, the smaller the noise, and the compensation lag will be caused if it is too large.								

F08.53	name	IF Vibration 1 Frequency			Setting method	Run settings	correlation model	P
	setting range	50~2000	unit	hz	Effective way	Effective immediately	factory setting	100
contact address: 0x2355 Setting instructions: IF vibration suppression 1 is enabled to manually set the frequency point mode (F08.81 is set to 1) and it is valid								

F08.54	name	Damping coefficient of IF vibration suppression 1			Setting method	run settings	correlation model	P
	setting range	0~300	unit	%	Effective way	Effective immediately	factory setting	150
contact address: 0x2356 Setting instructions: Set the damping coefficient of intermediate frequency vibration suppression 1. Increasing the damping coefficient can improve the anti-vibration effect, but if it is too large, it will increase the vibration.								

F08.56	name	Compensation coefficient of IF vibration suppression 1			Setting method	run settings	correlation model	P
	setting range	1~1000	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x2358 Setting instructions: Set the compensation coefficient of intermediate frequency vibration suppression 1; when the load moment of inertia ratio (F08.15) is set properly, this parameter is recommended to be set to 100. If the inertia cannot be obtained, this value is inversely proportional to the actual load inertia.								

F08.59	name	Medium frequency vibration 2 frequency			Setting method	run settings	correlation model	P
	setting range	50~2000	unit	hz	Effective way	Effective immediately	factory setting	100
contact address: 0x235B Setting instructions: If the intermediate frequency vibration suppression 2 is turned on, the manual setting frequency point mode (F08.82 is set to 1) is valid.								

F08.60	name	Damping Coefficient of IF Vibration Suppression 2	Setting method	run settings	correlation model	P

	setting range	0~300	unit	%	Effective way	Effective immediately	factory setting	150
contact address: 0x235C Setting instructions: Set the damping coefficient of intermediate frequency vibration suppression 2. Increasing the damping coefficient can improve the anti-vibration effect, but if it is too large, it will increase the vibration.								

F08.61	name	Compensation coefficient of IF vibration suppression 2			Setting method	run settings	correlation model	P
	setting range	1~1000	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x235D Setting instructions: Set the compensation coefficient of intermediate frequency vibration suppression 2; when the load moment of inertia ratio (F08.15) is set properly, this parameter is recommended to be set to 100. If the inertia cannot be obtained, this value is inversely proportional to the actual load inertia.								

F08.70	name	2nd torque filter frequency			Setting method	Shutdown setting	correlation model	PST
	setting range	100~5000	unit	Hz	Effective way	Effective immediately	factory setting	5000
contact address: 0x2366 Setting instructions: Sets the cutoff frequency of the 2nd torque second-order type filter.								

F08.71	name	2nd torque filter quality factor			Setting method	Shutdown setting	correlation model	PST
	setting range	1~100	unit	-	Effective way	Effective immediately	factory setting	50
contact address: 0x2367 Setting instructions: Sets the quality factor of the 2nd torque second-order type filter.								

F08.72	name	Gain switching selection			Setting method	Shutdown setting	correlation model	ALL
	setting range	0~5	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2368								

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Setting instructions: Set the gain switching mode, the parameter meanings are as follows. 0: Fixed 1st gain 1: Fixed 2nd gain 2: Determined by the DI input FunIN.3 (GAIN-SEL) signal level, OFF is the first gain, ON is the second gain 3: Command pulse frequency control, the second gain takes effect when the input pulse frequency is higher than the setting value of parameter F08.11, otherwise the second gain takes effect 4: Pulse deviation control, the second gain takes effect when the position pulse deviation exceeds the setting value of F08.11, otherwise the first gain takes effect 5: Motor speed control, when the motor speed value exceeds the setting value of F08.11, the second gain takes effect, otherwise the first gain takes effect

F08.75	name	Tip vibration detection filter frequency			Setting method	Shutdown setting	correlation model	P
	setting range	10~2000	unit	Hz	Effective way	Effective immediately	factory setting	200
contact address: 0x236b Setting instructions: Sets the tip vibration detection filter frequency.								

F08.76	name	Low frequency suppression minimum detection amplitude			Setting method	Shutdown setting	correlation model	P
	setting range	3~32767	unit	P	Effective way	Effective immediately	factory setting	5
contact address: 0x236c Setting instructions: Set the minimum detection amplitude of low frequency suppression.								

F08.77	name	Vibration suppression compensation coefficient			Setting method	Shutdown setting	correlation model	P
	setting range	1.0~100.0	unit	-	Effective way	Effective immediately	factory setting	1.0
contact address: 0x236d Setting instructions: Set the vibration suppression compensation coefficient. The larger the value, the more obvious the suppression effect. If it is too large, it will cause mechanical noise.								

F08.78	name	Vibration Suppression Mode			Setting method	Shutdown setting	correlation model	P
	setting	0~3	unit	-	Effective	Effective	factory	0

	range				way	immediately	setting	
contact address: 0x236e Setting instructions: Sets the vibration suppression operating mode. 0: Disable the vibration suppression function. 1: Automatic detection of vibration frequency, suitable for occasions where the inertia changes little. 2: Automatic detection of vibration frequency, suitable for occasions where the inertia always changes. 3: Manually set the vibration frequency, suitable for occasions where the vibration frequency is known.								

F08.79	name	Low frequency vibration cycle			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	ms	Effective way	Effective immediately	factory setting	0
contact address: 0x236f Setting instructions: Set the vibration cycle that needs to be suppressed when F08.78 vibration suppression mode is set to 3.								

F08.81	name	Medium frequencyVibration Suppression 1 Mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~2	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2371 Setting instructions: Set the running mode 1 of medium frequencyvibration suppression . 0: medium frequencyvibration suppression is invalid. 1: medium frequencyvibration suppression is valid. 2: Automatic setting of mediumfrequency vibration suppression.								

F08.82	name	Medium frequencyVibration Suppression 2 Mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~2	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2372 Setting instructions: Set the running mode 2 of medium frequencyvibration suppression . 0: medium frequencyvibration suppression is invalid. 1: medium frequencyvibration suppression is valid. 2: Automatic setting of medium frequency vibration suppression.								

F08.83	name	Advanced Control Speed Loop High Response Mode Gain Percentage			Setting method	Shutdown setting	correlation model	PS
	setting range	0~1000	unit	%	Effective way	Effective immediately	factory setting	50
contact address: 0x2373 Setting instructions: Set the gain percentage of advanced control high response mode, setting 20~80 can meet the needs, if it is too large, it will cause mechanical vibration.								

F08.84	name	Advanced Control Speed Loop High Response Mode Switch			Setting method	Shutdown setting	correlation model	PS
	setting range	0~2	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2374 Setting instructions: Set whether the high-response mode of the advanced control speed loop is valid. 0: Turn off the high-response mode of the advanced control speed loop. 1: Turn on the high-response mode of the advanced control speed loop and keep the default gain. 2: Turn on the high-response mode of the advanced control speed loop, and the gain is adjustable.								

F08.85	name	Multiples of advanced control speed loop			Setting method	Shutdown setting	correlation model	PS
	setting range	10~1000	unit	-	Effective way	Effective immediately	factory setting	100
contact address: 0x2375 Setting instructions: Set the multiple of the advanced control speed loop, it is recommended to set it between 75 and 150.								

F08.86	name	Friction Compensation Gain			Setting method	Shutdown setting	correlation model	P
	setting range	10~1000	unit	-	Effective way	Effective immediately	factory setting	100
contact address: 0x2376 Setting instructions: Set the friction compensation gain. When the load moment of inertia ratio is set reasonably, this parameter is set to 100; when the load moment of inertia ratio is uncertain, the value of this parameter is inversely proportional to the actual load moment of inertia ratio.								

F08.87	name	Friction Compensation Damping Coefficient			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2377 Setting instructions: Sets the friction compensation damping coefficient. 0: Disable the friction compensation function. Non-0: Increasing the parameter value can suppress the vibration, but it will increase the vibration if it is too large.								

F08.88	name	Friction compensation observer gain			Setting method	Shutdown setting	correlation model	P
	setting range	0~1200	unit	Hz	Effective way	Effective immediately	factory setting	400
contact address: 0x2378 Setting instructions: Set the gain of the friction compensation observer. Increasing the parameter value can compensate for external disturbances faster. If it is too large and there is a resonance frequency in the machine, it will cause vibration.								

F08.89	name	Advanced Control Mode Current Loop Mode Selection			Setting method	Shutdown setting	correlation model	PS
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2379 Setting instructions: Set the advanced control mode current loop mode. 0: Speed loop adopts advanced control. 1: Both the speed loop and the current loop adopt advanced control.								

F08.90	name	Advanced Control Nonlinear Function Structures			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	1
contact address: 0x237a Setting instructions: Sets the advanced control nonlinear function structure. 0: Advanced control non-linear functions apply structure 0. 1: High-level control nonlinear functions apply structure 1.								

F08.91	name	Advanced Control Velocity Feedback Source			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x237b Setting instructions: Sets the source of speed feedback for advanced control. 0: The advanced control speed feedback comes from the original speed. 1: Advanced control speed feedback comes from filter output speed.								

F08.92	name	Advanced Control Function Switch			Setting method	Shutdown setting	correlation model	P
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x237c Setting instructions: Set whether the advanced control function takes effect. 0: The servo loop control adopts the traditional control mode. 1: Servo loop control adopts advanced control mode.								

F08.93	name	Advanced Control Velocity Observer Bandwidth			Setting method	Shutdown setting	correlation model	PS
	setting range	100~2000	unit	Hz	Effective way	Effective immediately	factory setting	300
contact address: 0x237d Setting instructions: Set the bandwidth of the advanced control speed observer. Increasing the parameter value can improve the following ability and anti-interference ability. If it is too large, it will be easily disturbed by noise.								

F08.94	name	Advanced Control Speed Observer Bandwidth Parameter Switch			Setting method	Shutdown setting	correlation model	PS
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x237e Setting instructions: Sets whether the advanced control speed observer bandwidth parameter is valid. 0: Advanced Control Speed Observer Bandwidth parameter is invalid. 1: Advanced control speed observer bandwidth parameter is valid.								

F08.95	name	Advanced Control Current Observer Bandwidth			Setting method	Shutdown setting	correlation model	PS
	setting range	50~400	unit	10 Hz	Effective way	Effective immediatel y	factory setting	180
contact address: 0x237f Setting instructions: Set the bandwidth parameter of the advanced control current observer. Increasing the parameter value can improve the current following ability and anti-interference ability, and it is easy to be disturbed by noise if it is too large.								

F08.96	name	Advanced Control Current Observer Bandwidth Parameter Switch			Setting method	Shutdown setting	correlation model	PS
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x2380 Setting instructions: Set whether the advanced control current observer bandwidth parameter is valid. 0: Advanced Control Current Observer Bandwidth parameter is invalid. 1: The advanced control current observer bandwidth parameter is valid.								

F08.97	name	Advanced control 1st torque filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	5~500	unit		Effective way	Effective immediately	factory setting	10
contact address: 0x2381 Setting instructions: Set the advanced control 1st torque low-pass filter time constant. Increasing the parameter value can better suppress vibration and reduce torque current fluctuations. If it is too large, the response will slow down and cause vibration; reducing the parameter value can make the response faster, but it will be limited by mechanical conditions.								

F08.98	name	Advanced Control Nonlinear Function Types			Setting method	Shutdown setting	correlation model	PST
	setting range	0~5	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2382 Setting instructions: Sets the advanced control nonlinear function type. 0: linear. 1: Non-linear type 1.								

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2: Non-linear type 2. 3: Non-linear type 3. 4: Non-linear type 4. 5: Non-linear type 5.

F08.99	name	Advanced Control Nonlinear Function Gain Multiplier			Setting method	Shutdown setting	correlation model	PST
	setting range	0~100	unit		Effective way	Effective immediately	factory setting	15
contact address: 0x2383 Setting instructions: Setting the gain multiple of the advanced control nonlinear function and increasing the parameter value can improve the speed following ability and anti-disturbance ability.								

9.10 Group F09 self-tuning parameters

F09.01	name	Rigidity level selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~22	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2385 Setting instructions: Sets the stiffness level. 0: Rigidity level setting does not take effect. 1~22: The higher the rigidity level, the stronger the gain and the faster the response, if it is too high, it will cause vibration.								

F09.12	name	1st resonant notch filter frequency			Setting method	Shutdown setting	correlation model	PST
	setting range	50~5000	unit	Hz	Effective way	Effective immediately	factory setting	5000
contact address: 0x2390 Setting instructions: Set the center frequency of the first resonance notch filter, and the parameter value is 0 to close the notch filter.								

F09.13	name	Quality factor of the 1st resonant notch filter			Setting method	Shutdown setting	correlation model	PST
	setting range	1~100	unit		Effective way	Effective immediately	factory setting	7
contact address:								

0x2391 Setting instructions: Set the quality factor of the first resonance notch filter. The larger the quality factor, the sharper the shape of the notch filter and the narrower the -3dB notch width.

F09.14	name	1st resonant notch filter depth			Setting method	Shutdown setting	correlation model	PST
	setting range	0~60	unit	dB	Effective way	Effective immediately	factory setting	0
contact address: 0x2392 Setting instructions: Set the depth of the first resonance notch filter. The greater the depth, the greater the notch filter depth and the greater the filter gain attenuation; the parameter value is 0 to turn off the notch filter.								

F09.15	name	2nd resonant notch filter frequency			Setting method	Shutdown setting	correlation model	PST
	setting range	50~5000	unit	Hz	Effective way	Effective immediately	factory setting	5000
contact address: 0x2393 Setting instructions: Set the parameters of the second resonance notch filter, see F09.12 for details								

F09.16	name	2nd Resonance Notch Filter Quality Factor			Setting method	Shutdown setting	correlation model	PST
	setting range	1~100	unit		Effective way	Effective immediately	factory setting	7
contact address: 0x2394 Setting instructions: Set the parameters of the second resonance notch filter, see F09.13 for details.								

F09.17	name	2nd resonance notch filter depth			Setting method	Shutdown setting	correlation model	PST
	setting range	0~60	unit	dB	Effective way	Effective immediately	factory setting	0
contact address: 0x2395 Setting instructions: Set the parameters of the second resonance notch filter, see F09.14 for details.								

F09.18	name	3rd resonant notch filter	Setting	Shutdown	correlation	PST

		frequency			method	setting	model	
	setting range	50~5000	unit	Hz	Effective way	Effective immediately	factory setting	5000
contact address: 0x2396 Setting instructions: Set the parameters of the 3rd resonance notch filter, see F09.12 for details.								

F09.19	name	3rd Resonance Notch Filter Quality Factor			Setting method	Shutdown setting	correlation model	PST
	setting range	1~100	unit		Effective way	Effective immediately	factory setting	7
contact address: 0x2397 Setting instructions: Set the parameters of the 3rd resonance notch filter, see F09.13 for details.								

F09.20	name	3rd resonance notch filter depth			Setting method	Shutdown setting	correlation model	PST
	setting range	0~60	unit	dB	Effective way	Effective immediately	factory setting	0
contact address: 0x2398 Setting instructions: Set the parameters of the 3rd resonance notch filter, see F09.14 for details.								

F09.21	name	4th resonant notch filter frequency			Setting method	Shutdown setting	correlation model	PST
	setting range	50~5000	unit	Hz	Effective way	Effective immediately	factory setting	5000
contact address: 0x2399 Setting instructions: Set the parameters of the 4th resonance notch filter, see F09.12 for details.								

F09.22	name	4th Resonance Notch Filter Quality Factor			Setting method	Shutdown setting	correlation model	PST
	setting range	1~100	unit		Effective way	Effective immediately	factory setting	7
F09.13。 contact address: 0x239a Setting instructions:								

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Set the parameters of the 4th resonance notch filter, see F09.13 for details.

F09.23	name	4th resonance notch filter depth			Setting method	Shutdown setting	correlation model	PST
	setting range	0~60	unit	dB	Effective way	Effective immediately	factory setting	0
contact address: 0x239b Setting instructions: Set the parameters of the 4th resonance notch filter, see F09.14 for details.								

F09.57	name	Velocity Observer Gain			Setting method	Shutdown setting	correlation model	P
	setting range	10~1000	unit	Hz	Effective way	Effective immediately	factory setting	120
contact address: 0x23bd Setting instructions: Set the speed observer gain and increase the parameter value to make the observer output track to the actual speed feedback faster.								

F09.58	name	Speed observer compensation coefficient			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	%	Effective way	Effective immediately	factory setting	150
contact address: 0x23be Setting instructions: Set the compensation coefficient of the speed observer. The default value is not recommended to be modified.								

F09.60	name	Inertia Identification Mode			Setting method	Shutdown setting	correlation model	P
	setting range	0~2	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x23c0 Setting instructions: Set the inertia identification operation mode. 0: Disable inertia identification. 1: Retain the manufacturer applicable. 2: Online identification mode.								

F09.66	name	Inertia estimation mode	Setting	Shutdown	correlation	P

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					method	setting	model	
	setting range	0~10	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x23c6 Setting instructions: Set the inertia identification and estimation mode, and the parameter value corresponds to the inertia setting value of the inertia estimation mode.								

F09.67	name	Model Tracking Control Gain			Setting method	Shutdown setting	correlation model	P
	setting range	10~2000	unit	Hz	Effective way	Effective immediately	factory setting	40
contact address: 0x23c7 Setting instructions: Set the model tracking control gain, modes 1 to 3 are valid. The larger the parameter value is, the faster the response will be, and if it is too large, it will cause noise.								

F09.68	name	Model Tracking Damping Ratio			Setting method	Shutdown setting	correlation model	P
	setting range	50~200	unit	-	Effective way	Effective immediately	factory setting	100
contact address: 0x23c8 Setting instructions: Sets the model tracking damping ratio.								

F09.69	name	Model-Tracking forward proportional control			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	%	Effective way	Effective immediately	factory setting	100
contact address: 0x23c9 Setting instructions: Set model tracking positive direction control deviation, modes 1~3 are valid. The larger the parameter value, the greater the torque loop feedforward effect, and if it is too large, it will cause noise. This parameter can adjust the response speed of forward rotation.								

F09.70	name	Model Tracking reverse Proportional Control			Setting method	Shutdown setting	correlation model	P
	setting range	0~1000	unit	%	Effective way	Effective immediately	factory setting	100

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contact address: 0x23ca Setting instructions: Set model tracking reverse direction control deviation, modes 1~3 are valid. The larger the parameter value, the greater the torque loop feedforward effect, and if it is too large, it will cause noise. This parameter adjusts the response speed of inversion.

F09.75	name	Model Tracking Velocity Loop Gain			Setting method	Shutdown setting	correlation model	P
	setting range	1~3000	unit	Hz	Effective way	Effective immediately	factory setting	40
contact address: 0x23cf Setting instructions: Sets the model tracking velocity loop gain.								

F09.76	name	Model Tracking Velocity Loop Integral Time Constant			Setting method	Shutdown setting	correlation model	P
	setting range	1.0~1000.0	unit	ms	Effective way	Effective immediately	factory setting	20.0
contact address: 0x23d0 Setting instructions: Set the model tracking speed loop integral time constant.								

F09.77	name	Vibration alarm time			Setting method	Shutdown setting	correlation model	P
	setting range	0~100	unit	s	Effective way	Effective immediately	factory setting	0
contact address: 0x23d1 Setting instructions: Set the vibration alarm time. It will not take effect when the maximum value is set. The value is 3 as a unit, and each unit corresponds to 1s.								

F09.97	name	Notch Filter Function Settings			Setting method	Shutdown setting	correlation model	PST
	setting range	0~FFFF	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x23e5 Setting instructions: Set the notch filter function.								

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Bit0: 0: Automatic setting of the first notch filter is enabled; 1: The automatic setting of the first notch filter is disabled. Bit1: 0: The second notch filter automatic setting is enabled; 1: The automatic setting of the second notch filter is disabled. Bit2: 0: The automatic setting of the third notch filter is enabled; 1: The automatic setting of the third notch filter is disabled. Bit3: 0: The 4th notch filter is automatically set to open; 1: The automatic setting of the 4th notch filter is disabled. Bit4: 0: Close the automatic setting function after the automatic setting of the first notch filter is successful; 1: The automatic setting function of the first notch filter is always on. Bit5: 0: Close the automatic setting function after the automatic setting of the second notch filter is successful; 1: The automatic setting function of the second notch filter is always on. Bit6: 0: Close the automatic setting function after the automatic setting of the third notch filter is successful; 1: The automatic setting function of the third notch filter is always on. Bit7: 0: Close the automatic setting function after the automatic setting of the fourth notch filter is successful; 1: The automatic setting function of the 4th notch filter is always on. Other bits are meaningless

9.11 Group F0A fault and protection parameters

F0A.00	name	Power input phase loss protection selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	-	Effective way	Effective immediately	factory setting	0
contact address: 0x23e8 Setting instructions: Is the power input phase loss protection function enabled 1.No phase loss detection for power input. 2.Detecting phase loss for power input.								

F0A.04	name	Overload Protection Detection Gain			Setting method	Shutdown setting	correlation model	PST
	setting range	0~500	unit	%	Effective way	Effective immediately	factory setting	117
contact address: 0x23ec Setting instructions: Set the overload protection detection gain.								

F0A.08	name	Overspeed Detection Percentage	Setting method	Shutdown setting	correlation model	PST

	setting range	0~400	unit	%	Effective way	Effective immediately	factory setting	140
contact address: 0x23f0 Setting instructions: Based on the maximum speed of the motor, set the motor overspeed detection percentage.								

F0A.10	name	Detection threshold of excessive position deviation			Setting method	Shutdown setting	correlation model	P
	setting range	0.00~327.67	unit	lock up	Effective way	Effective immediatel y	factory setting	4.00
contact address: 0x23f2 Setting instructions: Set the detection range of excessive position deviation, the unit is circle, multiplied by the resolution of the motor encoder to get the number of pulses. In the position control mode, when the position deviation counter count value exceeds the F0A.10 parameter setting value, the servo drive will give an alarm.								

F0A.25	name	Speed feedback display value filter time parameter			Setting method	Shutdown setting	correlation model	PST
	setting range	0.1~1000.0	unit	ms	Effective way	power on again	factory setting	80.0
contact address: 0x2401 Setting instructions: Set the filter time constant when the speed feedback value is used for display to make the speed display smoother.								

F0A.36	name	Encoder multi-turn overflow fault selection			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit	-	Effective way	power on again	factory setting	1
contact address: 0x240c Setting instructions: Set whether to detect encoder multi-turn overflow fault. 0: Detect encoder multi-turn overflow fault. 1: Shield encoder multi-turn overflow fault.								

F0A.50	name	Forward rotation torque overload alarm threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	0~300	unit	%	Effective way	power on again	factory setting	300

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contact address: 0x241a Setting instructions: Set the forward rotation torque overload alarm threshold. When the forward rotation torque of the motor exceeds the F0A.50 parameter setting value and the duration exceeds the F0A.52 parameter setting value, the servo drive will give an alarm; when the parameter value is 0, no forward rotation detection will be performed. Torque overload.

F0A.51	name	Reverse torque overload alarm threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	-300~0	unit	%	Effective way	power on again	factory setting	-300
contact address: 0x241b Setting instructions: Set the reverse torque overload alarm threshold. When the motor reverse torque exceeds the F0A.51 parameter setting value and the duration exceeds the F0A.52 parameter setting value, the servo drive will give an alarm; when the parameter value is 0, no reverse rotation will be detected. Torque overload.								

F0A.52	name	Torque Overload Alarm Duration Threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	0~10000	unit	10ms	Effective way	power on again	factory setting	0
contact address: 0x241c Setting instructions: Set the torque overload alarm duration threshold.								

F0A.60	name	Protection detection program running cycle			Setting method	Shutdown setting	correlation model	PST
	setting range	5~100	unit	ms	Effective way	power on again	factory setting	5
contact address: 0x2424 Setting instructions: Set the running cycle of the protection detection program.								

F0A.61	name	Speed feedback monitoring value filter time parameter			Setting method	Shutdown setting	correlation model	PST
	setting range	0.0~300.0	unit	ms	Effective way	power on again	factory setting	2.0
contact address: 0x2425 Setting instructions:								

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Set the filter time constant for speed feedback value monitoring.

F0A.62	name	Speed feedback reading value filter time parameter			Setting method	Shutdown setting	correlation model	PST
	setting range	0.0~300.0	unit	ms	Effective way	Effective immediately	factory setting	0.1
contact address: 0x2426 Setting instructions: Set the filter time constant for reading the speed feedback value。								

F0A.63	name	Pulse command frequency detection filter time constant			Setting method	Shutdown setting	correlation model	P
	setting range	0.1~1000.0	unit	ms	Effective way	Effective immediately	factory setting	4.0
ontact address: 0x2426 Setting instructions: It is used to calculate the frequency value corresponding to the input pulse.								

F0A.64	name	Current feedback monitor value filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	1~3000	unit	ms	Effective way	Effective immediately	factory setting	24
contact address: 0x2427 Setting instructions: Set the filter time constant for monitoring the current feedback value.								

F0A.65	name	Torque feedback monitoring value filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	1~3000	unit	ms	Effective way	Effective immediately	factory setting	24
contact address: 0x2428 Setting instructions: Set the filter time constant for torque feedback value monitoring.								

F0A.66	name	Brake power feedback pre-detection filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	1~3000	unit	ms	Effective way	Effective immediately	factory setting	40
contact address:								

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0x2429 Setting instructions: Sets the filter time constant for brake power feedback pre-detection.

F0A.67	name	Average load rate feedback detection filter time constant			Setting method	Shutdown setting	correlation model	PST
	setting range	1~3000	unit	the s	Effective way	Effective immediately	factory setting	30
contact address: 0x242b Setting instructions: Set the filter time constant for the average load rate feedback detection.								

F0A.68	name	Peak detection data statistics time			Setting method	Shutdown setting	correlation model	PST
	setting range	1~30	unit	the s	Effective way	power on again	factory setting	10
contact address: 0x242c Setting instructions: Set the statistical time of various peak detection data, including peak current, peak torque, etc.								

F0A.70	name	Motor standstill speed detection threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1000	unit	rpm	Effective way	power on again	factory setting	5
contact address: 0x242e Setting instructions: Set the motor static speed detection threshold. When the motor speed is lower than the F0A.70 parameter setting value, the motor is considered to be in a static state.								

F0A.72	name	Switch position control mode speed detection threshold			Setting method	Shutdown setting	correlation model	PST
	setting range	0~3000	unit	rpm	Effective way	power on again	factory setting	15
contact address: 0x2430 Setting instructions: Set the speed detection threshold for switching to position control mode. When switching to the position control mode, when the speed value is less than the F0A.70 parameter value, the position deviation is cleared; otherwise, the initial value of the position deviation needs to be set appropriately to avoid impact.								

9.12 Group F0b monitoring parameters

F0B.00	name	Motor actual speed			Setting method	unchangeable	correlation model	PST
	display range	-9999~9999	unit	rmp	Effective way	-	Defaults	0
contact address: 0x244c Setting instructions: Display the actual rotational speed of the servo motor, after rounding, the accuracy is 1rpm. The filter time constant for F0b.00 can be set through F0A.25 (speed feedback display value filter time constant).								

F0B.01	name	speed command			Setting method	unchangeable	correlation model	PST
	display range	-9999~9999	unit	rmp	Effective way	-	Defaults	0
contact address: 0x244d Setting instructions: In position and speed mode, it displays the current speed command value of the driver with an accuracy of 1rpm.								

F0B.02	name	Internal torque command			Setting method	unchangeable	correlation model	PST
	display range	-300~300	unit	%	Effective way	-	Defaults	0
contact address: 0x244e Setting instructions: relative to the rated torque Displays the current torque command value with an accuracy of 0.1%, and 100.0% corresponds to 1 times the rated torque of the motor.								

F0B.03	name	Input signal monitoring DI			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	-	Effective way	-	Defaults	0
contact address: 0x244f Setting instructions: Display the current level status of 7 hardware DI terminals. Display mode: the upper half of the digital tube is bright, indicating that the optocoupler is conducting; the lower half is bright, indicating that the optocoupler is not conducting.								

F0B.05	name	Output signal monitoring DO			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	-	Effective way	-	Defaults	0
contact address: 0x2451 Setting instructions: Display the current level status of 5 hardware DO terminals. Display mode: the upper half of the digital tube is bright, indicating that the optocoupler is conducting; the lower half is bright, indicating that the optocoupler is not conducting.								

F0B.07	name	Absolute Position Counter			Setting method	unchange able	correlation model	PST
	display range	-2147483648 2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x2453 Setting instructions: In position mode, it displays the current absolute position of the motor (command unit). The parameter is 32 bits, and the panel display is decimal data.								

F0B.09	name	mechanical angle			Setting method	unchangeable	correlation model	PST
	display range	0.0-65535	unit	°	Effective way	-	Defaults	0
contact address: 0x2455 Setting instructions: the number of pulses starting from the origin Displays the current mechanical angle of the motor (encoder unit), 0 corresponds to a mechanical angle of 0°.								

F0B.10	name	electrical angle			Setting method	unchangeable	correlation model	PST
	display range	0.0-360.0	unit	°	Effective way	-	Defaults	0
contact address: 0x2456 Setting instructions: Display the current electrical angle of the motor with an accuracy of 0.1°. When the motor rotates, the electrical angle range is ±360.0°; When the motor has 4 pairs of poles, the motor will undergo 4 changes of 0°~359° every time it rotates; Similarly, when the motor has 5 pairs of poles, the electrical angle will change 5 times from 0° to 359° every time the motor rotates								

F0B.12	name	average load value			Setting method	unchangeable	correlation model	PST
	display range	0-800	unit	%	Effective way	-	Defaults	0
contact address: 0x2458 Setting instructions: Displays the percentage of the average load torque to the rated torque of the motor, with an accuracy of 0.1%, and 100.0% corresponds to 1 times the rated torque of the motor.								

F0B.13	name	Input instruction counter			Setting method	unchangeable	correlation model	P
	display range	-2147483648 2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x2459 Setting instructions: During servo operation, count and display the number of position commands that have not been multiplied by the electronic gear ratio. The parameter is 32 bits, and the panel display is decimal data.								

F0B.15	name	Encoder position deviation counter			Setting method	unchangeable	correlation model	P
	display range	-2147483648 2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x245b Setting instructions: In the position mode, the position deviation value after the electronic gear ratio is multiplied is counted and displayed. The parameter is 32 bits, and the panel display is decimal data.								

F0B.17	name	Feedback pulse counter			Setting method	unchangeable	correlation model	PST
	display range	-2147483648 2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x245d Setting instructions: In any mode, count the position pulses fed back by the encoder. The parameter is 32 bits, and the panel display is decimal data.								

F0B.19	name	total power-on time	247	Setting method	unchangeable	correlation model	PST

	display range	0.0s~429496729.5	unit	s	Effective way	-	Defaults	0
contact address: 0x245f Setting instructions: This parameter is used to record the total running time of the servo drive.								

F0B.21	name	Analog channel 1 voltage sampling value			Setting method	unchangeable	correlation model	ST
	display range	-10.00~10.00	unit	V	Effective way	-	Defaults	0
contact address: 0x2461 Setting instructions: Analog channel 1 voltage sampling value, display accuracy is 0.01V.								

F0B.22	name	Analog channel 2 voltage sampling value			Setting method	unchangeable	correlation model	ST
	display range	-10.00~10.00	unit	V	Effective way	-	Defaults	0
contact address: 0x2462 Setting instructions: Analog channel 2 voltage sampling value, display accuracy is 0.01V.								

F0B.24	name	Phase current effective value			Setting method	unchangeable	correlation model	PST
	display range	0.0~6553.5	unit	A	Effective way	-	Defaults	0
contact address: 0x2464 Setting instructions: Servo motor phase current effective value, display accuracy is 0.01A.								

F0B.26	name	Bus voltage value			Setting method	unchangeable	correlation model	PST
	display range	0.0~6553.5	unit	V	Effective way	-	Defaults	0
contact address: 0x2466 Setting instructions: The rectified DC bus voltage value of the main circuit input voltage of the driver.								

F0B.27	name	Module temperature value			Setting method	unchangeable	correlation model	PST
	display range	-20~200	unit	℃	Effective way	-	Defaults	0
contact address: 0x2467 Setting instructions: The temperature value of the internal module of the drive can be used as a reference value for the current actual temperature of the drive.								

F0B.33	name	fault record			Setting method	Change in real time	correlation model	PST
	display range	0~20	unit	-	Effective way	-	Defaults	0

contact address:

0x246d

Setting value:

0: current faults

1: last faults

2: Last 2 faults

3: last 3 faults

4: Last 4 faults

5: last 5 faults

6: last 6 faults

7: Last 7 faults

8: Last 8 faults

9: last 9 faults

10: last 10 failures

11: last 11 faults

12: last 12 faults

13: last 13 faults

14: last 14 faults

15: last 15 faults

16: last 16 faults

17: Last 17 failures

18: last 18 faults

19: Last 19 failures

Setting instructions:

It is used to select and view the latest 20 faults of the servo drive.

F0B.34	name	Selected number of fault codes	Setting method	unchangeable	correlation model	PST

	display range	0~20	unit	-	Effective way	-	Defaults	0
contact address: 0x246e Setting instructions: Display the fault code selected by F0b.33.								

F0B.35	name	Timestamp of selected number of failures			Setting method	unchangeable	correlation model	PST
	display range	0.0~429496729.5	unit	the s	Effective way	-	Defaults	0
contact address: 0x246f Setting instructions: Displays the time from power on to the occurrence of the selected fault.								

F0B.37	name	Motor speed at selected fault			Setting method	unchangeable	correlation model	PST
	display range	-32767~32767	unit	rpm	Effective way	-	Defaults	0
contact address: 0x2471 Setting instructions: Displays the speed at which the motor failed.								

F0B.38	name	Motor U-phase current at selected fault			Setting method	unchangeable	correlation model	PST
	display range	-3276.7~3276.7	unit	A	Effective way	-	Defaults	0
contact address: 0x2472 Setting instructions: Displays the U-phase current when the motor fails.								

F0B.39	name	Motor V-phase current at selected faults			Setting method	unchangeable	correlation model	PST
	display range	-3276.7~3276.7	unit	A	Effective way	-	Defaults	0
contact address: 0x2473 Setting instructions: Displays the V-phase current of the faulty motor.								

F0B.40	name	Bus voltage at selected fault			Setting method	unchangeable	correlation model	PST
	display range	0.0~6553.5	unit	V	Effective way	-	Defaults	0
contact address: 0x2474 Setting instructions: Display faulty bus voltage								

F0B.41	name	Input terminal state at the time of the selected fault			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	-	Effective way	-	Defaults	0
contact address: 0x2475 Setting instructions: Displays the status of input terminals in case of failure								

F0B.43	name	Output terminal state at the time of the selected fault			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	-	Effective way	-	Defaults	0
contact address: 0x2477 Setting instructions: Display the status of the output terminal in case of failure								

F0B.53	name	Position deviation counter			Setting method	unchangeable	correlation model	P
	display range	-2147483648~ 2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x2481 Setting instructions: In position control mode, the value of position deviation without electronic gear ratio. The position deviation (command unit) is the value converted from the position deviation of the encoder, and there is a loss of precision when performing division operations. The parameter is 32 bits, and the panel display is decimal data.								

F0B.55	name	Motor actual speed			Setting method	unchangeable	correlation model	PST
	display range	-2147483648~ 2147483647	unit	rpm	Effective way	-	Defaults	0

contact address:

0x2483

Setting instructions:

Display the actual running speed of the servo motor with an accuracy of 0.1rpm.

The parameter is 32 bits, and the panel display is decimal data.

F0A.25 can be used to set the speed feedback filter time constant for display.

F0B.58	name	mechanical absolute position			Setting method	unchangeable	correlation model	PST
	display range	-2147483648~ 2147483647	unit	p	Effective way	-	Defaults	0

contact address:

0x2486

Setting instructions:

Displays the lower 32-bit value (encoder unit) of the position feedback corresponding to the machine when the absolute value function is used.

F0B.60	name	mechanical absolute position			Setting method	unchangeable	correlation model	PST
	display range	-2147483648~ 2147483647	unit	p	Effective way	-	Defaults	0

contact address:

0x2488

Setting instructions:

Displays the high 32-bit value (encoder unit) of the position feedback corresponding to the machine when the absolute value function is used.

F0B.64	name	real-time input instruction counter			Setting method	unchangeable	correlation model	PST
	display range	-2147483648~ 2147483647	unit	-	Effective way	-	Defaults	0

contact address:

0x2480

Setting description: -2147483648 command unit~2147483647 command unit

Displays the pulse command counter before the electronic gear ratio multiplication, which has nothing to do with the current state of the servo and the control mode.

F0B.70	name	Absolute value encoder revolutions			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	Rev.	Effective way	-	Defaults	0

contact address:

0x2492

Setting instructions: Displays the number of revolutions of the absolute value encoder.

F0B.71	name	Position within 1 revolution of absolute encoder			Setting method	unchangeable	correlation model	PST
	display range	0~2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x2493 Setting instructions: Displays the single-turn position feedback value of the absolute encoder.								

F0B.77	name	Absolute position			Setting method	unchangeable	correlation model	PST
	display range	-2147483648 ~2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x2499 Setting instructions: Display the position feedback value of the absolute encoder, the lower 32 bits of data.								

F0B.79	name	Absolute position			Setting method	unchangeable	correlation model	PST
	display range	-2147483648 ~2147483647	unit	p	Effective way	-	Defaults	0
contact address: 0x249b Setting instructions: Display the position feedback value of the absolute encoder, the high 32 bits of data.								

F0B.87	name	current absolute position			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	p	Effective way	-	Defaults	0
contact address: 0x24a3 Setting instructions:								

F0B.91	name	Encoder Error Count			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	p	Effective way	-	Defaults	0

contact address: 0x24a7 Setting instructions: Display the number of encoder errors

F0B.92	name	Power board error count			Setting method	unchangeable	correlation model	PST
	display range	0~65535	unit	p	Effective way	-	Defaults	0
contact address: 0x24a8 Setting instructions: Displays the count of communication errors with the power board.								

F0B.98	name	U-phase current sampling value			Setting method	unchangeable	correlation model	PST
	display range	0~FFFF	unit	-	Effective way	-	Defaults	0
contact address: 0x24ae Setting instructions: Display U-phase current sampling value。								

F0B.99	name	W-phase current sampling value。			Setting method	unchangeable	correlation model	PST
	display range	0~FFFF	unit	-	Effective way	-	Defaults	0
contact address: 0x24af Setting instructions: Display W-phase current sampling value。								

9.13 F0C group communication parameters

F0C.00	name	drive device address			Setting method	Shutdown setting	correlation model	PST
	setting range	1~32	unit		Effective way	power on again	factory setting	1
contact address: 0x24b0 Setting instructions:								

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Set the drive device address. When multiple servo drives are networked, each drive needs to be set with a unique address to avoid communication conflicts.

F0C.01	name	Modbus communication baud rate setting			Setting method	Shutdown setting	correlation model	PST
	setting range	1~6	unit		Effective way	power on again	factory setting	2
contact address: 0x24b1 Setting instructions: Set the drive Modbus communication baud rate. 1:4800 2:9600 3:19200 4:38400 5:57600 6:115200								

F0C.02	name	Modbus communication wave mode			Setting method	Shutdown setting	correlation model	PST
	setting range	0~5	unit		Effective way	power on again	factory setting	3
contact address: 0x24b2 Setting instructions: Set the drive Modbus communication mode. 0~2: reserved 3: RTU, data length 8, no parity, stop bit 1 4: RTU, data length 8, even parity, stop bit 1 5: RTU, data length 8, odd parity, stop bit 1								

9.14 F0d group Auxiliary function parameters

F0D.10	name	Analog channel zeroing			Setting method	Shutdown setting	correlation model	ST
	setting range	0~2	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x251e Setting instructions: Shortcut parameters, analog channel zeroing. 0: no action 1: Trigger the zero adjustment of analog channel AS1, and the zero adjustment result will automatically take effect and be								

stored in the F03.54 parameter.

2: Trigger the zero adjustment of analog channel AS2, and the zero adjustment result will automatically take effect and be stored in the F03.59 parameter.

F0D.11	name	Speed 100% torque JOG operation			Setting method	Shutdown setting	correlation model	T
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x251f Setting instructions: Shortcut parameters, trigger speed 100% torque jogging operation,. 0: no action 1: Trigger the motor to run at the set speed with 100% rated torque								

F0D.12	name	Speed 300% torque JOG operation			Setting method	Shutdown setting	correlation model	T
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2520 Setting instructions: Shortcut parameters, trigger speed 300% torque jogging operation,. 0: no action 1: Trigger the motor to run at the set speed with 300% rated torque								

F0D.13	name	speed test run			Setting method	Shutdown setting	correlation model	S
	setting range	0~3	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2521 Setting instructions: Shortcut parameters，trigger speed trials in different modes. 0: no action 1: Trigger the positive and negative rated speed of the motor to switch back and forth 2: Trigger the motor to switch and run according to the internal set speed queue 1 3: Trigger the motor to switch and run according to the internal set speed queue 2								

F0D.20	name	Absolute Encoder Operation	Setting method	Shutdown setting	correlation model	PST

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	setting range	0~3	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2528 Setting instructions: Shortcut parameters to trigger encoder-related operations. 0: no action 1: Trigger encoder fault reset operation 2: Trigger the encoder fault reset and multi-turn reset operation 3: Trigger parameter write encoder EEPROM operation								

F0D.25	name	Encoder zero operation			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x252d Setting instructions: The shortcut parameter triggers the encoder to zero. After the operation is completed, the zero point information needs to be written into the encoder EEPROM through F0D.20. 0: no action 1: Trigger the encoder to zero operation								

F0D.29	name	Power Board Self-Test			Setting method	Shutdown setting	correlation model	PST
	setting range	0~1	unit		Effective way	Effective immediately	factory setting	0
contact address: 0x2531 Setting instructions: Shortcut parameter to trigger power board self-test. 0: no action 1: Trigger power board self-test								

F0D.76	name	High speed search origin switch signal distance			Setting method	Shutdown setting	correlation model	P
	setting range	0 ~ 4294967295	unit	pulse	Effective way	Effective immediately	factory setting	2147483648
contact address: 0x2560 Setting instructions: Set the distance to search for the reference point signal in the first step during the origin return process. If the origin switch signal is not found within the path distance, the servo will report Er.601 "No reference point signal found when returning to								

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zero” warning,This warning can be cleared.The pulse unit is related to parameter F05.02. Please refer to chapter 6.8 Origin Return

F0D.78	name	Low speed search origin switch signal distance			Setting method	Shutdown setting	correlation model	P
	setting range	0～4294967295	unit	pulse	Effective way	Effective immediately	factory setting	2147483648
contact address: 0x2562 Setting instructions: Set the distance to search for the reference point signal in the second step during the origin return process. If the origin switch signal is not found within the path distance, the servo will report Er.602 “No reference point signal found when returning to zero” warning,This warning can be cleared.The pulse unit is related to parameter F05.02. Please refer to chapter 6.8 Origin Return								

Chapter 10 Summary of parameters

parameter group	Parameter Group Summary
F00group	Servo Motor Parameters
F01group	Driver parameters
F02group	Basic Control Parameters
F03group	Terminal input parameters
F04group	Terminal output parameters
F05group	Position Control Parameters
F06group	Speed Control Parameters
F07group	Torque Control Parameters
F08group	Gain parameters
F09group	self-tuning parameters
F0Agroup	Fault and Protection Parameters
F0bgroup	Monitoring parameters
F0Cgroup	Communication parameters
F0dgroup	Auxiliary function parameters

10.1 F00 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F00.08	encoder type	0~9	0	-	power on again	All
F00.11	rated current	0.1~400.0	2.7	A	power on again	All
F00.12	Rated torque	0.1~400.0	1.3	Nm	power on again	All
F00.13	Maximum torque percentage	0~1000	300	%	power on again	All

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F00.14	Rated speed	1~10000	3000	rpm	power on again	All
F00.15	Percentage of maximum speed	0~300	200	%	power on again	All
F00.16	Moment of inertia	0.001~32.767	0	10^-3kgcm 2	power on again	All
F00.17	Number of motor pole pairs	1~50	5	-	power on again	All
F00.18	Stator phase resistance	0.01~327.67	1.72	Ω	power on again	All
F00.19	Stator phase inductance Lq	0.01~327.67	5.8	mH	power on again	All
F00.20	Stator phase inductance Ld	0.01~327.67	5.8	mH	power on again	All
F00.21	Line Back EMF Coefficient	1~32767	33	V/KRPM	power on again	All
F00.28	Encoder zero offset	-360.0~360.0	123	℃	power on again	All
F00.31	Encoder resolution	4~31	23	-	power on again	All
F00.45	2nd encoder type	1~31	10	-	power on again	All
F00.52	Line number of the first pulse encoder	1000~10000	2500	-	power on again	All
F00.53	1st pulse encoder rotation direction	0~1	0	-	power on again	All
F00.54	Line number of the 2nd pulse encoder	1000~10000	2500	-	power on again	All
F00.55	Rotation direction of the 2nd pulse encoder	0~1	0	-	power on again	All
F00.56	Motor rotation direction	0-1	0	-	power on again	All
F00.57	Encoder multi-turn bit	0-24	0	-	power on again	All
F00.58	Motor 1 parameter source	0-1	1	-	power on again	All
F00.61	Motor 2 parameter source	0-1	1	-	power on again	All

10.2 F01 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F01.00	MCU software version number	-	-	-	show	All
F01.02	Servo drive model	-	-	-	show	All
F01.30	Rated DC voltage	1-3000	300	V	power on again	All
F01.31	Current sensor gain	1~20000	2048	1/A	power on again	All
F01.32	IPM maximum current	0.1~400.0	5.0	A	power on again	All
F01.33	IPM overload detection point	1~100	95	%	power on again	All
F01.34	IPM overload detection filter time constant	0~32767	60	s	power on again	All
F01.35	IPM dead time	1.0~10.0	2.0	us	power on again	All
F01.36	IPM minimum pulse width	0.0~20.0	4.0	us	power on again	All
F01.37	PWM cycle time	20.00~300.00	125.00	us	show	All

F01.40	Overcurrent detection point	1~32767	16380	-	power on again	All
F01.41	Continuous times of overcurrent detection	1~10000	10	-	power on again	All
F01.42	power board maximum current	0.1~400.0	2.7	A	power on again	All
F01.43	Adaptive power of the power board	0.01~300.00	1.50	KW	power on again	All
F01.44	Rated current of power board	0.1~400.0	0.7	A	power on again	All
F01.45	Bus voltage protection action time	0.01~40.00	3.00	s	power on again	All
F01.51	Is dynamic braking onboard	0-1	0	-	show	All
F01.52	Onboard NTC type	0~255	0	-	show	All
F01.53	Power Board Current Sampling Bootstrap	0-1	0	-	show	All
F01.54	Power board NTC temperature alarm point	50~125	120	-	power on again	All
F01.60	current loop gain	1-600	110	Hz	power on again	All
F01.61	Current loop integral time constant	1-1000	10	%	power on again	All
F01.63	Overload feature point	1-1000	200	%	power on again	All
F01.64	Overload feature point duration	1~30000	10	ms	power on again	All
F01.65	IIT thermal overload point	0-300	112	%	power on again	All
F01.66	IIT thermal overload detection filter time constant	0-32767	3000	s	power on again	All
F01.67	Moment of inertia unit multiple	1~10000	1	-	power on again	All
F01.68	Inductance unit multiple	1~10000	1	-	power on again	All
F01.70	Open loop running speed	0~3000	60rpm	rpm	power on again	All
F01.71	Open loop running current	0~100	20	%	power on again	All
F01.72	Encoder to zero current	0-500	50	%	power on again	All
F01.73	Encoder to zero high speed	1-3000	50	-	power on again	All
F01.74	Encoder to zero low speed	1~1000	7	-	power on again	All
F01.76	Encoder counting maximum error	0~10000	25	pulse	power on again	All
F01.77	Encoder disconnection detection times	1~1000	35	-	power on again	All
F01.80	Power board self-test voltage	0~1000	310	V	power on again	All
F01.81	Power board AD sampling	0~3000	32	-	power on again	All

	value conversion voltage coefficient					
F01.83	fan temperature point	25~125	50	℃	power on again	All

10.3 F02 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F02.00	Control mode selection	0-6	0	-	Effective immediately	PST
F02.01	Absolute value system selection	0-2	0	-	power on again	PST
F02.03	Output pulse phase	0-1	0	-	power on again	PST
F02.09	Delay from brake output ON to command reception	0-1000	0	ms	Effective immediately	PST
F02.10	Static state, delay from brake output OFF to motor enable OFF	0-2000	150	ms	Effective immediately	PST
F02.11	Rotation state, the speed when the brake output is OFF	0-3000	100	rpm	Effective immediately	PST
F02.12	Rotation state, delay from servo enable OFF to brake output OFF	0-2000	0	rpm	Effective immediately	PST
F02.22	Rated power of built-in braking resistor	2-10000	-	W	power on again	PST
F02.23	Built-in braking resistor value	10-750		Ω	power on again	PST
F02.25	Brake resistor setting	0-1	0	-	Effective immediately	PST
F02.26	Rated power of external braking resistor	1-10000	-	W	power on again	PST
F02.27	External braking resistor value	1-750	-	Ω	power on again	PST
F02.30	user password	0-9999	0	-	power on again	PST
F02.31	System parameter initialization	0-2	0	-	power on again	PST
F02.32	Panel default display function	0-99	0	-	Effective immediately	PST
F02.40	CWL, CCWL direction prohibited way	0-1	0	-	Effective immediately	P
F02.41	Speed/torque corresponds to analog	0-1	0	-	Effective immediately	PST

	channel selection					
F02.44	Acceleration and deceleration time in stop mode	0-10000	1000	ms	Effective immediately	PST
F02.55	Regenerative braking voltage	1-1000	-	-	power on again	PST
F02.56	Maximum peak braking power	5-10000	-	W	power on again	PST
F02.57	Maximum average braking power	5-10000	-	W	power on again	PST
F02.58	Peak braking power detection filter time constant	0-32767	-	10ms	power on again	PST
F02.59	Average brake power detection filter time constant	0-32767		s	power on again	PST
F02.61	Dynamic braking action waiting time	30-1000	100	ms	Effective immediately	PST
F02.62	Dynamic braking action speed	0-100	50	%	Effective immediately	PST
F02.64	Dynamic braking mode	0-1	0	%	power on again	PST
F02.65	2nd encoder absolute value system selection	0-2	0	-	power on again	PST
F02.66	2nd encoder related servo selection	0-1	0	-	power on again	PST
F02.67	3rd encoder related servo selection	0-1	0	-	power on again	PST
F02.68	Drive axis associated encoder settings	0-2	0	-	power on again	PST
F02.69	Position deviation clearing method	0-1	0	-	Effective immediately	P
F02.70	emergency shutdown mode	0-1	0	-	Effective immediately	PS
F02.97	Ignore Drive Inhibit	0-3	3	-	Effective immediately	PST
F02.98	Force driver enable ON	0-1	0	-	Effective immediately	PST
F02.99	Wave recording output analog triangle wave data	0-1	0	-	Effective immediately	PST

10.4 F03 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant

F03.00	DI1 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.01	DI2 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.02	DI3 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.03	DI4 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.04	DI5 terminal function selection	--59~59	0	-	Effective immediately	PST
F03.07	DI8 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.08	DI9 terminal function selection	-59~59	0	-	Effective immediately	PST
F03.10	DI1 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.11	DI2 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.12	DI3 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.13	DI4 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.14	DI5 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.17	DI8 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.18	DI9 input filter time	0.1~100.0	2.0	ms	Effective immediately	PST
F03.20	DI function is forced to be valid 1	00000~11111	0000	-	Effective immediately	PST
F03.21	DI function is forced to be valid 2	00000~11111	0000	-	Effective immediately	PST
F03.22	DI function is forced to be valid 3	00000~11111	0000	-	Effective immediately	PST
F03.23	DI function is forced to be valid 4	00000~11111	0000	-	Effective immediately	PST
F03.24	DI function is forced to be valid 5	00000~11111	0000	-	Effective immediately	PST
F03.25	DI function is forced to be valid 6	00000~11111	0000	-	Effective immediately	PST
F03.26	DI function is forced to be valid 7	00000~11111	0000	-	Effective immediately	PST
F03.27	DI function is forced to be	00000~11111	0000	-	Effective	PST

	valid 8				immediately	
F03.28	DI function is forced to be valid 9	00000~11111	0000	-	Effective immediately	PST
F03.29	DI function is forced to be valid 10	00000~11111	0000	-	Effective immediately	PST
F03.30	DI function is forced to be valid 11	00000~11111	0000	-	Effective immediately	PST
F03.31	DI function is forced to be valid 12	00000~11111	0000	-	Effective immediately	PST
F03.32	DI function is forced to be valid 13	00000~11111	0000	-	Effective immediately	PST
F03.51	AS1 analog command filter time constant	0.20~50.00	0.2	ms	power on again	ST
F03.53	AS1 analog instruction dead zone	0~13000	0	mV	power on again	ST
F03.54	AS1 analog command zero offset compensation	-1500.0~1500.0	0.0	mV	power on again	ST
F03.56	AS2 analog command filter time constant	0.20~50.00	0.2	ms	power on again	ST
F03.58	AS2 analog command dead zone	0~13000	0	mV	power on again	ST
F03.59	AS2 analog command zero offset compensation	-1500.0~1500.0	0.0	mV	power on again	ST
F03.80	Analog speed command gain	10-3000	300	rpm/V	Effective immediately	S
F03.81	Analog torque command gain	1~300	30	%/V	Effective immediately	T

10.5 F04 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F04.00	DO1 terminal function selection	-41~41	0	-	Effective immediately	PST
F04.01	DO2 terminal function selection	-41~41	0	-	Effective immediately	PST
F04.02	DO3 terminal function selection	-41~41	0	-	Effective immediately	PST
F04.03	DO4 terminal function selection	-41~41	0	-	Effective immediately	PST
F04.04	DO5 terminal function selection	-41~41	0	-	Effective immediately	PST
F04.10	DO output is forced to be valid	-41~41	0	-	Effective immediately	PST

F04.20	DO output mandatory content	-41~41	0	-	Effective immediately	PST

10.6 F05 group parameters list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F05.01	Pulse command input terminal selection	0-1	0	-	power on again	P
F05.02	Number of position commands per motor revolution	1~1048576	10000	P/r	power on again	P
F05.04	Exponential smoothing filter time of position command	0~1000	0	ms	power on again	P
F05.06	Position command linear filter time	0~256	0	ms	power on again	P
F05.07	Electronic gear ratio 1 molecule	1~1073741824	1	-	power on again	P
F05.09	Electronic gear ratio 1 denominator	1~1073741824	1	-	power on again	P
F05.11	Electronic gear ratio 2 molecules	1~1073741824	1	-	power on again	P
F05.13	Electronic gear ratio 2 denominator	1~1073741824	1	-	power on again	P
F05.15	Command pulse input method	0-2	0	-	power on again	P
F05.17	Encoder pulse output lines	1~16384	2500	-	power on again	P
F05.21	Positioning complete range	0~32767	10	P	Effective immediately	P
F05.22	Locating Proximity Range	0~32767	500	P	Effective immediately	P
F05.30	Origin return enable mode	1-3	1	-	Effective immediately	P
F05.31	Return to origin operation mode	1-40	1	-	Effective immediately	P
F05.32	High-speed search origin switch signal speed	1~3000	500	r/min	Effective immediately	P
F05.33	Low speed search origin switch signal speed	1~3000	50	r/min	Effective immediately	P
F05.34	Acceleration and deceleration time for searching origin	0~30000	0	ms	Effective immediately	P

F05.36	Offset of mechanical origin	-1073741824 ~ 1073741824	0	pulse	Effective immediately	P
F05.41	Z pulse output polarity selection	0-1	0	-	power on again	P
F05.70	Command pulse input signal filtering	0-31	0	-	power on again	P
F05.72	Command pulse input direction signal polarity	0-1	0	-	Effective immediately	P
F05.73	Command pulse input signal logic	0-3	0	-	power on again	P
F05.75	Command pulse input signal filter mode	0-1	0	-	power on again	P
F05.87	Origin in-position delay	0~3000	50	ms	Effective immediately	
F05.88	Origin return completion signal delay	1~3000	100	ms	Effective immediately	P
F05.89	Origin return instruction execution mode	0-1	0	-	Effective immediately	P
F05.91	Positioning complete return difference	0~32767	5	p	Effective immediately	P
F05.93	Positioning close to return difference	0~32767	50	p	Effective immediately	P
F05.95	Z pulse output width selection	0-1	0	-	power on again	P

10.7 F06 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F06.04	JOG jog speed setting value	0~7500	100	rpm	Effective immediately	S
F06.05	Speed command ramp acceleration time	0~30000	0	ms	Effective immediately	S
F06.06	Speed command ramp deceleration time	0~30000	0	ms	Effective immediately	S
F06.07	Maximum speed limit	0~7500	5000	rpm	Effective immediately	S
F06.15	Zero speed detection threshold	0~1000	10	rpm	Effective immediately	S
F06.18	Speed reached signal threshold	-5000~5000	500	rpm	Effective immediately	S
F06.59	Source of speed command	0-5	0	-	Effective immediately	S
F06.60	Analog speed command	0-1	0	-	Effective	S

	direction				immediately	
F06.61	Analog speed command polarity	0-2	0	-	Effective immediately	S
F06.65	Speed loop PDFF control coefficient	0~100	100	%	Effective immediately	S
F06.66	Speed detection filter time constant	0.01~50.00	2.00	ms	Effective immediately	S
F06.80	internal speed 1	-5000~5000	0	rpm	Effective immediately	S
F06.81	internal speed 2	-5000~5000	0	rpm	Effective immediately	S
F06.82	internal speed 3	-5000~5000	0	rpm	Effective immediately	S
F06.83	internal speed 4	-5000~5000	0	rpm	Effective immediately	S
F06.85	Speed arrival difference	0-5000	30	rpm	Effective immediately	S
F06.86	speed arrival polarity	0-1	0	-	Effective immediately	S
F06.88	Zero speed detection return difference	0-5000	30	rpm	Effective immediately	S
F06.90	Zero fixed mode selection	0-1	0	-	Effective immediately	S

10.8 F07 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F07.05	Torque command filter time constant	0.01~50.00	1.00	ms	Effective immediately	PST
F07.06	2nd torque command filter time constant	0.01~50.00	1.00	ms	Effective immediately	PST
F07.07	Torque limit source	0-2	0	-	Effective immediately	PST
F07.09	Internal Forward Torque Limit	0-500	300	%	Effective immediately	PST
F07.10	Internal reverse torque limit	-500~0	-300	%	Effective immediately	PST
F07.11	External forward torque limit	0-500	100	%	Effective immediately	PST
F07.12	External reverse torque limit	-500~0	-1.00	%	Effective immediately	PST
F07.17	Speed limit source selection	0-2	0	-	Effective immediately	T

F07.59	Source of torque command	0-2	0	-	Effective immediately	T
F07.60	Analog torque command direction	0-1	0	-	Effective immediately	T
F07.61	Analog torque command polarity	0-2	0	-	Effective immediately	T
F07.62	Torque control time speed limit	0~5000	3000	rpm	Effective immediately	T
F07.80	Internal Torque 1	-300~300	0	%	Effective immediately	T
F07.81	Internal Torque 2	-300~300	0	%	Effective immediately	T
F07.82	Internal Torque 3	-300~300	0	%	Effective immediately	T
F07.83	Internal Torque 4	-300~300	0	%	Effective immediately	T
F07.84	Torque arrival signal threshold	-300~300	0	%	Effective immediately	PST
F07.85	Torque arrival return difference	0~300	5	%	Effective immediately	PST
F07.86	Torque reaching polarity	0~1	0	-	Effective immediately	PST

10.9 F08 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F08.00	speed loop gain	1~3000	40	Hz	Effective immediately	PS
F08.01	Speed loop integral time constant	1.0~1000.0	20.0	ms	Effective immediately	PS
F08.02	Position loop gain	1~1000	40	1/s	Effective immediately	PS
F08.03	2nd speed loop gain	1~3000	40	Hz	Effective immediately	PS
F08.04	Integral time constant of the second speed loop	1.0~1000.0	20.0	ms	Effective immediately	PS
F08.05	2nd position loop gain	1~1000	40	1/s	Effective immediately	PS
F08.10	Gain switching delay time	0~3000	5	ms	Effective immediately	PST
F08.11	Gain switching level	0~32767	100	-	Effective immediately	PST
F08.12	Gain switching time lag	0~32767	5	-	Effective	PST

					immediately	
F08.13	Position gain switching time	0~3000	5	ms	Effective immediately	PST
F08.15	Load moment of inertia ratio	0.0-200.0	1.0	times	power on again	PST
F08.18	Speed feedforward filter time constant	0-100	0	%	power on again	P
F08.19	speed Feedforward Gain	0-100	0	%	power on again	P
F08.40	speed observer enable	0-1	0	-	Effective immediately	P
F08.42	Model Following Control Mode	0-3	0	-	Effective immediately	P
F08.46	Model Tracking Velocity Compensation Feedforward	0~100	100	%	Effective immediately	P
F08.51	Model Tracking Velocity Compensation Feedforward Filter Time	0.10~50.00	0.50	ms	Effective immediately	P
F08.53	Intermediate frequency vibration 1 frequency	50~2000	0.50	ms	Effective immediately	P
F08.54	Damping coefficient of intermediate frequency vibration suppression 1	0~300	150	%	Effective immediately	P
F08.56	Compensation coefficient of IF vibration suppression 1	1~1000	100	%	Effective immediately	P
F08.59	Intermediate frequency vibration 1 frequency	50~2000	100	Hz	Effective immediately	P
F08.60	Damping coefficient of intermediate frequency vibration suppression 2	0~300	150	%	Effective immediately	P
F08.61	Compensation coefficient of IF vibration suppression 2	1~1000	100	%	Effective immediately	P
F08.70	2nd torque filter frequency	100-5000	5000	Hz	Effective immediately	PST
F08.71	2nd torque filter quality factor	1~100	50	-	Effective immediately	PST
F08.72	Gain switch selection	0~5	0	-	Effective immediately	PST
F08.75	End vibration detection filter frequency	10~2000	200	Hz	Effective immediately	P
F08.76	Minimum detection	3~32767	5	P	Effective	P

	amplitude of low frequency suppression				immediately	
F08.77	Vibration suppression compensation coefficient	1.0-100.0	1.0	-	Effective immediately	P
F08.78	Vibration suppression mode	0-3	0	-	Effective immediately	P
F08.79	Low frequency vibration period	0~1000	0	ms	Effective immediately	P
F08.81	IF Vibration Suppression 1 Mode	0-2	0	-	Effective immediately	P
F08.82	IF Vibration Suppression 2 Mode	0-2	0	-	Effective immediately	P
F08.83	Advanced control speed loop high response mode gain percentage	0-1000	50	%	Effective immediately	PS
F08.84	Advanced control speed loop high response mode switch	0-2	0	-	Effective immediately	PS
F08.85	Multiples of advanced control speed loop	10~1000	100	-	Effective immediately	PS
F08.86	Friction Compensation Gain	10~1000	100	-	Effective immediately	P
F08.87	Friction Compensation Damping Coefficient	0-1000	0	-	Effective immediately	P
F08.88	Friction compensation observer gain	0-1200	400	Hz	Effective immediately	P
F08.89	Advanced Control Mode Current Loop Mode Selection	0-1	0	-	Effective immediately	PS
F08.90	Advanced Control Nonlinear Function Structures	0-1	1	-	Effective immediately	P
F08.91	Advanced Control Velocity Feedback Source	0-1	0	-	Effective immediately	P
F08.92	Advanced Control Function Switch	0-1	0	-	Effective immediately	P
F08.93	Advanced Control Velocity Observer Bandwidth	100-2000	300	Hz	Effective immediately	PS
F08.94	Advanced Control Speed Observer Bandwidth Parameter Switch	0-1	0	-	Effective immediately	PS
F08.95	Advanced Control Current Observer Bandwidth	50-400	180	10Hz	Effective immediately	PS

F08.96	Advanced Control Current Observer Bandwidth Parameter Switch	0-1	0	-	Effective immediately	PS
F08.97	Advanced control 1st torque filter time constant	5-500	10	-	Effective immediately	PST
F08.98	Advanced Control Nonlinear Function Types	0-5	0	-	Effective immediately	PST
F08.99	Advanced Control Nonlinear Function Gain Multiplier	0-100	15	-	Effective immediately	PST

10.10 F09 group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F09.01	Rigidity level selection	0-22	0	-	Effective immediately	PST
F09.12	1st resonant notch filter frequency	50-5000	5000	Hz	Effective immediately	PST
F09.13	Quality factor of the 1st resonant notch filter	1-100	7	-	Effective immediately	PST
F09.14	1st resonant notch filter depth	0-60	0	dB	Effective immediately	PST
F09.15	2nd resonant notch filter frequency	50-5000	5000	Hz	Effective immediately	PST
F09.16	2nd Resonance Notch Filter Quality Factor	1-100	7	-	Effective immediately	PST
F09.17	2nd resonant notch filter depth	0-60	0	dB	Effective immediately	PST
F09.18	3rd resonant notch filter frequency	50-5000	5000	Hz	Effective immediately	PST
F09.19	3rd Resonance Notch Filter Quality Factor	1-100	7	-	Effective immediately	PST
F09.20	3rd resonancenotch filter depth	0-60	0	dB	Effective immediately	PST
F09.21	4th resonant notch filter frequency	50-5000	5000	Hz	Effective immediately	PST
F09.22	4th Resonance Notch Filter Quality Factor	1-100	7	-	Effective immediately	PST
F09.23	4th resonance notch filter depth	0-60	0	dB	Effective immediately	PST
F09.57	Velocity Observer Gain	10~1000	120	Hz	Effective immediately	P
F09.58	Speed observer	0~1000	150	%	Effective	P

	compensation coefficient				immediately	
F09.60	Inertia Identification Mode	0-2	0	-	Effective immediately	P
F09.66	Inertia estimation mode	0-10	0	-	Effective immediately	P
F09.67	Model Tracking Control Gain	10-2000	40	Hz	Effective immediately	P
F09.68	Model Tracking Damping Ratio	50-200	100	-	Effective immediately	P
F09.69	Model Tracking forward Proportional Control	0-1000	100	%	Effective immediately	P
F09.70	Model Tracking reverseProportional Control	0-1000	100	%	Effective immediately	P
F09.75	Model Tracking Velocity Loop Gain	1-3000	40	Hz	Effective immediately	P
F09.76	Model Tracking Velocity Loop Integral Time Constant	1.0-1000.0	20.0	ms	Effective immediately	P
F09.77	Vibration alarm time	0~100	0	s	Effective immediately	P
F09.97	Notch Filter Function Settings	0-FFFF	0	-	Effective immediately	PST

10.11 F0A group parameters list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F0A.00	Power input phase loss protection selection	0-1	0	-	Effective immediately	PST
F0A.04	Overload Protection Detection Gain	0-500	117	%	Effective immediately	PST
F0A.08	Overspeed Detection Percentage	0-400	140	%	Effective immediately	PST
F0A.10	Excessive position deviation detection threshold	0.00-327.67	4.00	circle	Effective immediately	P
F0A.25	Speed feedback display value filter time parameter	0.1~1000.0	80.0	ms	power on again	PST
F0A.36	Encoder multi-turn overflow fault selection	0-1	1	-	power on again	PST
F0A.50	Forward rotation torque overload alarm threshold	0-300	300	%	power on again	PST
F0A.51	Reverse torque overload alarm threshold	-300 - 0	-300	%	power on again	PST
F0A.52	Torque Overload Alarm	0-10000	0	10ms	power on again	PST

	Duration Threshold					
F0A.60	Protection detection program running cycle	5-100	5	ms	power on again	PST
F0A.61	Speed feedback monitoring value filter time parameter	0.0-300.0	2.0	ms	power on again	PST
F0A.62	Speed, cry, read value filter time parameters	0.0-300.0	0.1	ms	power on again	PST
F0A.63	Pulse command frequency detection filter time constant	0.1-1000.0	4.0	ms	Effective immediately	P
F0A.64	Current feedback monitoring value filter time constant	1-3000	24	ms	Effective immediately	PST
F0A.65	Torque feedback monitoring value filter time constant	1-3000	24	ms	Effective immediately	PST
F0A.66	Brake power feedback predetection filter time constant	1-3000	40	ms	Effective immediately	PST
F0A.67	Average load rate feedback detection filter time constant	1-3000	30	ms	Effective immediately	PST
F0A.68	Peak detection data statistics time	1-30	10	s	power on again	PST
F0A.70	Motor standstill speed detection threshold	0-1000	5	rpm	power on again	PST
F0A.72	Switch position control mode speed detection threshold	0-3000	15	rpm	power on again	PST

10.12 F0b group parameters list

parameter	Function	display range	Defaults	unit	Setting method	relevant
F0B.00	Motor actual speed	-9999~9999	0	rmp	unchangeable	PST
F0B.01	speed command	-9999~9999	0	rmp	unchangeable	PST
F0B.02	Internal torque command	-300-300	0	%	unchangeable	PST
F0B.03	Input signal monitoring DI	0~65535	0	-	unchangeable	PST
F0B.05	Output signal monitoring DO	0~65535	0	-	unchangeable	PST
F0B.07	Absolute Position Counter	-2147483648 2147483647	0	P	unchangeable	PST
F0B.09	mechanical angle	0~65535	0	°	unchangeable	PST
F0B.10	electrical angle	0.0-360.0	0	°	unchangeable	PST
F0B.12	average load value	0-800	0	%	unchangeable	PST
F0B.13	Input instruction counter	-2147483648 2147483647	0	P	unchangeable	PST

F0B.15	Encoder position deviation counter	-2147483648 2147483647	0	P	unchangeable	PST
F0B.17	Feedback pulse counter	-2147483648 2147483647	0	P	unchangeable	PST
F0B.19	total power-on time	0.0~429496729.5	0	s	unchangeable	PST
F0B.21	Simulation channel 1 voltage sampling value	-10.00~10.00	0	V	unchangeable	ST
F0B.22	Simulation channel 2 voltage sampling value	-10.00~10.00	0	V	unchangeable	ST
F0B.24	Phase current effective value	0.0~6553.5	0	A	unchangeable	PST
F0B.26	Bus voltage value	0.0~6553.5	0	A	unchangeable	PST
F0B.27	Module temperature Value	-20~200	0	℃	unchangeable	PST
F0B.33	Fault record	0~20	0	-	unchangeable	PST
F0B.34	Selected number of fault codes	0~20	0	-	unchangeable	PST
F0B.35	Timestamp of selected number of failures	0.0~429496729.5	0	s	unchangeable	PST
F0B.37	Motor speed at selected fault	-32767~32767	0	rpm	unchangeable	PST
F0B.38	Motor U-phase current at selected fault	-32767~32767	0	A	unchangeable	PST
F0B.39	Motor V-phase current at selected faults	-32767~32767	0	A	unchangeable	PST
F0B.40	Bus voltage at selected fault	0.0~6553.5	0	V	unchangeable	PST
F0B.41	Input terminal state at the time of the selected fault	0~65535	0	-	unchangeable	PST
F0B.43	Output terminal state at the time of the selected fault	0~65535	0	-	unchangeable	PST
F0B.53	Position deviation counter	-2147483648~ 2147483647	0	P	unchangeable	PST
F0B.55	Motor actual speed	-2147483648~ 2147483647	0	rpm	unchangeable	PST
F0B.58	mechanical absolute position	-2147483648~ 2147483647	0	p	unchangeable	PST
F0B.60	mechanical absolute position	-2147483648~ 2147483647	0	P	unchangeable	PST
F0B.64	real-time input instruction counter	-2147483648~ 2147483647	0	-	unchangeable	PST

F0B.70	Absolute encoder revolutions	0~2147483647	0	P	unchangeable	PST
F0B.71	Position within 1 revolution of absolute encoder	0~2147483647	0	P	unchangeable	PST
F0B.77	Absolute position	-2147483648~ 2147483647	0	P	unchangeable	PST
F0B.79	Absolute position	-2147483648~ 2147483647	0	P	unchangeable	PST
F0B.87	current absolute position	0~65535	0	P	unchangeable	PST
F0B.91	Encoder Error Count	0~65535	0	P	unchangeable	PST
F0B.92	Power board error count	0~65535	0	P	unchangeable	PST
F0B.98	U phase current sampling value	0~FFFF	0	-	unchangeable	PST
F0B.99	W phase current sampling value	0~FFFF	0	-	unchangeable	PST

10.13 F0C group parameter list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F0C.00	drive device address	1-32	1	-	power on again	PST
F0C.01	Modbus communication baud rate setting	1-6	2	-	power on again	PST
F0C.02	Modbus communication wave mode	0-5	3	-	power on again	PST

10.14 F0d group parameters list

parameter	Function	setting range	Defaults	unit	Setting method	relevant
F0D.10	Analog channel zeroing	0~2	0	-	Effective immediately	ST
F0D.11	Speed 100% torque JOG operation	0-1	0	-	Effective immediately	S
F0D.12	Speed 300% torque JOG operation	0-1	0	-	Effective immediately	S
F0D.13	speed test run	0-3	0	-	Effective immediately	S
F0D.20	Absolute Encoder Operation	0-3	0	-	Effective immediately	PST

F0D.25	Encoder zero operation	0-1	0	-	Effective immediately	PST
F0D.29	Power Board Self-Test	0-1	0	-	Effective immediately	PST
F0D.76	High speed search origin switch signal distance	0 ~ 4294967295	2147483648	pulse	Effective immediately	P
F0D.78	Low speed search origin switch signal distance	0 ~ 4294967295	2147483648	pulse	Effective immediately	P

Chapter 11 Communication

11.1 Communication parameter setting

11.1.1 Set drive axis address F0C-00 :

When multiple servo drives are networked , each drive can only have a unique address, otherwise it will cause communication abnormalities and communication failure , among which :

- 0: broadcast address
- 1 ~ 32 : Slave address

11.1.2 Set the communication speed between the driver and the upper computer F0C-01 :

communication speed of the servo drive must be set to be consistent with that of the upper computer, otherwise communication cannot be performed.

multiple servo drives are networked, if the communication baud rate of a certain drive is inconsistent with that of the host , it will cause a communication error for this axis or affect the communication of other axes.

11.1.3 Set the drive Modbus data format F0C -02 :

Odd parity or even parity, the actual number of data transmitted per frame is 11 bits :

0	1 ~ 8	9	10
start bit	data bit	Check Digit	stop bit

No parity, the actual number of data transmitted per frame is 10 bits:

0	1 ~ 8	9
start bit	data bit	stop bit

11.1.4 Modbus write parameters

parameters through Modbus function code 0x06 or 0x10 . After the command is executed successfully, the parameters will automatically take effect, but the modified parameter values will not be stored in EEPROM.

`

11.1.5 Modbus data reception

servo driver receives the correct Modbus data frame, it will immediately return the Modbus response frame ; if it receives the wrong Modbus data frame, it will not return the response frame. The wrong Modbus data frame includes, the slave address does not match and the data frame check mistake.

11.1.6 Format description of communication data

The parameter address of the servo drive is FXX - YY, where:

XX: parameter segment number , which is hexadecimal data , must be converted to decimal data in the communication data frame .

YY: Offset within the parameter segment , which is decimal data .

servo driver is a 16-bit address, which is composed of the parameter segment offset address (0x2000) + the parameter segment number and the offset within the segment , as shown below :

The communication address of F02.01 is 0x2000+ (2*100 +1) = 0x2000 + 0xC9 = 0x20C9 .

communication address of F05.13 is 0x2000 + (5*100 + 13) = 0x2000 + 0x201 = 0x2201 .

The communication address of F0B .53 is 0x2000 + (11*100 + 53) = 0x2000 + 0x481 = 0x2481 .

If the data range of the parameter is within -65536 ~ 35535 , this parameter is 16Bit, which occupies one register address in the Modbus data frame , where Bit15~Bit8 occupies the low address of the data frame, and Bit7~Bit0 occupies the high address of the data frame . Take the returned data frame of Modbus function code 0x03 as an example:

function code	Bytes	Register value Hi	Register value Lo
0x03	0x02	Bit15~Bit8	Bit7~Bit0

If the data range of the parameter exceeds -65536~35535 , this parameter is 32Bit , which occupies 2 register addresses in the Modbus data frame, among which Bit31~Bit24 occupies the lowest address of the data frame, Bit23~Bit16 occupies the second lowest address of the data frame, and Bit15~ Bit8 occupies the second highest address of the data frame, and Bit7~Bit0 occupies the highest address of the data frame. Take the returned data frame of Modbus function code 0x03 as an example:

function code	Bytes	Register value Hi	Register value Lo	Register value Hi	Register value Lo
0x03	0x04	Bit31~Bit24	Bit23~Bit16	Bit15~Bit8	Bit7~Bit0

11.2 Modbus communication protocol

Parameters are divided into 16 Bit length and 32 Bit length according to the data range. The parameters can be read and written through the ModbusRTU protocol . When writing parameters, different commands need to be used according to the data length .

operate	function code
Read 16Bit/32Bit parameters	0x03

`

Write 16Bit parameter	0x06
Write 32Bit parameter	0x10

11.2.1 Read register function code: 0x03

ModbusRTU protocol , when reading 16 Bit and 32Bit parameters , both use function code 0x03

Request frame format:

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts	
Communication axis address	Servo axis address 1~32	
function code	0x03	
initial address	Servo parameter communication first address, such as 0x2481	Address high 8Bit--0x24
		Address low 8Bit--0x81
number of registers	Read the number of parameters (Note 1), such as 0x0003	Quantity high 8Bit--0x00
		Quantity low 8Bit--0x03
CRC check	CRC check low 8Bit	
	CRC check high 8Bit	
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame	

Note 1: When there are 16Bit and 32Bit parameters to be read continuously , the 1 6Bit parameter occupies 1 register length, and the 32Bit parameter occupies 2 register lengths. Make sure that the parameter occupied register length conforms to the bit length of all parameters read . For example, two parameters need to be read, among which the length of parameter 1 is 32Bit , and the length of parameter 2 is 16Bit , so the number of registers to be set should be 0x0004.

Response frame format:

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts
Communication axis address	Servo axis address 1~32
function code	0x03
Bytes	The byte length of all parameters, that is, the number of registers in the request frame*2
register value 1	32Bit parameter 1--Bit31~Bit24
	32Bit parameter 1--Bit23~Bit16
register value 2	32Bit parameter 1--Bit15~Bit8
	32Bit parameter 1--Bit7~Bit0
register value 3	16Bit parameter 2--Bit15~Bit8
	16Bit parameter 2--Bit7~Bit0
CRC check	CRC check low 8Bit
	CRC check high 8Bit
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame

`

ModbusRTU protocol , when writing 16Bit parameters , you can use function code 0x06/0x10, and when writing 32Bit parameters , you can only use function code 0x10.

11.2.2 Write a single register function code : 0x06

When the function code 0x06 is used to write the 32Bit parameter , the driver returns a parameter range exceeding error.

request frame format

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts	
Communication axis address	Servo axis address 1~32	
function code	0x06	
register address	Servoparameter communication address, such as 0x20C9	Address high 8Bit--0x20
		Address low 8Bit--0xC9
Register content	16Bit parameters--Bit15~Bit8	
	16Bit parameter--Bit7~Bit0	
CRC check	CRC check low 8Bit	
	CRC check high 8Bit	
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame	

Response frame format

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts	
Communication axis address	Servo axis address 1~32	
function code	0x06	
register address	Servo parameter communication address, such as 0x20C9	Address high 8Bit--0x20
		Address low 8Bit--0xC9
Register content	16Bit parameters--Bit15~Bit8	
	16Bit parameter--Bit7~Bit0	
CRC check	CRC check low 8Bit	
	CRC check high 8Bit	
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame	

11.2.3 Write multiple registers function code : 0x10

request frame format

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts
Communication axis address	Servo axis address 1~32

`

function code	0x10	
register address	Servo parameter communication first address, such as 0x2201	Address high 8Bit--0x22
		Address low 8Bit--0x01
number of registers	Write the number of parameters (Note 2), such as 0x0003	Quantity high 8Bit--0x00
		Quantity low 8Bit--0x03
Bytes	The byte length of all parameters, that is, the number of registers in the request frame*2	
register value 1	32Bit parameter 1--Bit31~Bit24	
	32Bit parameter 1--Bit23~Bit16	
register value 2	32Bit parameter 1--Bit15~Bit8	
	32Bit parameter 1--Bit7~Bit0	
register value 3	16Bit parameter 2--Bit15~Bit8	
	16Bit parameter 2--Bit7~Bit0	
CRC check	CRC check low 8Bit	
	CRC check high 8Bit	
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame	

Note 2: When there are 16Bit and 32Bit parameters to be written continuously , 1 6Bit parameter occupies 1 register length, and 32Bit parameter occupies 2 register lengths. Make sure that the parameter occupied register length conforms to the Bit length of all parameters written . For example, two parameters need to be written , among which the length of parameter 1 is 32Bit , and the length of parameter 2 is 16Bit , so the number of registers to be set should be 0x0003.

Response frame format

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts	
Communication axis address	Servo axis address 1~32	
function code	0x10	
register address	Servo parameter communication first address, such as 0x2201	Address high 8Bit--0x22
		Address low 8Bit--0x01
number of registers	Write the number of parameters (Note 2), such as 0x0003	Quantity high 8Bit--0x00
		Quantity low 8Bit--0x03
CRC check	CRC check low 8Bit	
	CRC check high 8Bit	
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame	

11.2.4 Error response frame

Error response frame format:

communication start	Greater than or equal to 3.5 character idle time, indicating that a frame starts
Communication axis address	Servo axis address 1~32

`

error code	Function code +0x80
exception code	wrong code
CRC check	CRC check low 8Bit
	CRC check high 8Bit
newsletter end	Greater than or equal to 3.5 character idle time, indicating the end of a frame

wrong code

wrong code	Coding instructions
0x01	illegal function code
0x02	illegal data address
0x03	illegal data value
0x04	Slave device failure

11.2.5 Hexadecimal representation of signed numbers

When writing signed parameter values (including 16Bit and 32Bit) , it is necessary to convert the pre-written data into hexadecimal complements.

16Bit parameters

data is a positive number or 0: complement code = original code

data is a negative number: complement code = 0xFFFF – data absolute value original code + 0x0001

For example :

16-bit signed positive number +300, its original code is 0x012C , so its complement code is also 0x012C .

The 16-bit signed negative number -300, its hexadecimal complement is: 0xFFFF–0x012C+0x0001=0xFED4.

32Bit parameter

data is a positive number or 0: complement code=original code

data is a negative number: complement code=0xFFFFFFFF–data absolute value original code + 0x00000001

For example :

32-bit signed positive number +300, its original code is 0x 0000 0 12C , so the complement code is also 0x 0000012C .

32-bit signed negative number -300, its hexadecimal complement is : 0xFFFFFFFF – 0x0000012C + 0x00000001 =

0xFFFFFED4 .

11.2.6 Representation with a decimal point parameter

the parameter value with a decimal point is read , the read parameter value is amplified by the corresponding multiple .

with a decimal point, it is necessary to amplify the pre-written parameter value by the corresponding multiple.

`

parameter number	contact address	Instruction manual display value	Communication operation value	Transformation method
F08.00	0x2320	40	40	constant
F08.01	0x2321	20.0	200	magnify 10 times
F07.05	0x22C1	1.00	100	magnify 100 times

11.3 Modbus operation commands

servo driver provides an operation command code register and an operation status register. By writing the operation command code into the operation command code register, after a certain delay time, read the operation status register, and read a specific value to indicate the command code The operation succeeded or failed . The register addresses are as follows :

Register description	mailing address	data size
Operation command code register	27FEH	16bit
Operation Status Register	27FFH	16bit

The command codes supported by the current version are as follows:

Command code description	command code	finished condition	operational meaning
Write parameters to EEPROM	F03CH	Operation successful: 3CF0H Operation failed: 3C80H	Indicates that the parameters in the parameter table are written into EEPROM
restore default	F03EH	Operation successful: 3EF0H Operation failed: 3E80H	Indicates that the default values of all parameters are read into the parameter table

Chapter 12 Panel monitoring display

12.1 Panel monitoring display

● Group F0b of the servo drive: Display parameters can be used to monitor the running status of the servo drive.

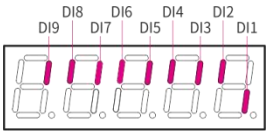
● By setting parameter F02.32 (default panel display function), after the servo motor runs normally, the display will automatically switch from "servo status display mode" to "parameter display mode". The parameter group number of the parameter is F0b, and the group number Set value for F02.32.

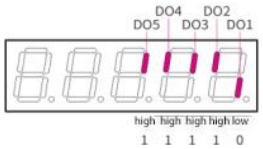
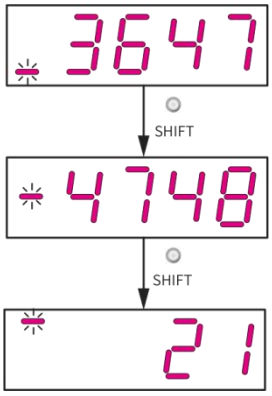
● Example: Set F0 2.32=00, then when the servo motor speed is not 0, the display will display the parameter value corresponding to F0b.00. F0bgroupmonitoring display details are as follows:

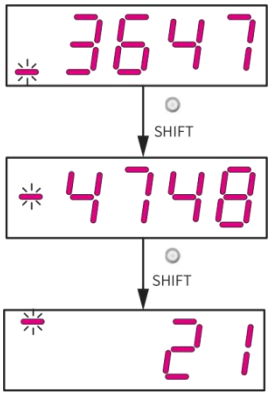
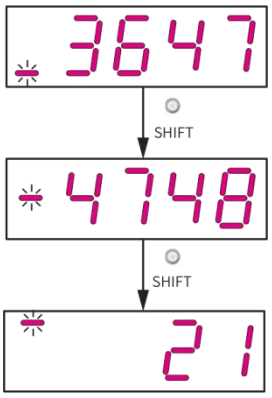
parameter	name	unit	Meaning	Show example
F0b.00	Actual motor speed	rpm	The actual running speed of the servo motor can be	3000rpm display:

`

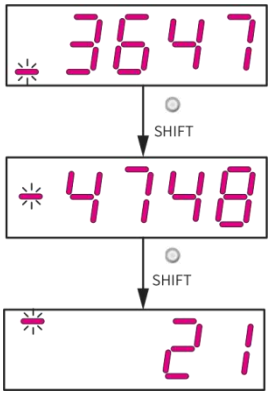
			displayed accurately to 1rpm after being rounded off.	
F0b.01	speed command	rpm	The current speed command of the drive.	3000rpm display: 

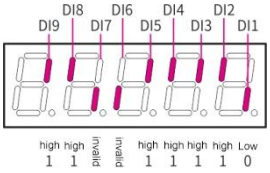
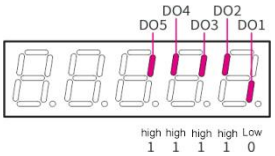
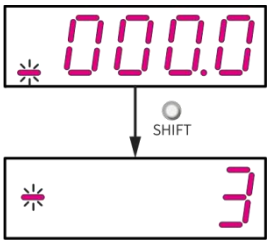
parameter	name	unit	Meaning	Show example
F0b.02	Internal torque command	0.10%	The percentage of the actual output torque of the servo motor to the rated torque of the motor.	100.0% display:  -100.0% display: 
F0b.03	Input signal (DI signal) monitoring	-	Optocoupler status corresponding to 9 DI terminals: The upper part of the nixie tube is bright to indicate that the optocoupler is cut off: (indicated by "1"). The lower half is bright to indicate that the optocoupler is on: (indicated by "0"). F0b.03 read by the background software is a decimal value.	Take terminal DI1 as low level and terminals DI2~DI9 as high level as an example: The corresponding binary code is "111111110", corresponding to background reading F0b.03=510. Displayed as follows: 

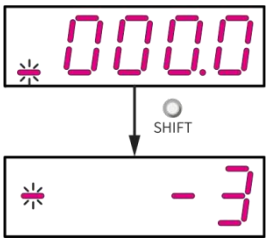
F0b.05	Output signal (DO signal) monitoring	-	Optocoupler status corresponding to 5 DO terminals: The upper part of the nixie tube is bright to indicate that the optocoupler is cut off: (indicated by "1"). The lower half is bright to indicate that the optocoupler is on: (indicated by "0"). F0 b.05 read by the background software is a decimal value.	Take terminal DO1 as low level and terminals DO2~DO5 as high level as an example: the corresponding binary code is "11110". Corresponding background reading F0b.05=30. Displayed as follows: 
parameter	name	unit	Meaning	Show example
F0b.07	Absolute position counter (32 decimal display)	command unit	The current absolute position of the motor (command unit).	2147483647 instruction unit show: 
F0b.09	mechanical angle (from number of pulses at the origin)	p	The current mechanical angle of the motor (p), 0 corresponds to a mechanical angle of 0°. Incremental encoder F0b.09 maximum value: encoder line number×41°. (Example: The maximum value of 2500-line incremental encoder F0b.09 is 9999). Absolute encoder F0b.09 maximum value: 65535. Actual Mechanical Angle = F0 b.09 / (F0 b.09 Maximum value +1) × 360 °	10000p display: 
F0b.10	Rotation angle (electrical angle)	0.1°	The current electrical angle of the motor.	360.0° display: 

F0b.11	Input the speed information corresponding to the position command	rpm	The position command of the driver's single control cycle corresponds to the speed value.	3000rpm display:  -3000rpm display: 
F0b.12	average load factor	0.10%	Average load torque as a percentage of motor rated torque.	100.0% display: 
parameter	name	unit	Meaning	Show example
F0b.13	Input position command counter (32-bit decimal display)	command unit	Count and display the number of input position commands.	2147483647 instruction unit show: 
F0b.15	Encoder position deviation counter (32 decimal display)	encoder unit	Encoder position deviation = total number of input position commands (encoder unit) -total number of encoder feedback pulses (encoder unit)	10000 encoder units display: 
F0b.17	Feedback pulse counter (32 decimal display)	encoder unit	Count and display the number of pulses fed back by the servo motor encoder (encoder unit).	2147483647 encoder single bit display: 
F0b.19	Total power-on time (32-bit decimal	0.1s	Count and display the power-on time of the servo	429496729.5s shows:

	display)		drive.	
parameter	name	unit	Meaning	Show example
F0b.24	RMS value of phase current	0.01A	Servo motor phase current effective value.	4.60A display: 
F0b.26	Bus voltage value	0.1V	Main circuit DC bus voltage value.	AC220V after rectifier : 311.0V display:  AC380Vafter rectifier : 537.0V display: 
F0b.27	Module temperature value	℃	The temperature of the power module inside the servo drive.	27℃ display: 
F0b.33	fault record	-	Set the number of times to view historical faults. 0 - current faults 1 - Last 1 failure 2 - Last 2 failures ... 9 - Last 9 failures	0- Current fault display: 
F0b.34	Selected number of fault codes	-	F0b.33 selected fault code When no fault occurs F0b.34 The displayed value is "Er.000".	If F0b.33=0, F0b.34=Er.941, it means the current fault code is 941. show: 
parameter	name	unit	Meaning	Show example
F0b.35	Selected failure timestamp	s	F0b.34 shows the total running time of the servo when the	If F0b.34=Er.941, F0b.35=107374182.4, it

			fault occurs. F0b.35 display value is "0" when no fault occurs .	indicates that the current fault code is 941, and the total running time of the servo is 107374182.4s when the fault occurs. 
F0b.37	Motor speed at selected fault	rpm	When the fault displayed by F0b.34 occurs, the servo motor speed. F0b.37 display value is "0" when no fault occurs.	3000rpm display:  -3000rpmdisplay: 
F0b.38	Motor U-phase current at selected fault	0.01A	When the fault displayed by F0b.34 occurs, the effective value of the U-phase winding current of the servo motor. F0b.38 display value is "0" when no fault occurs.	4.60A display: 
F0b.39	Motor V-phase current at selected faults	0.01A	When the fault displayed by F0b.34 occurs, the effective value of the V-phase winding current of the servo motor. F0b.39 display value is "0" when no fault occurs.	4.60A display: 
F0b.40	Bus voltage at selected fault	V	When the fault displayed by F0b.34 occurs, the DC bus voltage value of the main circuit. F0b.40 display value is "0" when no fault occurs.	AC220Vafter rectifier : 311.0V display:  AC380V after rectifier : 537.0V display:

				
parameter	name	unit	Meaning	Display example
F0b.41	Input terminal state at the time of the selected fault	-	When the fault displayed by F0b.34 occurs, the high and low levels corresponding to the 9 DI terminals. The viewing method is the same as F0b.03. When no fault occurs, F0b.41 shows that all DI terminals are at low level, and the corresponding decimal value is "0".	F0b.41=414 display: 
F0b.42	Output terminal state at selected fault	-	When the fault displayed by F0b.34 occurs, the high and low levels corresponding to the 5 DO terminals. The viewing method is the same as F0b.05. When no fault occurs, F0b.42 shows that all DO terminals are at low level, and the corresponding decimal value is "0".	F0b.42=30 display: 
F0b.53	Position deviation counter (32-bit decimal display Show)	command unit	Position deviation = total number of input position commands (command unit) -total number of encoder feedback pulses (command unit)	10000Display unit display: 
parameter	name	unit	Meaning	Display example
F0b.55	Actual motor speed	0.1 rpm	The actual running speed of the servo motor can be accurate to 0.1rpm.	3000.0rpm display:  -3000.0rpm display:

				
F0b.64	Real-time input position command counter	command unit	Displays the position command counter before the electronic gear ratio multiplication, which has nothing to do with the current state of the servo and the control mode.	2147483647command unit display: