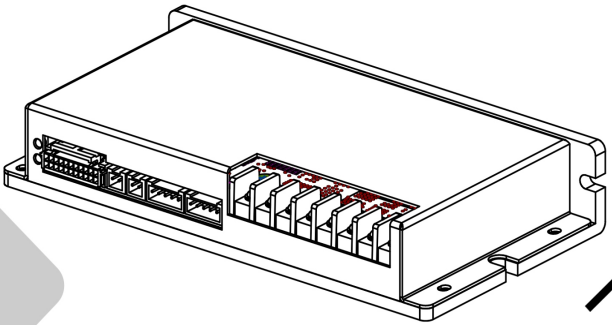
RiDING日鼎

AGV Dedicated Servo(full version)

User Manual



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Safety Warnings

Safety Signs

(1) Types and meanings of warning signs

Before installation, wiring construction, maintenance, and inspection, please read and use this manual and other ancillary materials.

Please start using it after confirming the equipment knowledge, safety information and precautions.

This manual divides the levels of safety precautions into "danger" and "caution".

Warning sign	Meaning
DANGER	This mark indicates that if the operation is wrong, a dangerous situation may occur, which may cause death or serious injury.
CAUTION	This mark indicates that if you operate incorrectly, a dangerous situation may occur, resulting in moderate injury, minor injury, and equipment damage.

In addition, even the items listed in the "Caution" may lead to serious consequences depending on the situation.

The texts marked with warning signs are important contents, please observe them.

After reading this manual, please keep it in a place where the user can see it at all times.

(2) symbols

Use symbols as needed so that you can understand the main points of the display at a glance.

Symbol	Meaning
	Generally prohibited
	No touch
	Dismantling is prohibited
	Burn carefully

Symbol	Meaning
	Instruct the general user's behavior
	Must be grounded
	Caution Electricity
	Watch out for high temperatures

Security Matters

1. Precautions for use	
DANGER	
	1. Never touch the inside of the drive with your hands. Otherwise, electric shock may occur.
	2. The ground terminal of the drive and motor must be grounded. Otherwise, electric shock may occur.
	3. Please perform wiring and inspection after cutting off the power supply for 5 minutes. Otherwise, electric shock may occur.
	4. . Please do not damage the cable, or apply unnecessary stress, ballast, or pinch to the cable. Otherwise, it may cause malfunction, damage and electric shock.
	5. During operation, please do not touch the rotating part of the motor. Otherwise, it may be injured.
CAUTION	
	1. Please use the motor and driver in the specified combination. Otherwise, fire and malfunction may occur.
	2. Please never use it in a place prone to splashing water, corrosive gas environment, flammable gas environment and combustible materials. Otherwise, fire and malfunction may occur.
	3. The temperature of the drive, motor and peripheral equipment is high, so please keep the distance. Otherwise, it is easy to burn.
	4. During the power-on process and for a period of time after the power is cut off, the heat sink, regenerative resistor, motor, etc. of the drive may be in a high temperature state, so please do not touch it. Otherwise, you may get burned.
	5. If the surface temperature of the motor in the final product exceeds 70°C during operation, please affix a label of “caution hot” on the final product.

2. Precautions for storage
PROHIBIT

	1. Please do not store it in a place exposed to rain or dripping water, or in a place with harmful gases and liquids. Otherwise, a malfunction may occur.
	2. Do not store it in places with high vibration or directly on the ground. Otherwise, a malfunction may occur.
	INSTRUCTION
	1. Please keep it in a place without direct sunlight and within the specified temperature and humidity range (-20 ℃ ～60 ℃ 10% ～90% RH or less, no condensation). Otherwise, a malfunction may occur.
	2. When storing in the installed state Please cover the entire servo motor with a film to prevent moisture, oil and water. Please apply anti-rust agent to the machined surface (shaft, flange surface) every 6 months. To prevent the bearing from rusting, rotate the bearing by hand or idling for 5 minutes once a month.

3. Precautions for handling	
	CAUTION
	When transporting, please do not hold the cable or motor shaft. Otherwise, the equipment is easily damaged or malfunctions, and personnel are easily injured.
	INSTRUCTION
	1. Excessive product loading may cause the goods to collapse, please do as required.
	2. The motor eye bolts are only used for the handling of the servo motor. Please do not use it for moving machinery and equipment. Otherwise, malfunctions may occur and personnel may be easily injured.

4. Precautions during installation	
	CAUTION
	1. Please do not sit on the motor or put heavy objects on it. Otherwise, the machine may malfunction, break down, or get an electric shock or injury.
	2. Please do not block the exhaust port, and do not allow debris to enter. Otherwise, accidents such as fire and electric shock may occur to the machine.

	3．Be sure to follow the installation direction. Otherwise, accidents such as fire and electric shock may occur to the machine.
	4．Do not apply strong shocks. Otherwise, the machine may malfunction.
	**INSTRUCTION**
	1．As the motor shaft passes through parts that are not waterproof or oil-proof, please take measures to prevent water and cutting oil from entering the motor. Otherwise, the machine may malfunction.
	2．If the use environment of the motor body is likely to be splashed with a large number of water droplets and oil droplets, please use a waterproof and oil drop cover for the equipment. For a small amount of splashing, the motor can be self-treated to protect it. When using in an environment with high humidity and oil mist, please install the wires and connectors downwards. Otherwise, poor insulation and short circuit may occur and cause accidents.
	3．Never disassemble or modify the motor. Otherwise, fire and malfunction may occur.

5．Wiring precautions	
	**CAUTION**
	The wiring must be correct and connected securely. Otherwise, accidents such as fire, breakdown, and injury may occur.
	**Prohibit**
	1．Never connect power to the U, V, and W terminals on the servo motor side. Otherwise, fire and malfunction may occur.
	2．Please connect the ground wire (PE) to the U, V, and W terminals on the side of the servo motor. When wiring, please do not mistake the order of the U, V, and W terminals. Otherwise, fire and malfunction may occur.
	3．Please never test the withstand voltage and resistance of the encoder terminal to prevent the encoder from being damaged. When performing withstand voltage and resistance tests on the U, V, and W terminals on the servo motor side, please cut off the connection with the servo drive.
	4．Please do not connect the wrong encoder terminal sequence. Otherwise, the encoder and servo drive will be damaged.

	INSTRUCTION
	・The ground wire is used to prevent an electric shock accident. For safety reasons, please install a ground wire.

6. Precautions during operation and running	
	CAUTION
	1. Excessive adjustments and changes will cause unstable operation, please do not make it arbitrarily. Otherwise, it may be injured.
	2. During the trial operation, fix the servo motor and install it in the equipment after confirming the operation status while it is disconnected from the mechanical equipment. Otherwise, it may be injured.
	3. The self-holding brake is not a stopping device to ensure the safety of the equipment. Please install a safety stop device on the equipment side. Otherwise, accidents such as failure or injury may occur.
	4. When an alarm occurs, remove the cause, and after ensuring safety, reset the alarm before running. Otherwise, it may be injured.
	5. The motor may restart suddenly when the power is turned on after a momentary power failure, so please keep away from the equipment. (Please consider how to ensure personal safety when restarting during mechanical design). Otherwise, it may be injured.
	6. Please confirm that the power supply specifications are normal. Otherwise, it may cause fire, malfunction and injury.
	Prohibit
	・The brake installed in the servo motor is used for self-protection, so please do not use it for general braking. Otherwise, malfunction or injury may occur.
	INSTRUCTION
	・Please install an emergency stop circuit externally so that you can stop the operation at any time and cut off the power supply. Otherwise, fire, malfunction, burns and injuries may occur.

7. Precautions during maintenance and inspection
Prohibit

	・Please do not allow non-professional technicians to disassemble and repair the equipment. When it is necessary to disassemble and repair the motor, please contact the product sales engineer or our company when you purchased the product.

Chapter 1 Overview

1.1 Product introduction

The servo system is an automatic control system with mechanical parameters as the control object. It is a follow-up system that can automatically, quickly and accurately follow the change of input. Since the development of AC servo technology, the technology has matured and its performance has been continuously improved. It is widely used in textile machinery, printing and packaging machinery, CNC machine tools, and automated production lines.

Riding L series AC servo drive system adopts advanced PID algorithm and space vector control. It has the advantages of fast response, good followability, high precision and high production efficiency. Various hardware protections and software alarms are perfect, which can facilitate the judgment of faults and avoid danger. The product quality is stable, the heat dissipation performance is good, and the repair rate is low.

Basic specifications

<table>
<tr><td colspan="2" rowspan="3">main power</td><td>DC 24V series</td><td colspan="2" rowspan="3">voltage range: -10% +10%</td></tr>
<tr><td>DC 48V series</td></tr>
<tr><td>DC 60V series</td></tr>
<tr><td colspan="2">control method</td><td colspan="3">SVPWM sine wave drive</td></tr>
<tr><td colspan="2">Feedback</td><td colspan="3">Standard configuration: incremental 2500ppr encoder</td></tr>
<tr><td rowspan="2">Function · Input and output signal</td><td>Command sequence input (CONT1～3)</td><td colspan="3">0：No designation
1：Servo start [RUN]
2：Manual forward [FWD]
3：Manual reverse [REV]
4：Point-to-point start signal
5：Origin trigger
6：Origin signal
8：Right limit
7：Left limit
10：Alarm clear
9：emergency stop
17：Gain switching
14 ： Acceleration and deceleration selection
20：Torque limit option 2
19：Torque limit option 1
25：Gear ratio switch 2
24：Gear ratio switch 1
31 ： Internal position stop signal
26：Prohibit pulse input
34：External braking resistor is overheated
32：Internal position pulse clear signal
36：Mode switch
37: Position control mode
38：Torque control mode
39: Speed control mode
50: Clear position deviation
51: Multi-speed selection 1
52: Multi-speed selection 2
53: Multi-speed selection 3
54: Multi-speed selection 4
55：Forced stop
65: Point-to-point location selection 1
66: Point-to-point location selection 2
67: Point-to-point location
68: Point-to-point location</td></tr>
</table>

			selection 3	selection 4
	Command sequence output (OUT1～2)		0：No designation 2：End of positioning 12：Brake action 15：Alarm a contact output 23：Zero position deviation 25：Speed reached 30：Multi-segment point 0 32：Multi-segment point 2 34：Multi-segment point 4 41：Force stop detection	1：Ready 11: Speed limit determination 14：Timing of the brake 16：Alarm b contact output 22 ： Return to origin completed 24：Zero speed 26：Current limit detection 31：Multi-segment point 1 33：Multi-segment point 3 35：Multi-segment point 5 50 ： Internal position completion signal
	Position control	Maximum command pulse frequency	Open collector: 200KHZ	
		Input pulse signal form	1. Open collector signal	
		Input pulse type	1. Command pulse/command symbol 2. Forward pulse/reverse pulse 3. 90 degree phase difference signal	
		Command pulse compensation	Command pulse compensation α、α1、α2、α3 /β As a position command, four types of command pulse compensation can be set and can be switched at any time.	
		Input position control	1. Command pulse compensation α selection 1 2. Command pulse compensation α selection 2 3. Clear deviation 4. Prohibit command pulse The above functions can be assigned to the command sequence input CONT1～3	
	Speed control	Speed control range	1:5000	
		Set acceleration and	0～10s corresponds to 0～rated speed; Acceleration time and deceleration time can be set separately, two kinds of acceleration/deceleration time can be set separately, and	

		deceleration time	S-shaped acceleration and deceleration can be performed.
		Input external speed command	Speed control can be carried out by using analog voltage command, set by reference 0～+10V input, the voltage corresponds to the speed.
		Set internal speed	16 internal speeds can be set (P1-00-P1-15)
		Input speed control	1. Multi-speed selection 1 2. Multi-speed selection 2 3. Forward 4. Reverse 5. Select acceleration and deceleration time The above functions can be assigned to the command sequence input CONT1～3
	Torque control	Input external torque command	Torque control can be performed by using analog voltage commands, set by reference to 0～+10V input, the voltage corresponds to the torque
		Input torque control	1. Forward 2. Reverse. The above functions can be assigned to the command sequence input CONT1～3
	Control Mode		0: Position 1: Speed 2: torque 3: Position ⇔ Speed 4: Position ⇔ Torque 5: Speed ⇔ Torque 6: Can communication 11：CANOPEN mode
	Electronic gear ratio		1～100000000/1～100000000 (Pn-00，Pn-01/ Pn-02，Pn-03)
	Monitoring function		Feedback speed, command speed, average torque, feedback current position, command current position, position deviation, DC bus voltage, electrical angle, drive internal temperature, input analog voltage value, input signal, output signal, command cumulative pulse, peak torque value, input pulse frequency, motor code, software version, sequence mode, current alarm, alarm record, etc.
	Ancillary function		Zero-speed clamp function, simple and convenient self-tuning
Protection			Overcurrent, overspeed, overvoltage, encoder failure, memory failure, regenerative resistor overheating, overload, undervoltage, overvoltage, deviation exceeding, drive overheating
environme usa	Placement		Indoor, altitude below 1000m, no dust, no corrosive gas, no direct sunlight
	Temperature and humidity		-10～55[℃]/10～90[%RH] Non-condensing

	Vibration/shock resistance	4.9(m/s^2)/19.6(m/s^2)

1.2 Confirmation

After the product (RIDING servo) arrives, please open the package and confirm the following contents.

Confirmation
1. Whether the packing box is intact and whether the goods are damaged due to transportation;
2. Check the nameplate of the drive and servo motor, and whether the model of the received goods is the ordered goods;
3. Check the delivery note, whether the accessories are complete;
4. Whether the motor shaft runs smoothly: Rotate the motor shaft by hand. If it can run smoothly, it means that the motor shaft is normal. But a motor with a holding brake cannot run smoothly by hand under normal circumstances!
5. Are there any loose screws: Are there any screws that are not tightened or fall off.

The complete and operable servo components should include:

(1) Servo drive

(2) Servo motor. (Optional)

(3) A power output wiring connected to the motor W U V PE. (Optional)

(4) An encoder wiring connected to the motor encoder. (Optional)

(5) Control wiring connected to the host computer. (Order)

If you find any abnormalities, please immediately contact the store where you purchased the product or the sales staff of our company.

1.3 Servo drive model description

L	B	0	48	010	-	V	T	R	(***)
1	2	3	4	5		6	7	8	9

1：Indicates the controller series: L series Riding low voltage servo driver;

2：Indicates the drive type, B: dedicated for AGV;

3：Indicates the product extension bit, 0-9;

4：Indicates the maximum adaptable voltage level of this drive:24：DC 24V；36: DC 36V；48：DC 48V；60: DC 60V。

5：Indicates the rated output current level of this drive, in amperes (A)；

6：Indicates the type of corresponding motor encoder. V: 2500ppr Incremental photoelectric or magnetic encoder; S: 2500ppr Line-saving incremental photoelectric encoder or magnetic encoder; A: 17-bit or 23-bit multi-turn absolute encoder; I: SPI bus encoder; H: Hall; B without encoder.

7：Indicates the characteristics of the motor, T: synchronous servo motor; D: brushed DC motor; B: brushless DC motor;

8: Indicates the communication function of the drive. R: RS-485 communication; N: CANopen communication; E: EtherCat communication; Default: no communication function.

9：Indicates that there are special features in the driver's software and hardware, and the

default means no special features.

1.4 Servo motor model description

80	ST	- M	024	D	A A
1 2	3	4	5	6	7

1：Indicates the frame number. There are currently eight sizes of frame: 40, 60, 80, 90, 110, 130, 150, 180 (unit: mm).

2： Represents the performance parameter code, "ST" represents a permanent magnet synchronous AC servo motor driven by a sine wave.

3：Indicates the feedback type of the motor, "M" represents 2500ppr incremental photoelectric encoder; "S" represents 2500ppr wire-saving incremental photoelectric encoder; "A" represents 17-bit multi-turn absolute encoder; "CC" represents 2500ppr. Magnetic encoder; "CD" stands for 2500ppr wire-saving magnetic encoder;

4：Indicates rated output torque, unit:×0.1 Nm;

5：Indicates the rated speed of the motor:

A stands for 1500r/min	**D** stands for 3000r/min
B stands for 2000 r/min	**E** stands for 1000r/min
C stands for 2500r/min	

6：Indicates the working voltage of the motor:

A stand for 24V	**D** stands for 60V
B stands for 36V	**E** stands for 72V
C stands for 48V	

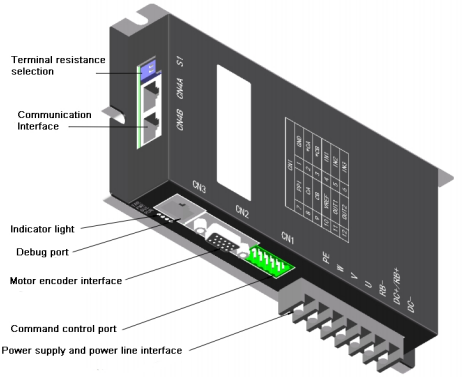
7：Output shaft form:

A stand for straight shaft, with key, key width 6mm	E stands for straight shaft with key, key width 10mm
B stands for straight shaft without key	F stands for straight shaft with key, key width 4mm
C stands for straight shaft with key, key width 8mm	G stands for straight shaft with key, key width 12mm
D stands for straight shaft with key, key width 5mm	H stands for straight shaft with key, key width 3mm

1.5 Product appearance and interface introduction

1.5.1 Servo Drive

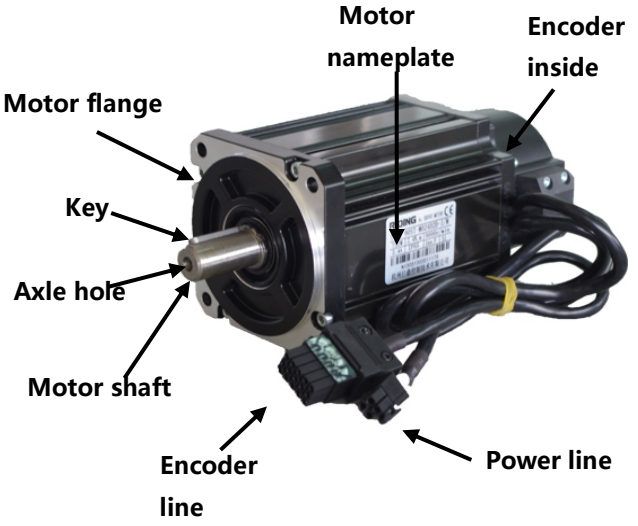
(1) LB series interface



1.5.2 Servo Motor

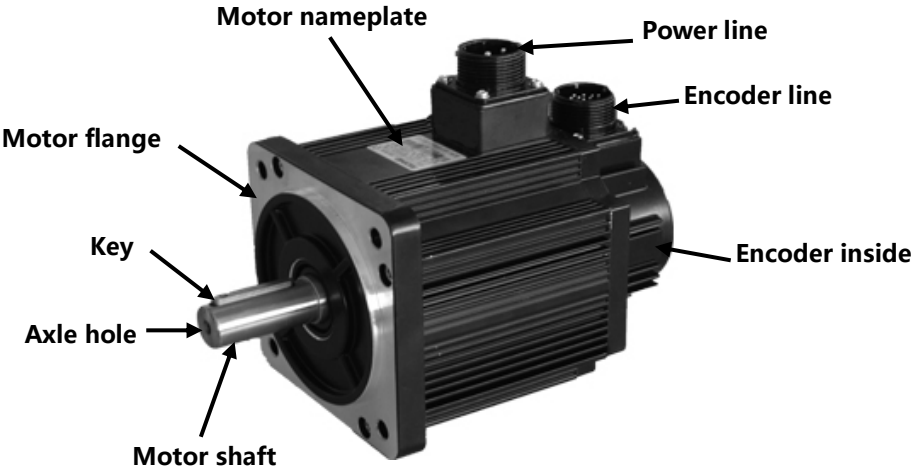
(1) Lead-out interface

Corresponding flange size: 40mm，60mm，80mm，90mm



(2) Aviation plug interface

Corresponding flange size: 110mm, 130mm, 150mm



Note: The power line aviation plug of the motor with a flange size of 180mm is a large aviation plug!

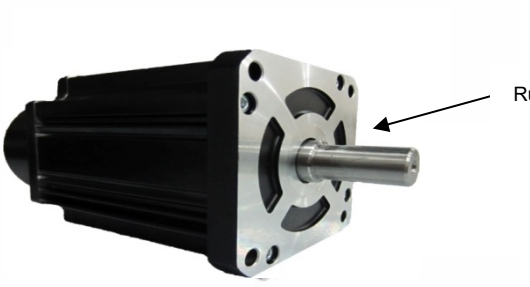
Chapter 2 Installation of Drive and Motor

2.1 Servo motor

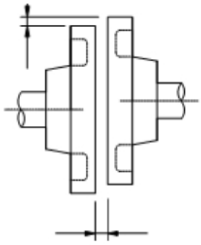
The servo motor can be installed horizontally, vertically and in any direction; however, if the mechanical coordination is incorrect during installation, the service life of the servo motor will be severely shortened, and unexpected accidents may also be caused.

Please follow the precautions below for proper installation.

Precautions before installation:
The motor shaft end is coated with anti-rust agent. Please wipe the anti-rust agent clean with a soft cloth dipped in thinner before installing the motor.



1. Storage temperature:
When storing the servo motor without power, please store it in the following environment:
Storage temperature: -20～60[℃]
Storage humidity: 10～90[%RH] or less (no condensation)
2. Use environment:
Please use the servo motor in the following use environment:
No corrosive or flammable, explosive gas
Use environment temperature: -10～55[℃]
Use environment humidity: 10～90[%RH] or less (no knot dew)
3. Installation concentricity:
When connecting with machinery, use flexible couplings as much as possible, and keep the axis of the servo motor and the axis of the mechanical load in a straight line. If a rigid coupling is used, when installing the servo motor, it should meet the concentricity tolerance requirements in the figure below.



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

- If the concentricity deviation is too large, it will cause mechanical vibration and damage the servo motor bearings.
- When installing the coupling, strike it strictly in the axial direction, otherwise the encoder of the servo motor will be easily damaged.

4. Installation treatment:

The servo motor can be installed horizontally, vertically or in any direction.

An encoder is installed in the servo motor. Since the encoder is a precision machine, please do not hit the output shaft of the servo motor with a hammer, etc.

When installing, please do not support and lift the encoder part.

The positional relationship between the encoder built into the servo motor and the servo motor is adjusted. Once disassembled, the correct function will be lost.

Therefore, please note:

1) It is strictly forbidden to hit the servo motor with a hammer, otherwise it may cause the encoder to be damaged or run away!

2) It is strictly forbidden to disassemble the servo motor. Once disassembled, the performance may be reduced and the mechanical system may be damaged!

5. Power supply Please do not directly provide commercial power to the servo motor, otherwise the motor will be burned.

The servo motor must be connected to the corresponding servo driver before it can be used.

6. Tension of the cable, please do not "bend" the cable or apply "tension" to the cable when using it.

Precautions when moving the servo motor:

1) When moving the servo motor, please do not apply unreasonable tension to the cable.

2). Please put the wiring of the encoder line and power line in the cable box for use.

3) When using the encoder cable and power cable attached to the servo motor (derived from the motor), please fix it with a cable clamp.

4) Please try to increase the bending radius of the cable.

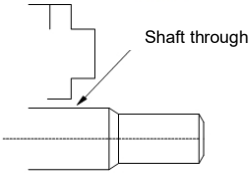
5). Please do not apply bending tension and self-weight tension to the connection part of the cable.

7. Measures to prevent water droplets and oil droplets.

When used in places with water droplets, oil droplets or condensation, the motor needs to be specially treated to meet the protection requirements; but the motor needs to meet the protection requirements for the shaft through part when it leaves the factory. Specify the

motor model with oil seal.

The oil seal is in the through part of the motor shaft, and the shaft through part refers to the gap between the motor shaft extension and the end flange.



2.2 Servo Drive

1. Storage temperature:

When storing the servo drive without power on, please store it in the following environment:

Storage temperature: -20～85[℃]

Storage humidity: 10～90[%RH] or less (no condensation)

Storage place: indoor, below 1000 [m] elevation, no dust, no corrosive gas, away from direct sunlight.

Storage pressure: 70～106[kpa]

Vibration/shock: 4.9(m/s2)/19.6(m/s2)

2. Operating environment:

Please use the servo drive in the following operating environment:

The servo drive does not adopt waterproof and dustproof measures.

Use environment temperature: 0～55[℃]

Use environment humidity: 10～90[%RH] or less (no condensation)

Storage location: indoor, under 1000[m] elevation, no dust, no corrosive gas, away from direct sunlight

Storage air pressure: 70～106[kpa]

Vibration/shock: 4.9(m/s2)/19.6(m/s2)

3. Installation site:

The precautions for the installation site are as follows:

Installation Precautions
During installation, the size of the AGV trolley installation space, the configuration of the servo drive and the cooling method should be uniformly designed to keep the ambient temperature near the servo drive below 55°C. The radiation and convection of the heat source should be strictly controlled, and forced air cooling should be adopted for heat dissipation. Measures to prevent excessive temperature. Anti-vibration equipment should be installed under the installation base surface of the servo drive to prevent vibration from being transmitted to the servo drive. Try to prevent the intrusion of corrosive gas. Although corrosive gas will not affect the servo drive immediately, it will cause the electronic components to malfunction after a long time and affect the stable operation of the drive.

2.3 Servo drive installation size

Unit mm

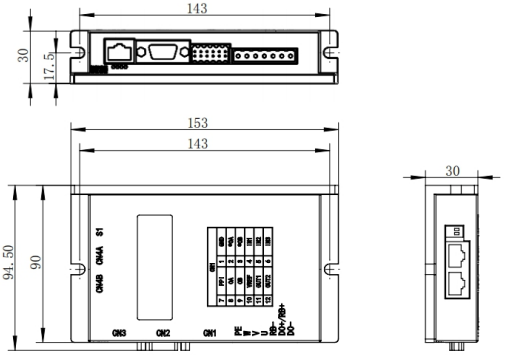


Figure 2-1 LB0**005-VT*/LB0**010-VT* Dimensions

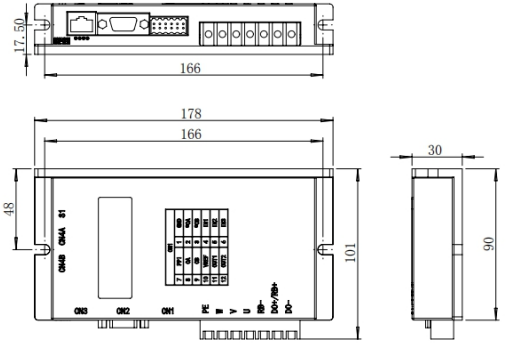


Figure 2-2 LB0**020-VT* Dimensions

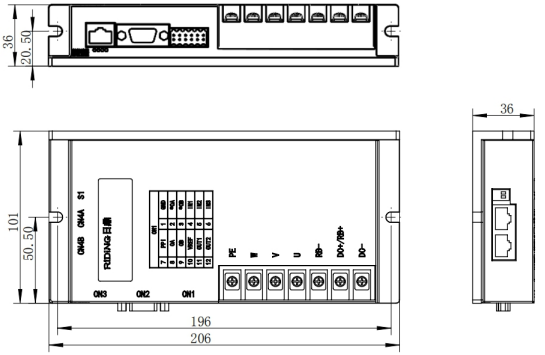


Figure 2-3 LB0**040-VT* Dimensions

Chapter 3 Wiring and Detailed Description

3.1 Driver wiring diagram

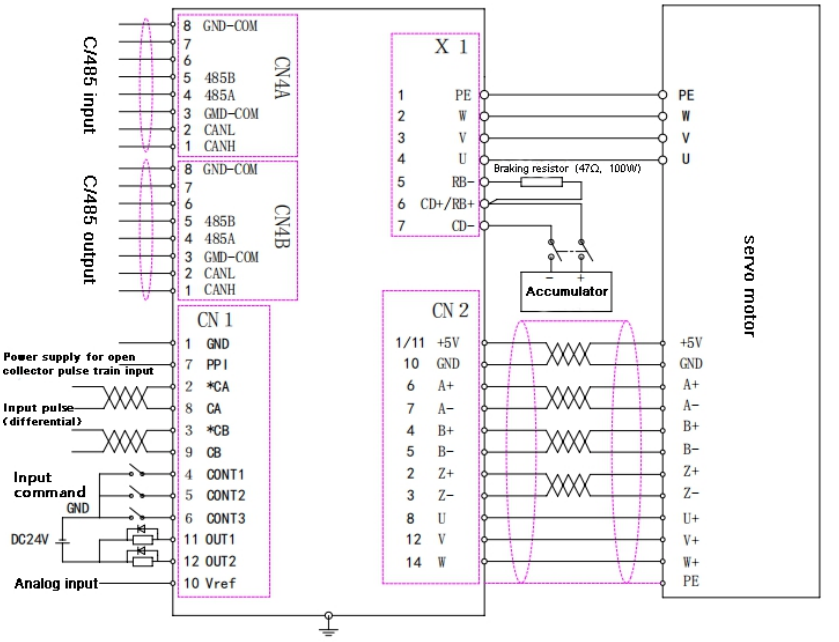


Figure 3-1 LB0**005-VT*/LB0**010-VT* Wiring diagram

When wiring, be sure to follow the following precautions:

CAUTION
1、 It is not advisable to pass the power line and signal line through the same pipe, and do not tie them together. When wiring, the power line and signal line should be separated by more than 10cm.
2、 The signal wire and encoder feedback wire should use twisted-pair wires with overall shielding, and the shielding layer should be connected to the connector shell. Wiring length: The longest command signal input wire should not exceed 0.5M, and the encoder feedback wire should be the longest. Should not exceed 0.5M.
3、 Even if the power is turned off, there may still be voltage in the servo drive. Please operate the power connector 5 minutes after the PWR indicator turns off. Please make sure that the PWR indicator is off for 5 minutes before wiring or checking.
4、 Please do not turn on and off the power frequently. If you need to turn on and off the power repeatedly, it should be controlled below 1 time per minute. A large-capacity capacitor is installed inside the servo drive. When the power is turned on, a large

charging current will flow (the charging time is tens of milliseconds). Therefore, if the power is turned on/off frequently, the internal components of the servo drive will accelerate aging.

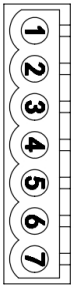
3.2 Power supply

Supply 24~60V DC power to the servo drive.

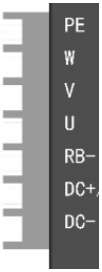
※ **If the given power supply voltage exceeds the limit value, the servo drive will be damaged.**

3.3 Power and motor interface (X1)

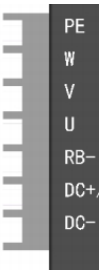
LB0**010 Driver CN1 interface definition

Socket	CN1 pin number	Pin definition		External devices
	1	PE		Servo motor
	2	W		
	3	V		
	4	U		
	5	RB-		Braking resistance -
	6	DC+/R B+	RB+	Braking resistance +
			DC+	DC power input +
	7	DC-		DC power input -

LB0**020 Drive X1 interface definition

Socket	CN1 pin number	Pin definition		External devices
	1	PE		Servo motor
	2	W		
	3	V		
	4	U		
	5	RB-		Braking resistance -
	6	DC+/R B+	RB+	Braking resistance +
			DC+	DC power input +
	7	DC-		DC power input -

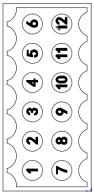
LB0**040 drive X1 interface definition

Socket	CN1 pin number	Pin definition		External devices
	1	PE		Servo motor
	2	W		
	3	V		
	4	U		
	5	RB-		Braking resistance -
	6	DC+/R	RB+	Braking resistance +
		B+	DC+	DC power input +
	7	DC-		DC power input -

3.4 Command control sequence input and output (CN1)

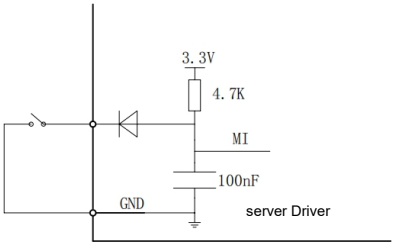
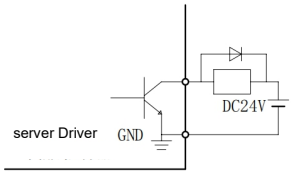
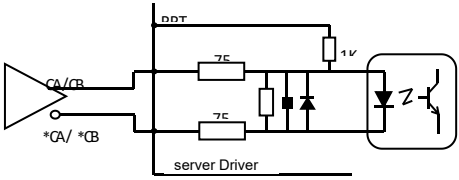
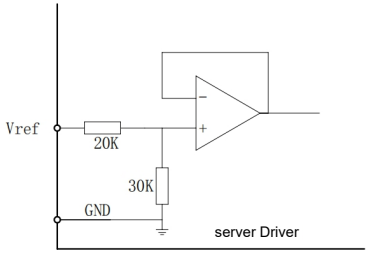
Servo drive control line socket (F83-A-3.5 male) pin:

Connect the control signal of the host controller to the connector (CN1) of the servo drive. The definition of each signal is as follows:

Socket	Name	Label	Signal name	Function and definition
	CONT1 CONT2 CONT3 GND	4 5 6 1	Input command control sequence	Input command control sequence signal. (Low level control) CONT1: Servo enable (RUN) CONT2: (No designation at the factory) CONT3: (No designation at the factory)
	OUT1 OUT2	11 12	Output command control sequence	Output command control sequence signal. (Maximum DC24V/100mA) OUT1: (Factory default value 16) OUT2: (No designation at the factory)
	PPI CA *CA CB *CB	7 8 2 9 3	Input pulse Differential input or open collector input	PPI: Open collector power input (DC24V +5%/-5%) CA, *CA, CB, *CB: maximum input frequency 500KHz for differential input; *CA, *CB: maximum input frequency 200kHz pulse for open collector input. The form of the string has three options: command pulse/symbol, forward/reverse pulse and 90-degree phase difference signal. *CA, *CB connect to the negative pole.

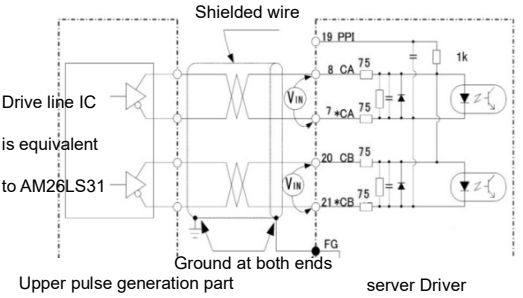
	Vref1 GND	10 1	Analog input	Input terminal for analog voltage. Input the speed command voltage during speed control and the torque command voltage during torque control.0～+5v

Interface circuit diagram

Signal name	Circuit
Input command control sequence Interface specifications, low-level active	
Output command control sequence Interface specifications DC24V/200Ma (maximum)	
Input pulse train (open collector)	
Analog input (0-5V) Interface specifications Input impedance 20kΩ	

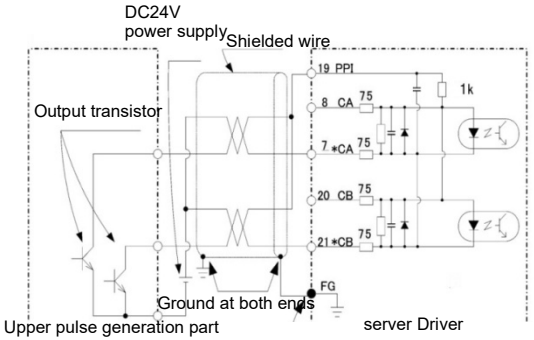
Wiring example of input pulse

①In the case of differential output devices



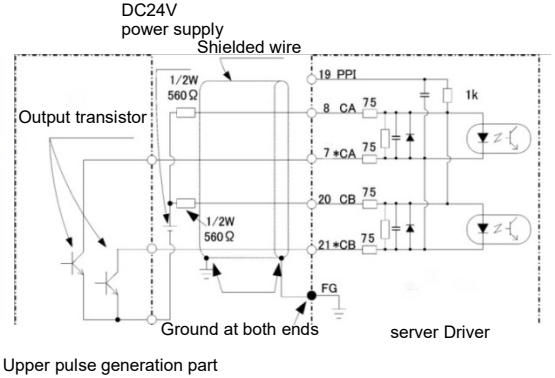
V_{in}: The voltage amplitude between CA-*CA(CB-*CB) should be within 2.8V~3.7V.
(Exceeding this range, sometimes the input pulse is not accepted.)

② NPN open collector output device (DC24V input)



DC24V power supply: The power supply voltage range should be within DC24±5%.
In addition, this circuit requires a maximum of 40mA power supply. Please prepare a sufficient power supply.

③ NPN open collector output device (DC12V input)



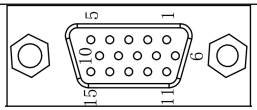
Upper pulse generation part

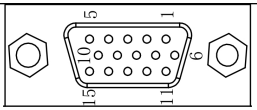
DC12V power supply: The power supply voltage range should be within DC12±5%.
In addition, this circuit requires a maximum of 40mA power supply. Please prepare a sufficient power supply.

3.5 Encoder interface (CN2)

The maximum wiring length of the encoder is 1m, which is restricted by the wiring cable.

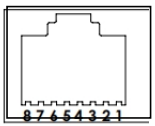
Driver CN2 pin definition:

Socket	CN2 Pin number	Incremental encoder
		Definition
	1	+5V (Drive output)
	2	Z+
	3	Z-
	4	B+
	5	B-
	6	A+
	7	A-
	8	U
	9	/
	10	GND (Drive output)
	11	+5V (Drive output)
	12	V
	13	/
	14	W
	15	/

Socket	CN2 Pin number	Incremental encoder
		Definition
	1	+5V (Drive output)
	2	SD+
	3	SD-
	10	GND (Drive output)

3.6 Serial interface (CN3)

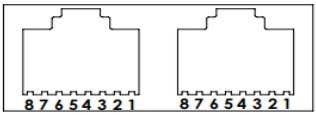
CN3 is RJ45 RS-232 serial interface, used for parameter adjustment and program upgrade

	Socket pin number	CN3
	1	/
	2	/
	3	/
	4	RX
	5	TX
	6	/

	7	DC+
	8	GND

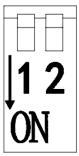
3.7 Communication Interface (CN4)

CN4 (1605-281-01-1) interface is RS-485 communication and CAN communication interface



Socket pin number	CN4A	CN4B
1	CAN-H	CAN-H
2	CAN-L	CAN-L
3	GND	GND
4	485A	485A
5	485B	485B
6	/	/
7	/	/
8	GND	GND

3.8 DIP switch (S1)



1	CAN communication 120R terminal resistance	ON：Add terminal resistance OFF：No terminal resistance
2	485 communication 120R terminal resistance	ON：Add terminal resistance OFF：No terminal resistance

3.9 Indicator light (ERR&PWR)

1 Indicator light	ERR(Red)	Lit when the drive reports an error
2 Indicator light	PWR(Green)	The drive is powered on, and the POWER light lit
3 Indicator light	BUS(Green)	It will flicker when there is a message transmission on the bus, the flicker frequency is related to the message transmission speed
4 Indicator light	RUN(Green)	Lit when the drive is ready

Chapter 4 Description of Servo Parameters

4.1 Parameter list

No.	Definition	Predetermined Area	Default	Change
P0				
P0-00	Electronic gear molecule high 0 16 bits	1-100000000	1	Outage
P0-01	Electronic gear molecule low 0 16 bits			
P0-02	Electronic gear denominator high 16 bits	1-100000000	1	Outage
P0-03	Electronic gear denominator low 16 bits			
P0-04	Command pulse form	0: Pulse + Direction 1: AB Pulse 2：Positive and negative pulse	0	Outage
P0-05	Rotation direction switch	0: Same as the default direction 1: Opposite to the default direction	0	Outage
P0-06	Output pulse phase when rotating	0: Phase B starts when CCW is rotating 1: Phase A starts when CCW is rotating	0	Outage
P0-07	Forward torque limit	0-300%	180%	Always
P0-08	Reverse torque limit	0-300%	180%	Always
P0-09	Control mode selection	0: Position 1: Speed 2: Torque 3: Position ⇔ Speed 4: Position ⇔ Torque 5: Speed ⇔ Torque 6: Can Communication 7: Internal location 8: Internal position ⇔ speed 9：Internal position ⇔ torque 10: Pulse speed mode 11: CANOPEN mode	11	Outage

P0-10	CONT1 Input signal distribution	0: No designation 1: Servo start [RUN]	1	Outage
P0-11	CONT2 Input signal distribution	2: Manual forward [FWD] 3: Manual reversal [REV]	0	Outage
P0-12	CONT3 Input signal distribution	4: Point-to-point start signal 5: Origin trigger 6: Origin signal	0	Outage
P0-13	Reserved	7: Left limit 8: Right limit	0	Outage
P0-14	Reserved	9: emergency stop 10: Alarm clear 14: Acceleration and deceleration selection 17: Gain switching 19: Torque limit selection 1 20: Torque limit selection 2 24: Gear ratio switch 1 25: Gear ratio switching 2 26: Disable pulse input 31: Internal position stop signal 32: Internal position pulse 33: Clear signal 34: External braking resistor is overheated 36: Mode switching 37: Position control mode 38: Torque control mode 39: Speed control mode 50: Clear position deviation 51: Multi-speed selection 1 52: Multi-speed selection 2 53: Multi-speed selection 3 54: Multi-speed selection 4 55: Forced sliding stop 65: Point-to-point position selection 1 66: Point-to-point position selection 2 67: Point-to-point position selection 3 68: Point-to-point position selection 4	0	Outage

P0-15	OUT1 Signal distribution	0: No designation 1: Ready 2: Positioning end 11: Speed limit measurement 12: Brake action time 14: Brake timing 15: Alarm a contact output 16: Alarm b contact output 20: OT detection 22: Home return completed 23: Zero position deviation 24: Zero speed 25: Speed reached 26: Current limit detection 30: Multi-stage position point 0 31: Multi-step position Point 1 32: Multi-stage position point 2 33: Multi-segment position point 3 34: Multi-stage position point 4 35: Multi-segment position point 5 38: +OT detection 39: -OT detection 41: Forced stop detection 50: Internal position completion signal	16	Outage
P0-16	OUT2 Signal distribution		0	Outage
P0-17	OUT3 Signal distribution		0	Outage
P0-18	Reserved		0	Outage
P0-19	Zero speed range	0.1~P0-34 (rpm)	50.0	Always
P0-20	Z pulse compensation	0~60000 (pulse)	0	Always
P0-21 P0-22	Deviation zero range / positioning end range	0~100000000 (pulse)	100	Always
P0-23	Deviation exceeds the detection value	0.1~100.0 (ring)	15.0	Condition is valid
P0-24	Positioning end judgment time	0.000~1.000 sec (0.001 sec)	0	Always
P0-25	Positioning end output form	0: Output form 1 1: Output form 2	0	Condition is valid
P0-26	Minimum OFF time at the end of positioning	1~1000 (msec)	20	Always

P0-27	Alarm detection when the voltage is insufficient	0: Alarm not detected 1: Alarm detected	1	Condition is valid
P0-28	Motor action when undervoltage	0: Emergency stop after undervoltage 1: Free stop under undervoltage	0	Condition is valid
P0-29	Prohibit overwriting parameters	0: Parameter can be changed 1: Parameter change is prohibited	0	Always
P0-30	Power-on display interface	0~50	0	Outage
P0-31	Speed uniform range	0.1~6000.0 (rpm)	10.0	Always
P0-32	Speed limit selection during torque control	0: Use analog or multi-speed as speed reference 1: Use P0-33 as speed reference	0	Condition is valid
P0-33	Maximum speed (for torque control)	0.1~6000.0 (rpm)	3000.0	Always
P0-34	Maximum speed (For position and speed)	0.1~6000.0 (rpm)	3000.0	Always
P0-35	Acceleration time 1 (also test run)	1~10000 (msec)	100	Always
P0-36	Deceleration time 1 (also test run)	1~10000 (msec)	100	Always
P0-37	Acceleration time 2	1~10000 (msec)	500	Always
P0-38	Deceleration time 2	1~10000 (msec)	500	Always
P0-39	Reserved	0~10000	500	Always
P0-40	Position regulator gain 1	1~2000[rad/sec] (1 Scale)	25	Always
P0-41	Speed regulator gain 1	1~30000[Hz] (1 Scale)	100	Always
P0-42	Speed regulator integral coefficient 1	0~4096 (1 Scale)	200	Always
P0-43	S-shaped time constant	0~1000 (msec)	100	Always
P0-44	Position loop feedforward gain 1	0.000~1.200 (0.001 Scale)	0	Always
P0-45	Feedforward filter time constant	0.000~2.500[msec] (0.001 Scale)	0	Always
P0-46	Torque filter time constant	0.00~20.00[msec] (0.01 Scale)	0.5	Always

P0-47	Speed setting filter	0.00~20.00[msec] (0.01 Scale)	0	Always
P0-48	Main reasons for gain switching	0: Position deviation (×10) 1: Feedback speed 2: Command speed 3: Switch by terminal	1	Always
P0-49	Gain switching level	1~1000(1 Scale or %)	50	Always
P0-50	Gain switching time constant	1~100[msec] (1 Scale)	10	Always
P0-51	Position regulator gain 2	30~200% (1%)	100	Always
P0-52	Speed regulator gain 2	1~1500 (%)	100	Always
P0-53	Speed regulator integral coefficient 2	1~1500 (1%)	100	Always
P0-54	Position loop feedforward gain 2	0~1200(%) (1%)	100	Always
P0-55	Analog filter	0.00~300.00 (msec)	1	Always
P0-56	Deceleration time after disable	0~10000 (msec)	500	Always
P0-57	Action sequence when disable	0: Emergency stop 1: Free stop	0	Outage
P0-58	OL type Judgment type	To be added	0	Condition is valid
P0-59	OL ratio	0.0000~1.5000	1	Always
P0-60	One-time delay S-shaped time constant	0.0~1000.0 (msec)	0	Always
P0-62	OH alarm temperature setting	40～110 ° C	80	Outage
P0-63	Fan opening temperature	20～70 ° C	40	Always
P0-64	Motor code	0~500	1	Outage
P0-65	Analog input 1 offset	0~4096	2048	Outage
P0-66	Maximum speed corresponding to analog input 1	0.0~P0-34	2500	Always
P0-67	Analog configuration	0x0~0x1111 **bit0**, the mode of analog 1 and 2 **bit1**, 1: unipolar 0~5V, 0: bipolar -5~5V	0x0000	Outage

		bit2, the number of hardware analog: 0. Single analog 1. Dual analog **bit3**, torque setting source: 0. Analog setting 1. Panel parameter setting (P2-08 and P2-09)		
P0-68	Analog 1 ratio	0.00~3.00	1	Always
P0-69	Analog input 2 offset	0~4096	2048	Outage
P0-70	Maximum Torque corresponding to analog input	0~300%	200	Always
P0-71	Reserved	0~1	0	Always
P0-72	Analog 2 ratio	0.00~3.00	1	Always
P0-73	Analog speed zero limit	0.0~P0-34(rpm)	10	Always
P0-74	Analog torque zero limit	0~300%	5	Always
P0-75	CONT Always valid 1	0~78	0	Outage
P0-76	CONT Always valid 2		0	Outage
P0-77	CONT Always valid 3		0	Outage
P0-78	Reserved		0	Outage
P0-79	Check bit/stop bit selection (Modbus)	RTU: 1: 8N2 (None) 3: 8O1 (odd) 5: 8E1 (even)	1	Outage
P0-80	Communication configuration	0: Store 1: Don't store	0	Outage
P0-81	To be added	0-1	0	Always
P0-82	485 CAN Station No	1-127	1	Outage
P0-83	485 Baud rate	0=4800，1=9600，2=19200， 3=38400，4=57600，5=115200	1	Outage
P0-84	CAN Baud rate	0=125k， 1=250k ，2=500k， 3=1M	3	Outage
P0-85	Compatible with 402 version speed unit problem	0: rpm 1: PUU/S	0	Outage
P0-86	0S alarm ratio	1.10~5.00	1.1	Always
P0-87	Related actions after OT	0: Maximum torque stop 2: Lock in original position	0	Condition is valid
P0-88	Deviation detection type	0: Alarm detection	0	Outage

		1: No alarm, active pulse loss		
P0-89	Power section selection	1~6	2	Outage
P0-90	EC alarm detection time	3~3000(msec)	12	Outage
P0-91	Overcurrent forecast value	10~500%	200	Always
P0-92	Electric speed setting Fn-01	0.0~P0-34(rpm)	50	Always
P0-93	Test run mode	0: Position (to be added) 1: Speed 2: Torque (to be added)	1	Always
P0-94	Test speed given Fn-10	0.0~P0-34 (rpm)	200	Always
P0-95	Current loop feedforward ratio	0~500%	0	Always
P0-96	Differential time of current regulator	0~1.00 (msec)	0	Always
P0-97	Cut-off frequency of current regulator	100~3000 (Hz)	950	Always
P0-98	Current regulator integration time	0.0~100.0 (msec)	8.0	Always
P0-99	Current loop output filter	0.000~1.000 (msec)	0	Always
P1				
P1-00	Index function speed / internal position speed 1	0.1~P0-34	500	Always
P1-01	Multi-step speed 1 / internal position speed 2	0.1~P0-34	500	Always
P1-02	Multi-step speed 2 / internal position speed 3	0.1~P0-34	1000	Always
P1-03	Multi-step speed 3 / internal position speed 4	0.1~P0-34	1000	Always
P1-04	Multi-step speed 4 / internal position speed 5	0.1~P0-34	1000	Always
P1-05	Multi-step speed 5 / internal position speed 6	0.1~P0-34	1000	Always
P1-06	Multi-step speed 6/ internal position speed 7	0.1~P0-34	1000	Always

P1-07	Multi-step speed 7 / internal position speed 8	0.1~P0-34	500	Always
P1-08	Multi-step speed 8 / internal position speed 9	0.1~P0-34	500	Always
P1-09	Multi-step speed 9 / internal position speed 10	0.1~P0-34	1000	Always
P1-10	Multi-step speed 10 / internal position speed 11	0.1~P0-34	1000	Always
P1-11	Multi-step speed 11 / internal position speed 12	0.1~P0-34	1000	Always
P1-12	Multi-step speed 12 / internal position speed 13	0.1~P0-34	1000	Always
P1-13	Multi-step speed 13 / internal position speed 14	0.1~P0-34	1000	Always
P1-14	Multi-step speed 14 / internal position speed 15	0.1~P0-34	1000	Always
P1-15	Multi-step speed 15 / internal position speed 16	0.1~P0-34	1000	Always
P1-16 P1-17	Output pulse frequency division numerator (to be added)	0~100000000	1	Outage
P1-18 P1-19	Output pulse frequency division denominator (to be added)	0~100000000	16	Outage
P1-20	CONT1~3 Signal polarity	0~0xffff，bitn=1 means opposite polarity	0	Outage
P1-21	CONT1 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly 2. Down edge dly	0	Always
P1-22	CONT2 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly 2. Down edge dly	0	Always
P1-23	CONT3 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly 2. Down edge dly	0	Always
P1-24	Reserved		0	Always
P1-25	Reserved		0	Always

P1-26	OUT1~2 Signal polarity	0~3ff, bitn=1 means opposite polarity	0	Outage
P1-27 P1-28	Electronic gear molecule 1	0~100000000	1	Always
P1-29 P1-30	Electronic gear molecule 2	0~100000000	1	Always
P1-31 P1-32	Electronic gear molecule 3	0~100000000	1	Always
P1-33	Command pulse ratio 1	0.01~100.00	1	Always
P1-34	Command pulse ratio 2	0.01~100.00	10	Always
P1-35	Speed position mode torque limit selection	0: In the emergency stop state, use the third torque limit to stop 1: Always use the analog torque limit	0	Condition is valid
P1-36	Second torque limit value	0~300%	200	Always
P1-37	The third torque limit value	0~300%	200	Always
P1-38	Brake action time (Ten thousand digits indicate action type)	0-29999 Ten thousand digits: 0. Delay after enabling 1. Delay after disabling 2. Delay both enabling and disabling	0	Always
P1-39	High-speed pulse low-pass filter frequency	0~500(kHz)	0	Outage
P1-40	Reserved	0~25.5	0	Outage
P1-41	Curve type	0: T-shaped curve 1: S-shaped curve (not considering 0 speed reversal) 2: S-shaped curve (considering 0 speed reversal)	0	Outage
P1-42	Adjusting function switch (暂时未实现)	0~1	0	Always
P1-43	Adjusting ratio 1	0.00~1.50	0.1	Always
P1-44	Adjusting ratio 2	0.00~1.50	0.2	Always
P1-45	Adjusting ratio 4	0.00~1.50	0.4	Always
P1-46	Adjusting ratio 8	0.00~1.50	0.8	Always
P1-47	Number of output pulses	16~4095	2500	Outage

P1-48	per revolution			
P1-49	Reserved	0.50~300.00	3.19	Outage
P1-50	Carrier frequency (to be added)	12	12	Outage
P1-51	Dead time (to be added)	2.0~5.0 (us)	2.8	Outage
P1-52	Encoder type configuration	0-0x116 bit0-3: INC/ABS selection: 0: incremental, incremental system 1: single-turn, incremental system 2: multi-turn, absolute system 3: multi-turn, incremental system 4: multi-turn, ignore Multi-turn alarm 5: Multi-turn, as single-turn (to be added) bit4-7: Whether it is a wire-saving encoder 0: not 1: yes bit8-11: Special processing for Z signal 1: half-turn Z	0	Outage
P1-53	Absolute encoder configuration	0: 17 bits, 1: 20 bits, 2: 23 bits	0	Outage
P1-54	Lines of incremental encoder	180~10000	2500	Outage
P1-55	Encoder error protection time	0~3000 (msec)	525	Outage
P1-56	Motor rated speed	50~6000 (rpm)	2500	Outage
P1-57	Motor rated current	0.1~100.00 (A)	5	Outage
P1-58	Motor rated voltage	20~80 (V)	48	Outage
P1-59	Motor torque coefficient	0.01~5.00	1	Outage
P1-60	Number of motor pole pairs	1~16	4	Outage
P1-61	Motor stator resistance	0.01~100.00 (Ω)	1.84	Outage
P1-62	Motor quadrature inductance	0.01~80.00 (mH)	3.2	Outage
P1-63	Motor shaft inductance	0.01~80.00 (mH)	3.2	Outage

P1-64	Motor back electromotive force	10~1000 (v/kRPM)	68	Outage
P1-65	Motor rotor inertia	0.001~30.000 (gm^2)	1.06	Outage
P1-66	Motor electrical time constant	0.5~300.00 (msec)	3.19	Outage
P1-67	Reserved	0.0~25.5	0	Outage
P1-68	Reserved	0.50~300.00	3.19	Outage
P1-69	Reserved	0.50~300.00	3.19	Outage
P1-70	Reserved	0~3000.0	0	Always
P2				
P2-00	Moving average S-shaped time	0~500 (msec)	0	Always
P2-01	Convergent integral filtering	0.00~20.00 (msec)	0.5	Always
P2-02	Position loop convergence integration time	1.0~1000.0 (msec)	1000	Always
P2-03	Position loop differential	0.00~1.00 (msec)	0.05	Always
P2-04	End convergence position deviation	0~10000 (pulse)	20	Always
P2-05	Reserved	0.0~25.5	0	Outage
P2-06	Reserved	0.0~25.5	0	Outage
P2-07	Reserved	0.0~25.5	0	Outage
P2-08	Positive torque set by the panel	0~300%	100	Always
P2-09	Negative torque set by the panel	0~300%	100	Always
P2-10	Load inertia ratio	0.0~100.0	0	Always
P2-11	Speed loop feedforward coefficient	0.000~1.500	0	Always
P2-12	Speed feedback method	0~0x31 bit0-3 0: Encoder feedback 1: Speed observer Bit4-7: Observer gear	0x10	Outage
P2-13	Speed feedback filter time	0.00~10.00 (msec)	0	Always

	constant			
P2-14	Speed loop PI regulator	0: Normal; 1: PDFF; 2: High beat	0	Outage
P2-15	PDFF-Kf	0.00~2.00	1	Always
P2-16	Reserved	0.0~25.5	0	Outage
P2-17	Reserved	50~6001	200	Outage
P2-18	Reserved	10~100	10	Outage
P2-19	Reserved	0~200	0	Always
P2-20	Reserved	0~200	0	Always
P2-21	Reserved	0~200	0	Always
P2-22	Virtual In1 (to be added)	Reserved	0	Always
P2-23	Virtual In2 (to be added)	Reserved	0	Always
P2-24	Virtual In3 (to be added)	Reserved	0	Always
P2-25	Virtual In4 (to be added)	Reserved	0	Always
P2-26	Virtual In5 (to be added)	Reserved	0	Always
P2-27	Virtual In6 (to be added)	Reserved	0	Always
P2-28	Virtual In7 (to be added)	Reserved	0	Always
P2-29	Virtual In8 (to be added)	Reserved	0	Always
P2-30	Virtual Out1 (to be added)	Reserved	0	Always
P2-31	Virtual Out2 (to be added)	Reserved	0	Always
P2-32	Virtual Out3 (to be added)	Reserved	0	Always
P2-33	Virtual Out4 (to be added)	Reserved	0	Always
P2-34	Virtual Out5 (to be added)	Reserved	0	Always
P2-35	Virtual Out6 (to be added)	Reserved	0	Always
P2-36	Virtual Out7 (to be added)	Reserved	0	Always
P2-37	Virtual Out8 (to be added)	Reserved	0	Always
P2-38	Position data decimal point position (to be added)	Reserved	0	Always
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always

P2-41	Origin return configuration	0x1245 bit0~3 Origin return mode: 0: positive direction return (external reference point), 1: reverse direction return (external reference point), 2: positive and positive (mixed reference), 3: positive and negative (mixed reference) 4: negative and positive, 5: negative and negative bit4~7 Origin return trigger mode: 0: Off, 1: Level trigger, 2: Rising edge trigger, 3: Automatically trigger once at power-on and level trigger, 4: Trigger once at power-up and rising edge trigger bit8~11 reference point to set. The origin reference signal: 0: external reference, 1: Z signal reference, 2: mixed reference bit12~15 whether to allow segment skip 0: allow the high-speed segment to be skipped when the external signal is valid; 1: Not allowed	0	Outage
P2-42	Reserved	0-255	0	Outage
P2-43	Reserved	0-255	0	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-48 P2-49	Z phase bias	-2147483647~2147483647	0	Always
P2-50	Origin LS timing selection	0-1 (to be added)	0	Always
P2-51	Select origin return OT operation	0-1 (to be added)	0	Always
P2-52	Positive software OT	-2147483647~2147483647	2000000000	Outage

P2-53	detection position			
P2-54 P2-55	Negative software OT detection position	-2147483647~2147483647	-2000000000	Outage
P2-56	Software OT is valid/invalid (if P0-09=7)	0: Do not check the software OT; 1: OT is not regarded as an error; 2: OT reports a software error	0	Outage
P2-57	Position command i form	(If P0-09=7) 0-1 (to be added)	0	Condition is valid
P2-58	Positioning data valid/invalid	0-1 (to be added)	0	Always
P2-59	Sequential start valid/invalid	0~2 (to be added)	0	Always
P2-60	Stop timing decimal point position	0~10 (to be added)	10	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always
P2-63 P2-64	Forward stroke (must be a positive number)	0~2147483647	2000000000	Always
P2-65 P2-66	Backward stroke (must be a positive number)	0~2147483647	2000000000	Always
P2-67	Reserved	0.0~25.5	0	Outage
P2-68	Reserved	0.0~25.5	0	Outage
P2-69	Reserved	0.0~25.5	0	Outage
P2-70	Reserved	0.0~25.5	0	Outage
P2-71	Reserved	0~0xFFFF	0	Always
P2-72	Reserved	0~0xFFFF	0	Always
P2-73	Reserved	0~0xFFFF	0	Always
P3				
P3-00	Point-to-point control parameters 1	bit0~3 Point-to-point trigger mode 0: high level, 1: rising edge bit4~7 operating mode 0: 1/0 mode, multi-segment position; 1:	0x1001	Outage

		discontinuous programming mode; 2: continuous programming mode; 3: infinite loop bit8~11 Addressing mode 0: Normal, 1: Sequential addressing, 2: Reverse order addressing, 3: Optimal addressing bit12~15 Coordinate system mode 0: Relative position, 1: Absolute position		
P3-01	Point-to-point control parameters 2	bit0~3 M code output mode 0: output when starting 1: output when positioning is completed bit4~7 combination code logic: 0: imitating Delta combination logic 1: imitating Delta combination logic	0x0011	Outage
P3-02	Reserved	0~3	0	Outage
P3-03	Reserved	0~1	1	Outage
P3-04	Number of cycles Cooperating mode 2	1~30000	1	Always
P3-05	Reserved	1~30000	1	Outage
P3-06 P3-07	Single lap setting of indexing function	-2147483647~2147483647	10000	Outage
P3-08	Programming mode enables the number of segments/indexing function, single-turn indexing	1~32	16	Outage
P3-09	Reserved	0.0~25.5	0	Outage
P3-10 P3-11	Multi-terminal position given 0	-2147483647~2147483647	0	Always
P3-12 P3-13	Multi-terminal position given 1	-2147483647~2147483647	0	Always
P3-14	Multi-terminal position	-2147483647~2147483647	0	Always

P3-15	given 2			
P3-16	Multi-terminal position given 3	-2147483647~2147483647	0	Always
P3-17				
P3-18	Multi-terminal position given 4	-2147483647~2147483647	0	Always
P3-19				
P3-20	Multi-terminal position given 5	-2147483647~2147483647	0	Always
P3-21				
P3-22	Multi-terminal position given 6	-2147483647~2147483647	0	Always
P3-23				
P3-24	Multi-terminal position given 7	-2147483647~2147483647	0	Always
P3-25				
P3-26	Multi-terminal position given 8	-2147483647~2147483647	0	Always
P3-27				
P3-28	Multi-terminal position given 9	-2147483647~2147483647	0	Always
P3-29				
P3-30	Multi-terminal position given 10	-2147483647~2147483647	0	Always
P3-31				
P3-32	Multi-terminal position given 11	-2147483647~2147483647	0	Always
P3-33				
P3-34	Multi-terminal position given 12	-2147483647~2147483647	0	Always
P3-35				
P3-36	Multi-terminal position given 13	-2147483647~2147483647	0	Always
P3-37				
P3-38	Multi-terminal position given 14	-2147483647~2147483647	0	Always
P3-39				
P3-40	Multi-terminal position given 15	-2147483647~2147483647	0	Always
P3-41				
P3-42	Delay 1	0~5000(ms)	100	Always
P3-43	Delay 2	0~5000(ms)	100	Always
P3-44	Delay 3	0~5000(ms)	100	Always
P3-45	Delay 4	0~5000(ms)	100	Always

P3-46	Delay 5	0~5000(ms)	100	Always
P3-47	Delay 6	0~5000(ms)	100	Always
P3-48	Delay 7	0~5000(ms)	100	Always
P3-49	Delay 8	0~5000(ms)	100	Always
P3-50	Delay 9	0~5000(ms)	100	Always
P3-51	Delay 10	0~5000(ms)	100	Always
P3-52	Delay 11	0~5000(ms)	100	Always
P3-53	Delay 12	0~5000(ms)	100	Always
P3-54	Delay 13	0~5000(ms)	100	Always
P3-55	Delay 14	0~5000(ms)	100	Always
P3-56	Delay 15	0~5000(ms)	100	Always
P3-57	Delay 16	0~5000(ms)	100	Always
P3-58	Reserved	0.0~25.5	0	Outage
P3-59	Reserved	0.0~25.5	0	Outage
P3-60	Reserved	0.0~25.5	0	Outage
P3-61	Reserved	0.0~25.5	0	Outage
P3-62	Reserved	0.0~25.5	0	Outage
P3-63	Reserved	0.0~25.5	0	Outage
P3-64	Reserved	0-0x1111	0x1100	Outage

Always：Take effect immediately after modification;

Outage：After parameter modification, it will take effect after power off and restart;

Condition is valid：It can be modified only when the servo is not enabled.

4.2 Parameter Description

4.2.1 P0 Parameter group

(1)**P0-00，P0-01/P0-02，P0-03** Electronic gear

No.	Definition	Predetermined area	Default	Change
P0-00	Electronic gear	1-100000000	4	Always

P0-01				
P0-02	Electronic gear	1-100000000	1	Always
P0-03	denominator 0			

It is valid for position control, and the numerator and denominator of the 0x6091 dictionary item will also be associated in CANopen mode and Ehtercat mode.

When the electronic gear ratio is given by communication, give the high 16 bits first, and then give the low 16 bits. For example, to give the numerator value N:

P0-00 = N/65536, P0-01 = N%65536. After setting, it needs to power off and restart to take effect.

The parameter (electronic gear) is set in the unit of movement of the mechanical system per command pulse.

Use the following calculation formula to calculate.

$$\frac{\text{P0-00}}{\text{P0-02}} = (\text{Unit})^{※} \times \frac{\text{10000 Pulse/revolution}}{\text{(Movement of the mechanical system when the motor rotates one revolution)}}$$

※ The unit quantity is the distance traveled by the machine when the host computer outputs a pulse.

Tip: When there is π in the movement of the mechanical system when the servo motor rotates once, 355/113 can be approximated. The number of output pulses has nothing to do with the electronic gear ratio. According to the setting values of parameters P1-47 and P1-48, when the motor shaft rotates forward, it outputs 2 signals of phase B feed with 90° phase difference.

(2)**P0-04** Command pulse form

No.	Definition	Predetermined area	Default	Change
P0-04	Command pulse form	0: Pulse + direction 1: AB pulse 2: Positive and negative pulse	0	Outrage

It is valid only in position control.

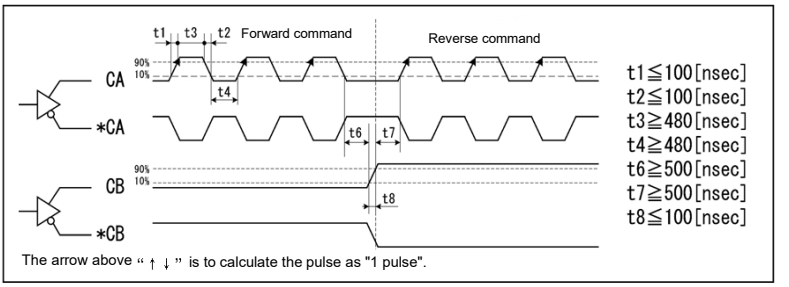
The pulse form of the input pulse terminal [CA], [*CA], [CB], [*CB] of the servo drive can be selected.

The maximum input frequency is 500 [KHz] for differential input and 200 [kHz] for open collector input.

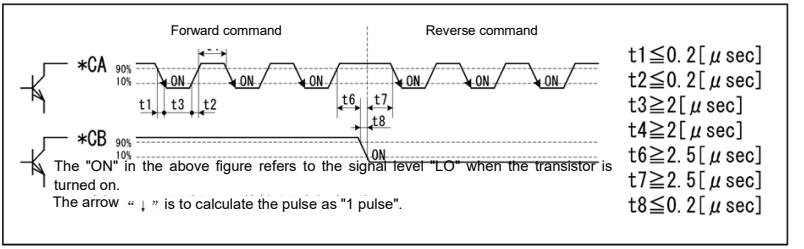
■Command pulse + command symbol (setting value of parameter 04: 0)

The command pulse is used to indicate the amount of rotation, and the command symbol is used to indicate the direction of rotation.

・ Differential input



・ Open collector input

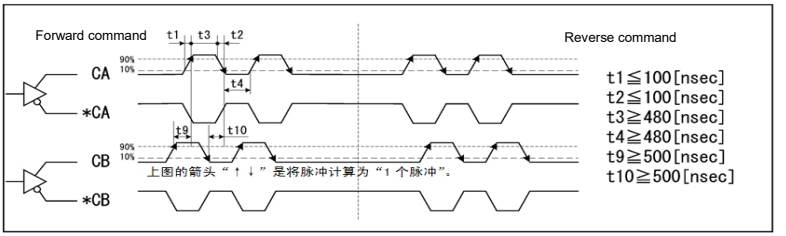


■AB(90 degree phase difference) 2 signal (Setting value of parameter 03:1)

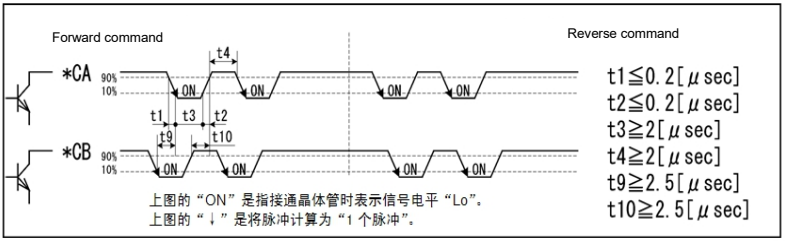
The A-phase and B-phase signals are used to indicate the direction of rotation and the amount of rotation.

Each edge of the A-phase and B-phase signals corresponds to one pulse.

・ Differential input



・ Open collector input

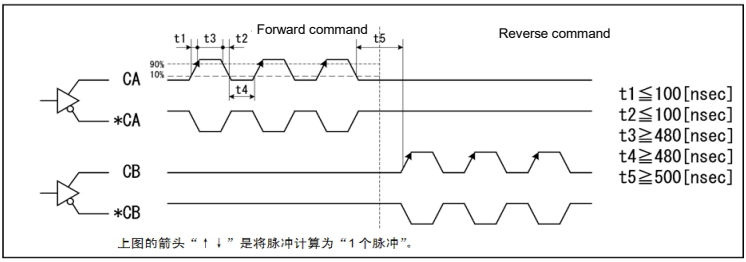


■Forward pulse/reverse pulse (setting value of parameter 03: 2)

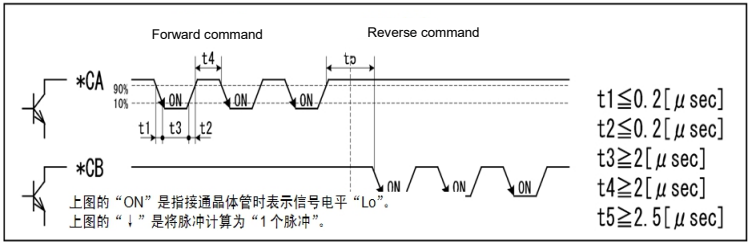
The forward pulse indicates the forward direction, and the reverse pulse

indicates the amount of rotation in the reverse direction.

・Differential input



・Open collector input



(3)**P0-05** Rotation direction switch

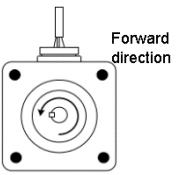
No.	Definition	Predetermined area	Default	Change
P0-05	Rotation direction switch	0: Same as the default direction 1: Opposite to the default direction	0	Outage

Align the direction of rotation of the servo motor with the direction of movement of the machine.

When running according to the pulse: When the pulse for forward rotation pulse, the command symbol is "H" level or the phase B start pulse is input with 2 signals with a phase difference of 90 degrees, the rotation direction is the positive direction, and the servo motor rotates forward.

The phase switching of the output pulse selects the phase when the servo motor rotates counterclockwise (CCW).

When operating according to the speed command voltage: Apply positive (+) polarity voltage to the speed command voltage, and the rotation direction when the forward rotation command (FWD) signal is given is the positive direction, and the servo motor rotates forward.



Observing the output shaft of the servo motor from the front

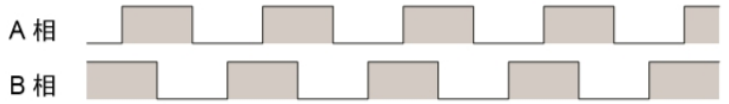
counterclockwise rotation (CCW: right picture) is forward rotation. Clockwise rotation (CW) is reverse.

(4) **P0-06** Output pulse phase switching during rotation

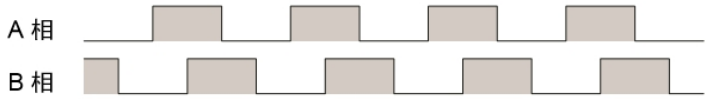
No.	Definition	Predetermined area	Default	Change
P0-06	Output pulse phase when rotating	0: Phase B starts when CCW is rotating 1: Phase A starts when CCW is rotating	0	Outage

Make the phase of the output pulse of the servo motor match the moving direction of the machine. Select the phase when the servo motor is rotating forward. The pulse is output from the connector CN1 (FFA, *FFA, FFB, *FFB).

When the setting value is 0:



When the setting value is 1:



(5)**P0-07** Forward torque limit

No.	Definition	Predetermined area	Default	Change
P0-07	Forward torque limit	0-300%	180%	Always

In position or speed mode, when the terminal torque input limit function is not used or enabled, and the torque input limit sequence number is 0, this parameter controls the maximum torque value of forward rotation.

In torque mode, this value is the maximum value of forward torque output. If the forward torque setting is greater than this value, it will be limited to this value.

(6)**P0-08** Reverse torque limit

No.	Definition	Predetermined area	Default	Change
P0-08	Reverse torque limit	0-300%	180%	Always

In position or speed mode, when the terminal torque input limit function is not used or enabled, and the torque input limit sequence number is 0, this parameter controls the maximum torque value of reverse rotation.

In torque mode, this value is the maximum value of reverse torque output. If the reverse torque setting is greater than this value, it will be limited to this value.

(7)**P0-09** Control mode selection

No.	Definition	Predetermined area	Default	Change
P0-09	Control mode selection	0: Position 1: Speed 2: Torque 3: Position ⇔ Speed 4: Position ⇔ Torque 5: Speed ⇔ Torque 6: Can Communication 7: Internal location 8: Internal position ⇔ speed 9：Internal position ⇔ torque 10: Pulse speed mode 11: CANOPEN mode	11	Outage

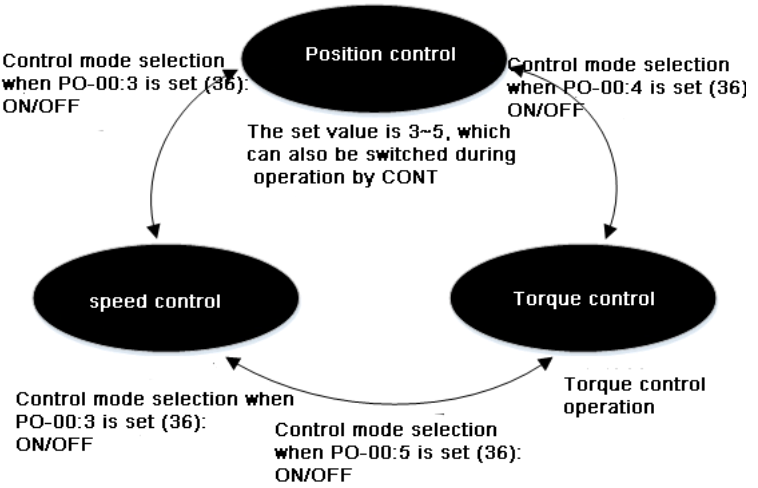
Set the control mode to be used as a parameter in numerical form.

Note: The default setting is the most commonly used canopen communication mode on AGV. If you need to run in terminal mode, please use the host computer to modify this parameter first, and then restart it before normal use.

When it is necessary to switch during operation, the control mode switch (function No. 36) signal must be ON/OFF.

Please refer to the table below for details.

P0_09: Set value of control mode selection	Control mode	
	Control mode switch = OFF	Control mode switch = ON
0	Position control	
1	Speed control	
2	Torque control	
3	Position control	Speed control
4	Position control	Torque control
5	Speed control	Torque control
6	Manufacturer CAN communication mode	
7	Internal location	
11	CANOPEN Communication mode	



Note: When P0-09=6, the factory CAN mode is running. If you want to run the more general canopen mode, please set P0-09=11.

(8)**P0-10/P-12** CONT Signal distribution

No.	Definition	Predetermined area	Default	Change
P0-10	CONT1 Input signal distribution	0: No designation 1: Servo start [RUN] 2: Manual forward [FWD] 3: Manual reversal [REV] 4: Point-to-point start signal 5: Origin trigger 6: Origin signal 7: Left limit 8: Right limit 9: emergency stop 10: Alarm clear 14: Acceleration and deceleration selection 17: Gain switching	1	Outage

P0-11	CONT2 Input signal distribution	19: Torque limit selection 1 20: Torque limit selection 2 24: Gear ratio switch 1 25: Gear ratio switching 2 26: Disable pulse input 31: Internal position stop signal 32: Internal position pulse 33: Clear signal 34: External braking resistor is overheated 36: Mode switching 37: Position control mode	0	Outage
P0-12	CONT3 Input signal distribution	38: Torque control mode 39: Speed control mode 50: Clear position deviation 51: Multi-speed selection 1 52: Multi-speed selection 2 53: Multi-speed selection 3 54: Multi-speed selection 4 55: Forced sliding stop 65: Point-to-point position selection 1 66: Point-to-point position selection 2 67: Point-to-point position selection 3 68: Point-to-point position selection 4	0	Outage

CONT1~CONT5 corresponding to PN-10~PN-12 need external signal, which is manual mode.

(9)**P0-15/P0-16 OUT** Signal distribution

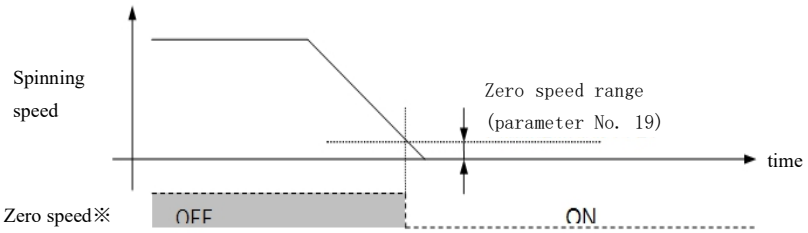
No.	Definition	Predetermined area	Default	Change

P0-15	OUT1 Signal distribution	0: No designation 1: Ready 2: Positioning end 11: Speed limit measurement 12: Brake action time 14: Brake timing 15: Alarm a contact output 16: Alarm b contact output 20: OT detection 22: Home return completed 23: Zero position deviation 24: Zero speed 25: Speed reached	16	Outage
P0-16	OUT2 Signal distribution	26: Current limit detection 30: Multi-stage position point 0 31: Multi-step position Point 1 32: Multi-stage position point 2 33: Multi-segment position point 3 34: Multi-stage position point 4 35: Multi-segment position point 5 38: +OT detection 39: -OT detection 41: Forced stop detection 50: Internal position completion signal	0	Outage

(10) **P0-19** Zero speed range

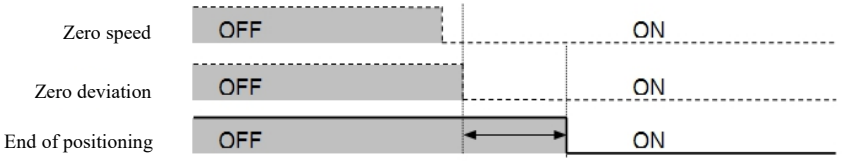
No.	Definition	Predetermined area	Default	Change
P0-19	Zero speed range	0.1~P0-34(rpm)	50.0	Always

This parameter is used to determine whether the servo motor has stopped. Set the amplitude at which the zero speed signal is turned on.



If both the zero deviation signal and the zero speed signal are continuously turned on

during the determination of whether the positioning is completed, the positioning end signal is turned on.



Judgment time for positioning end

(11) **P0-20** Z pulse compensation

No.	Definition	Predetermined area	Default	Change
P0-20	Z pulse compensation	0~60000(pulse)	0	Always

For the encoder angle compensation parameters, if the original motor is used, it generally does not need to be modified

(12) **P0-21, P0-22** Deviation zero range / positioning end range

No.	Definition	Predetermined area	Default	Change
P0-21	Deviation zero range / positioning end range	0~100000000(pulse)	100	Always
P0-22				

Zero deviation range: Set the ON level of the "zero deviation" signal output as the output signal (OUT signal). If the position deviation is below the set value, it will be turned on.

Positioning end range: Set the deviation condition of the "positioning end (INP)" signal output as the output signal (OUT signal).

If the position deviation is below this set value and the motor speed is below the set value of "Zero Speed Range", the positioning end (INP) signal is turned ON. However, during automatic operation, home return operation, and manual operation of position control, the end of pulse output in the servo amplifier is also added to the judgment condition.

(13) **P0-23** Deviation exceeds the detection value

No.	Definition	Predetermined area	Default	Change
P0-23	Deviation exceeds the detection	0.1~100.0(ring)	15.0	Conditio

Set the "deviation exceeding" alarm detection value, and use it in conjunction with P0-88.

It should be set based on the rotation amount of the motor output shaft.

(14) **P0-24/ P0-25/ P0-26** Positioning end judgment time / Positioning end output form /Minimum OFF time at the end of positioning

No.	Definition	Predetermined area	Default	Change
P0-24	Positioning end judgment time	0.000~1.000 sec (0.001 sec)	0	Always

P0-25	Positioning end output form	0: Output form 1	0	Conditio
P0-26	Minimum OFF time at the end of positioning	1~1000 (msec)	20	Always

Set positioning completion [INP] signal output form, minimum OFF time/1 short-circuit ON time, and judgment time.

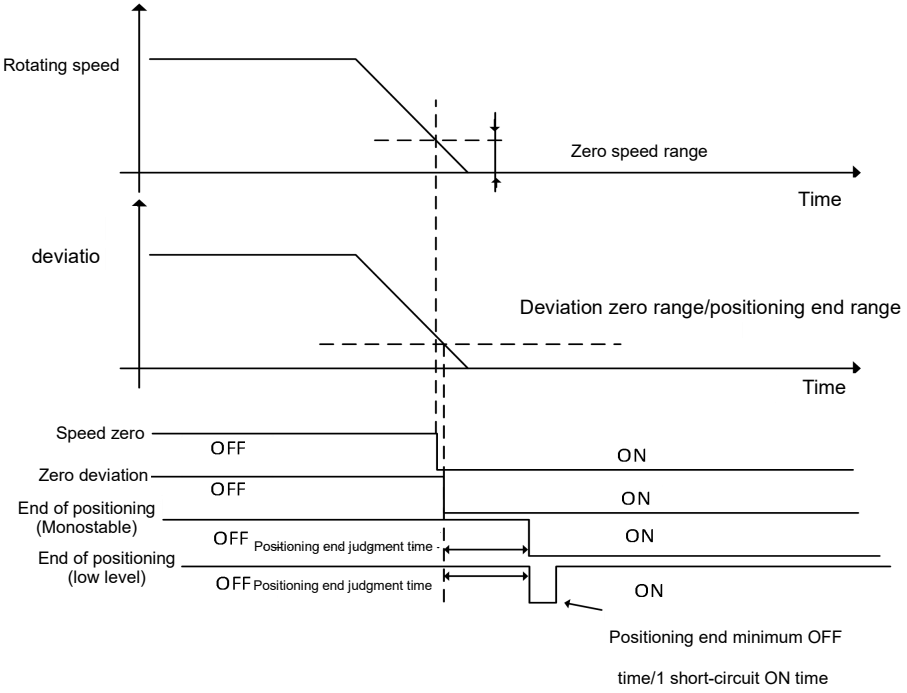
Select the positioning completion output format: the output signal format (refer to the timing chart shown below).

Positioning end minimum OFF time/1 short-circuit ON time: Set the time when the output signal is turned ON when the output form is 1 short-circuit.

Positioning end judgment time: Set the judgment time from recognition to the end of positioning.

Tip: Regarding the position deviation of the positioning end signal is below the set value of the "deviation zero range" and the motor speed is below the set value of the "zero speed range", the positioning end signal is set to ON.

Please confirm the setting value again, and then use it. Please refer to the timing chart below.



(15) **P0-27/P0-28** Alarm detection when the voltage is insufficient / Motor action when undervoltage

No.	Definition	Predetermined area	Default	Change
P0-27	Alarm detection when the voltage is insufficient	0: Alarm not detected 1: Alarm detected	0	Condition is valid
P0-28	Motor action when undervoltage	0: Emergency stop after undervoltage 1: Free stop under undervoltage	0	Condition is valid

Set during the servo start [RUN] signal is on, an alarm will be generated when the power supply voltage is detected to be insufficient.

The monitored alarm is that the main circuit voltage is insufficient. If an alarm occurs, the servo will stop and disable, and the current error can be displayed as “LU” in the “Current Servo Alarm” or “Servo History Alarm” interface of the host computer.

Note: When the low voltage servo is running, because the bus voltage is not high, the influence on torque and maximum speed after deviation is more serious than 220V ordinary voltage servo. So please be sure to set the "P1-58 motor rated voltage" parameter before running.

When the motor is in motion, the emergency stop is the maximum torque stop. Free stop means that the motor no longer outputs torque to control the rotation of the motor, waiting for the motor's own speed. For potential loads, it may not be possible to freely stop to 0 speed. At this time, a motor with a brake may be required.

(16) **P0-29** Prohibit overwriting parameters

No.	Definition	Predetermined area	Default	Change
P0-29	Prohibit overwriting parameters	0: Parameter can be changed 1: Parameter change is prohibited	0	Always

1: Prohibit editing parameters

Even if rewriting is prohibited in parameter No. 29, P0-29 can still be edited to control whether other parameters can be rewritten.

(17)**P0-31** Speed uniform range

No.	Definition	Predetermined area	Default	Change
P0-31	Speed uniform range	0.1~6000.0 (rpm)	10.0	Always

Set the ON range of the "speed reached" signal output as the output signal (OUT signal).

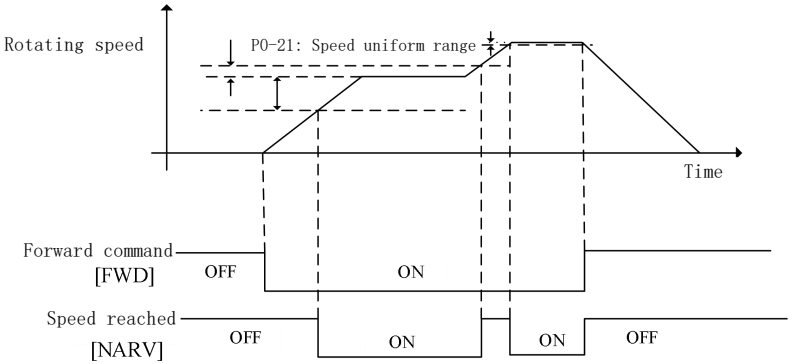
The actual speed of the servo motor is near the command speed, and the speed reached

signal is turned ON.

When the initial value is 10.0[rpm], within the range of the command speed ±10.0[rpm], the speed reached signal turns ON.

When the command speed is not reached due to reasons such as the maximum speed and the adjustment, it is turned OFF.

When the [FWD] signal or [REV] signal is OFF, the speed arrival signal is not turned ON.



(18) **P0-32/P0-33** Speed limit selection during torque control / Maximum speed

No.	Definition	Predetermined area	Default	Change
P0-32	Speed limit selection during torque control	0: Use analog or multi-speed as speed reference 1: Use P0-33 as speed	0	Condition is valid
P0-33	Maximum speed (for torque control)	0.1~6000.0 (rpm)	3000.0	Always

When it is set to 0, the maximum speed limit is determined by the external analog input signal (when there is no multi-speed reference command input) or multi-speed reference; when it is set to 1, the maximum speed is determined by parameter P0-33.

During torque control, an error of about 10.0 [rpm] will occur between the set value and the actual speed of the servo motor. The gain for speed limit during torque control can adjust the error.

(19) **P0-34** Maximum speed (For position and speed)

No.	Definition	Predetermined area	Defaul	Change
P0-34	Maximum speed (For position and speed)	0.1~6000.0(rpm)	3000.0	Always

Set the maximum speed of the servo motor for position control, speed control, and torque control.

(20) **P0-35/P0-36/P0-37/P0-38** Acceleration and deceleration time

No.	Definition	Predetermined area	Default	Change
P0-35	Acceleration time 1 (also test run)	1~10000(msec)	100	Always
P0-36	Deceleration time 1 (also test run)	1~10000(msec)	100	Always
P0-37	Acceleration time 2	1~10000(msec)	500	Always
P0-38	Deceleration time 2	1~10000(msec)	500	Always

It is valid only during speed control. In canopen communication mode, it will be loaded as the initial value of acceleration such as position mode.

The acceleration and deceleration time of the servo motor can be set.

The time setting is the time required to reach 0~rated speed.

Acceleration time 2 and deceleration time 2 are valid while the acceleration and deceleration time selection signal is on.

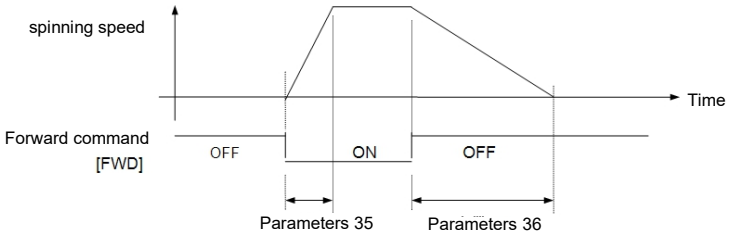
The ON/OFF of the acceleration/deceleration time selection is always valid, and the acceleration time/deceleration time can also be changed. The acceleration/deceleration time selection signal is the available parameter to control the distribution signal.

External selection of acceleration and deceleration time:

Acceleration and deceleration time selection (14)	Acceleration time	Deceleration time
OFF	P0-35	P0-36
ON	P0-37	P0-38

Acceleration time 1 and deceleration time 1 can be set individually. You can only extend the deceleration time.

The deceleration time can be flexibly used according to the driving of the trolley, whether it is loaded or not.



When the host control device outputs the analog speed command voltage and the

frequency division output of the servo drive for position control in the form of feedback, please set the acceleration time and deceleration time to 0.000 seconds or very small numbers.

(21) **P0-40/P0-41/P0-42** Position and speed regulator parameters

No.	Definition	Predetermined area	Default	Change
P0-40	Position regulator gain 1	1~2000[rad/sec] (1 Scale)	25	Always
P0-41	Speed regulator gain 1	1~30000[Hz] (1 Scale)	100	Always
P0-42	Speed regulator integral coefficient 1	0~4096 (1 Scale)	200	Always

Several parameters can be adjusted to adjust the servo's response to position or speed commands. For the adjustment of specific parameters, please refer to the specific explanations on page 56 (25).

(22) **P0-43** S-shaped time constant

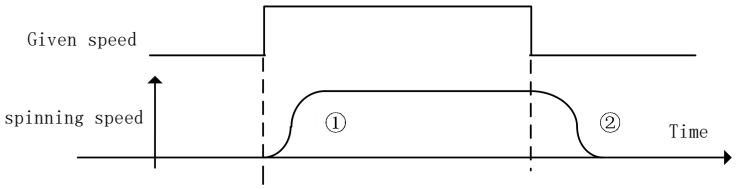
No.	Definition	Predetermined area	Default	Change
P0-43	S-shaped time constant	0~1000(msec)	100	Always

Effective during speed control.

The servo motor can be accelerated/decelerated in an S-shaped curve. This parameter can set the smoothness of the S-shaped addition and subtraction curve to make the curve smoother or more similar to the T-shaped acceleration. The larger the parameter, the smoother the curve, but it may cause the acceleration and deceleration time to be prolonged. The smaller the value, the worse the smoothing effect.

When setting the analog or multi-speed reference speed, the first acceleration or deceleration stage will set smooth acceleration and deceleration according to this value, and the latter stage will still accelerate/decelerate according to the time constant of the set time.

The operation situation is shown in the figure, P0-43 mainly adjusts (1) section (slow acceleration section), still need to configure P0-35 and other parameters to configure the acceleration or deceleration time



(23) **P0-44/P0-45/P0-54** Position loop feedforward parameters

No.	Definition	Predetermined area	Default	Change
P0-44	Position loop feedforward gain 1	0.000~1.200 (0.001 Scale)	0	Always

P0-45	Feedforward filter time constant	0.000~2.500[msec] (0.001 Scale)	0	Always
P0-54	Position loop feedforward gain 2	0~1200(%) (1%)	100	Always

If you increase the setting P0-44, you can reduce the position deviation and enhance the responsiveness.

If the setting is set to 1.000, the position deviation at a certain speed can be almost controlled to 0 (except during acceleration and deceleration).

It is used when it is necessary to improve the synchronization accuracy between two axes such as synchronization control.

P0-45 indicates the filtering time for the position feedforward quantity setting. Generally, when the feedforward setting is greater than 0.1, it needs to be set to run the given command smoothly.

Switch the gain of the servo system from the first gain to the second gain. By switching the gain, noise and vibration at stop can be reduced. Gain switching is based on the reason for gain switching.

Note: The typical value of feedforward is between 0.1-0.4. If you want to continue to increase, please use an encoder with 17 bits or higher to obtain better position response and smaller speed fluctuations.

(24) **P0-46** Torque filter time constant

No.	Definition	Predetermined area	Default	Change
P0-46	Torque filter time constant	0.00~20.00[msec](0.01 scale)	0.5	Always

It is effective in position control and speed control. It can smooth the output torque, but after setting, it will affect the ability to quickly track the position and speed commands.

■Position regulator gain 1(P0-40)

It is the responsive parameter that determines the position control loop. If the set value is increased, the position command can obtain a good tracking adjustment result, but if the set value is too large, excessive adjustment is likely to occur.

■Speed regulator gain 1(P0-41)

It is the responsive parameter that determines the speed control loop. If the setting value is increased, an adjustment result that emphasizes the responsiveness of the servo motor will be obtained, but if the setting value is too large, the mechanical system is likely to vibrate.

■Speed regulator integral coefficient 1(P0-42)

It is the responsive parameter that determines the speed control loop. If the setting value is increased, an adjustment result that emphasizes the responsiveness of the servo motor will be

obtained. If the setting value is too large, the mechanical system is likely to vibrate.

■Feedforward filter time constant (P0-45)

It is a parameter for filtering and controlling the feedforward of the position control loop.

If this parameter is reduced, the responsiveness will be faster, but torque shock will easily occur.

■Torque filter time constant (P0-46)

It is a parameter for filtering and controlling the torque command.

Increasing the parameter has the effect of suppressing mechanical resonance, but sometimes it may undermine the stability of control.

(25) **P0-47** Speed setting filter

No.	Definition	Predetermined area	Default	Change
P0-47	Speed setting filter	0.00~20.00[msec](0.01 scale)	0	Always

Valid for position control.

Set when filtering the speed command.

(26) **P0-48/P0-49/P0-50/P0-51/P0-52/P0-53**

No.	Definition	Predetermined area	Default	Change
P0-48	Main reasons for gain switching	0: Position deviation (×10) 1: Feedback speed 2: Command speed	1	Always
P0-49	Gain switching level	1~1000(1 Scale or %)	50	Always
P0-50	Gain switching time constant	1~100[msec] (1 Scale)	10	Always
P0-51	Position regulator gain 2	30~200% (1%)	100	Always
P0-52	Speed regulator gain 2	1~1500 (%)	100	Always
P0-53	Speed regulator integral coefficient 2	1~1500 (1%)	100	Always

It is valid for position control and speed control.

However, No. 51 is only valid for position control.

When the current value of the content indicated by the gain switching cause PN-48 is less than the representative value of the gain switching level, the switching level value uses the second gain.

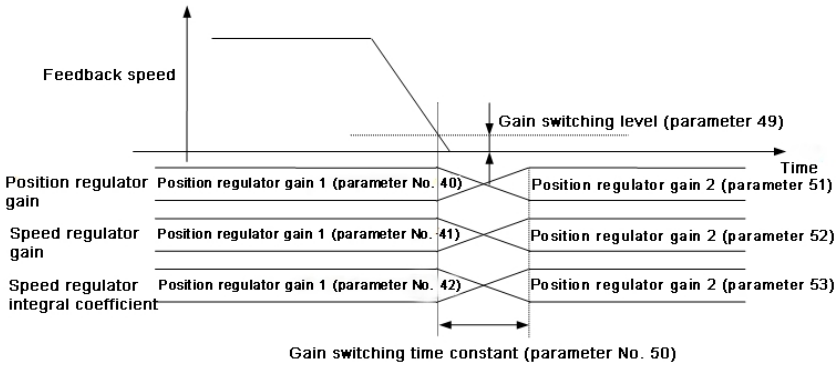
Switch the gain during stop from the first gain (parameter 40~42) to the second gain (parameter 51~53); by switching the gain, the noise and vibration during stop can be reduced.

The unit of the setting value of the second gain (parameter No. 51 to No. 53) is %, which is set in proportion to the first gain.

Example:

When the speed regulator gain 1 (parameter No. 41) is 100 [Hz]; if the speed regulator gain 2 (parameter No. 52) is set to 100, the actual value is 100 [Hz]. If the speed regulator gain 2 (parameter 52) is set to 80, the actual value is 80 [Hz]. The same

is true for position regulator gain 2 (parameter No. 51) and speed regulator integral coefficient 2 (parameter No. 53).



(27) **P0-54** Position loop feedforward gain 2

No.	Definition	Predetermined area	Default	Change
P0-54	Position loop feedforward gain 2	0~1200(%)(1%)	100	Always

See P0-44

(28) **P0-55** Analog filter ms

No.	Definition	Predetermined area	Default	Change
P0-55	Analog filter ms	0.00~300.00(msec)	1	Always

The input voltage of the analog torque command input [Vref] terminal can be filtered. The analog input voltage command that changes drastically can be filtered more smoothly. At the same time reduce the influence of some interference signals.

(29) **P0-56** Deceleration time after disable

No.	Definition	Predetermined area	Default	Change
P0-56	Deceleration time after disable	0~10000(msec)	500	Always

It is valid only during speed control.

The deceleration time when the enable is turned off is the deceleration time to start speed running when the running signal is ON→OFF; the deceleration time from the current running speed to zero speed can be set when the enable signal changes from presence to absence during speed control.

The disable deceleration time is effective for speed loop and torque loop control, and it will only take effect when the enable signal is disconnected and the button simple operation stops. P0-56 is invalid when the positive and negative overtravel limit alarms.

(30) **P0-57** Action sequence when disable

No.	Definition	Predetermined area	Default	Change
P0-57	Action sequence when disable	0: Emergency stop	0	Outage

As shown in the table above, set the deceleration operation under each condition and the operation state at stop.

(31) **P0-58** OL type Judgment type

No.	Definition	Predetermined area	Default	Change
P0-58	OL type Judgment type	To be added	0	Conditio

The curve-type overload alarm curve has high sensitivity, which can effectively protect it under the locked-rotor state.

This parameter is temporarily invalid, and OL alarm is now judged by the curve type overload curve.

(32) **P0-59** OL ratio

No.	Definition	Predetermined area	Default	Change
P0-59	OL ratio	0.0000~1.5000	1	Always

Set the threshold ratio of OL alarm. The smaller the value, the shorter the time for triggering OL alarm.

(33) **P0-60/P2-00** One-time delay S-shaped time constant / S-shaped time

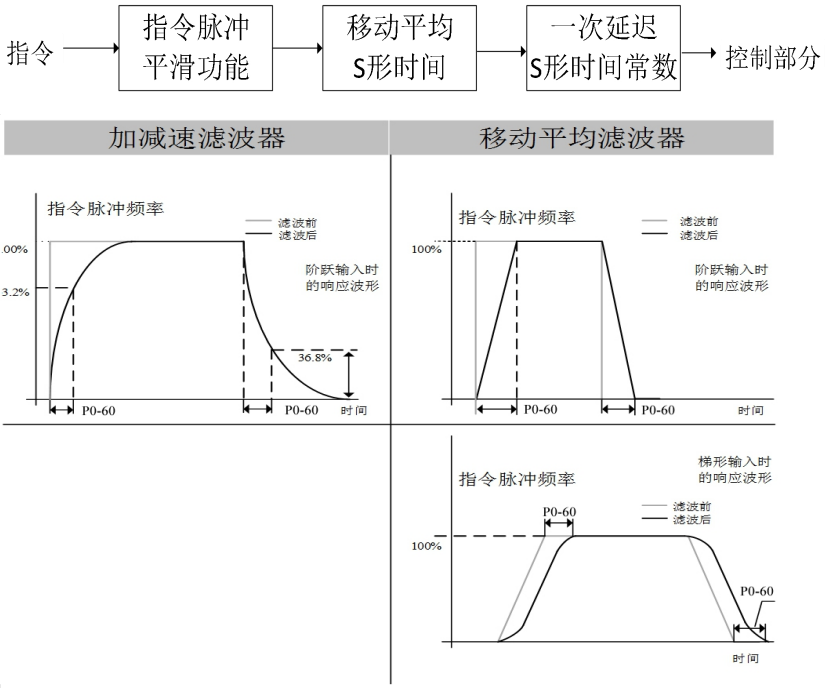
No.	Definition	Predetermined area	Default	Change
P0-60	One-time delay S-shaped time constant	0.0~1000.0(msec)	0	Always
P2-00	S-shaped time	0~500(msec)	0	Always

Set when the filter is introduced in the command and it can be tracked smoothly.

Moving average S time	It is valid for operation during position control. Relative position command, set the moving average S-shaped filter time. When the command pulse frequency is low and the electronic gear ratio is large, if the setting is increased, the torque fluctuation caused by the fluctuation of the command pulse can be reduced.
One time delay S-shaped time constant	For position command and speed command, set the time constant of a delay S-shaped filter. Accelerate and decelerate like an S-shaped curve.

Command smoothing filter function	It is valid for operation during position control. If enabled, the relative position command will be smoothed every 0.25 [mS] interval. When the command pulse frequency is low and the electronic gear ratio is large, if the setting is increased, the torque fluctuation caused by the fluctuation of the command pulse can be reduced. The valid/invalid setting can be changed from time to time, but the setting change actually reflects when the conditions of the position command=0 and the pulse accumulated by the filter=0 are met.

Functional block



(34) **P0-62 /P0-63** OH alarm temperature setting / Fan opening temperature

No.	Definition	Predetermined area	Default	Change
P0-62	OH alarm temperature setting	40～110 ° C	80	Outage
P0-63	Fan opening temperature	20～70 ° C	40	Always

When the value of ON-09 (drive internal temperature) reaches the value of P0-62, AH alarms.

When the value of ON-09 (drive internal temperature) does not reach the set value of

P0-63, the cooling fan on the drive is turned off; when the temperature reaches the set value of Pn-63, the cooling fan on the drive is turned on;

(35) **P0-64** Motor code

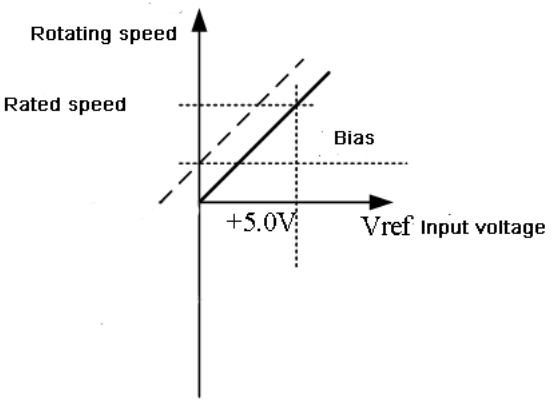
No.	Definition	Predetermined area	Default	Change
P0-64	Motor code	0~500	1	Outage

Please see the attachment for the motor code correspondence table.

(36) **P0-65** Analog input 1

No.	Definition	Predetermined area	Default	Change
P0-65	Analog input 1 offset	0~4096	2048	Outage
P0-66	Maximum speed corresponding to analog input 1	0.0~P0-34	2500	Always
P0-67	Analog configuration	0 is invalid, 1 is valid	1	Outage
P0-68	Analog 1 ratio	0.00~3.00	1	Always

Set the scale, gain and offset of the analog input signal.



The ratio adjustment parameter can fine-tune the gain.

The servo will use the VREF voltage value multiplied by the ratio as the servo's internal speed command. The default value of the gain parameter is 1.

P0-67 is analog quantity related configuration

bit0-3, the mode of analog 1 and 2 (to be added)

bit4-7, 1: Unipolar 0~10V, 0: Bipolar -10~10V (to be added)

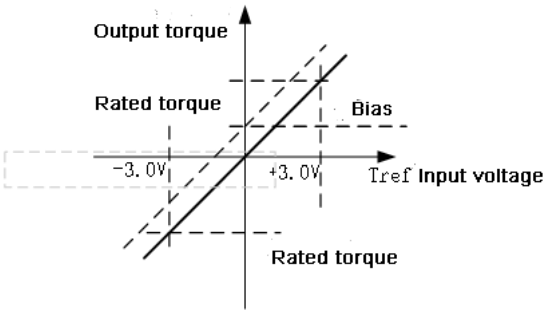
bit8-11, hardware analog quantity 0. Single analog quantity 1. Double analog quantity

bit12-15. Torque reference source 0: Analog value reference 1: Panel parameter reference (P2-08 and P2-09). When this parameter=0, the torque reference of torque mode is the input analog value 1. When this value is set to 1, use the panel settings (P2-08 and P2-09) to set the torque values for forward and reverse rotation respectively.

P0-69	Analog input 2 offset	0~4096	2048	Outage
P0-70	Maximum Torque corresponding to analog input	0~300%	300	Always
P0-72	Analog 2 ratio	0.00~3.00	1	Always

Set the scale, ratio gain and offset of the output torque of the analog input signal.

The servo will multiply the ratio gain by the TREF voltage value as the servo's internal torque command. The default value of the ratio gain parameter is 1.



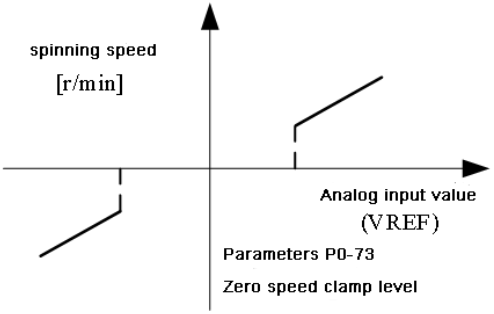
P0-73	Analog speed zero limit	0.0~P0-34(rpm)	10	Always

It is effective in position control and speed control.

Set the rotation speed of the servo motor for zero-speed clamping.

It is valid when inputting analog speed commands for position control and speed control. If the speed command value of the analog speed command (VREF) input terminal is lower than the zero-speed clamp level, the rotation speed will be zero-speed clamped.

Prevent the analog speed command input value from fluctuating near zero.



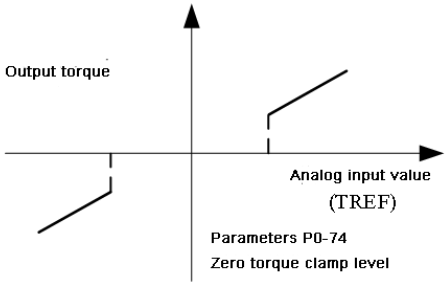
P0-74	Analog torque zero limit	0~300%	5	Always

Set the torque of the servo motor for torque zero-speed clamping.

It is valid when the input position control, speed control and torque control are analog input torque commands.

If the torque command value of the analog torque command (TREF) input terminal is lower than the zero-speed clamp torque, the torque will be clamped at zero speed.

Prevent the analog torque command input value from fluctuating near zero.



(37) **P0-75~ P0-78** CONT Always valid 1-4

No.	Definition	Predetermined area	Default	Change
P0-75	CONT Always valid 1	0~78	0	Outage
P0-76	CONT Always valid 2	0~78	0	Outage
P0-77	CONT Always valid 3	0~78	0	Outage
P0-78	CONT Always valid 4		0	Outage

Set the CONT input signal that is always valid at the same time as the power ON.

The A contact signal is always ON, and the B contact signal is always OFF.

The functions that cannot be set by the A contact signal are alarm reset and deviation

clearing.

The functions that cannot be set by the B contact signal are forced stop and overheating of the external regenerative resistor.

(The function that can be set by the B contact signal is the ±OT signal)

For example, when the forward rotation command [FWD] needs to be always ON, CONT is always valid 1~4 to set the corresponding forward rotation command Number "2".

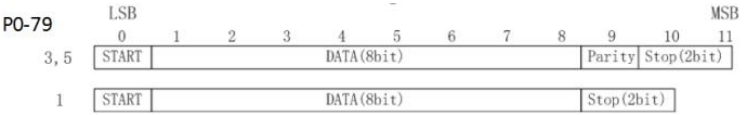
The signal assigned to the CONT input signal can be repeatedly assigned to the CONT always valid signal.

(38) **P0-79** Check bit/stop bit selection (Modbus)

No.	Definition	Predetermined area	Default	Change
P0-79	Check bit/stop bit selection (Modbus)	RTU:1: 8n2 3: 801 5: 8E1	1	Outage

Set the frame format of 485 communication.

Each set of characters is composed as follows:



(39) **P0-80** Whether the communication is stored in EEOROM

No.	Definition	Predetermined area	Default	Change
P0-80	Whether the communication is stored in EEOROM	0: store 1: don't store	0	Outage

This parameter can set whether the parameters written by communication are saved in EEPROM. Due to the limited number of EEPROM writes. For applications that load parameters before power-on and run, and frequent communication to modify parameters during operation, turning on this parameter can improve the life of the EEPROM.

(40) **P0-81** Action after communication timeout

No.	Definition	Predetermined area	Defaul	Change
P0-81	Action after communication timeout (to be added)	0: Regardless, only display status 1: Decelerate to stop	0	Always

The plan to join, has not yet been realized.

(41) **P0-82/P0-83/P0-84** 485 CAN Station No/485 Baud rate / CAN Baud rate

No.	Definition	Predetermined area	Defaul	Change
P0-82	485 CAN Station No	1-127	1	Outage
P0-83	485 Baud rate	0=4800，1=9600，2=19200，	1	Outage
P0-84	CAN Baud rate	0=125k， 1=250k ，2=500k，	3	Outage

P0-82 sets the station number of this servo drive in the bus network. The station numbers of different servos in the same network cannot be the same.

P0-83 sets the baud rate of 485 communication.

P0-84 sets the baud rate of CAN communication, the default is 1Mbps.

(42) **P0-86** 0S alarm ratio

No.	Definition	Predetermined area	Default	Change
P0-86	0S alarm ratio	1.10~5.00	1.1	Always

During position and speed control, the OS alarm threshold is equal to P0-34×P0-86.

During torque control, the OS alarm threshold is equal to P0-33×P0-86.

(43) **P0-87** Related actions after OT

No.	Definition	Predetermined area	Default	Change
P0-87	Related actions after OT	0: Maximum torque stop 2: Lock in original position	0	Condition is valid

As shown in the above table, this parameter can set the specific action after hitting the limit signal.

(44) **P0-88** Deviation detection type

No.	Definition	Predetermined area	Default	Change
P0-88	Deviation detection type	0: Alarm detection 1: No alarm, active pulse loss	0	Outage

When the deviation detection type is set to 0, it will alarm OF immediately if the deviation is exceeded, and the motor will stop running.

When set to 1, the position loop error output is limited to the set value of P0-23.

(45) **P0-89** Power section selection

No.	Definition	Predetermined area	Default	Change
P0-89	Power section selection	0~6	6	Outage

Manufacturer parameters, users do not need to set.

(46) **P0-90** EC alarm detection time

No.	Definition	Predetermined area	Default	Change
P0-90	EC alarm detection time	3~3000msec	5	Outage

This parameter can be set to determine the filter time for encoder error signals. When EC

alarms frequently occur during operation, increasing the value of this parameter may be able to solve this problem.

Be sure to confirm the encoder wiring, motor grounding and other hardware connections at the same time, and then modify this parameter.

(47) **P0-91** Overcurrent forecast value

No.	Definition	Predetermined area	Default	Change
P0-91	Overcurrent forecast value	10~500%	200	Always

Set the current threshold that triggers the software over-current alarm (OC2), which is the ratio of the rated current.

(48) **P0-92/P0-93/P0-94** Test speed given

No.	Definition	Predetermined area	Default	Change
P0-92	Electric speed setting Fn-01	0.0~P0-34(rpm)	50	Always
P0-93	Test run mode	0: Position (to be added)	1	Always
P0-94	Test speed given Fn-10	0.0~P0-34 (rpm)	200	Always

Speed setting value during FN-01/FN-10 test.

(49) **P0-95** Current loop feedforward ratio -**P0-99** Current loop output filter

No.	Definition	Predetermined area	Default	Change
P0-95	Current loop feedforward ratio %	0.00~5.00%	0	Always
P0-96	Differential time of current	0~1.00(0.01ms)	0	Always
P0-97	Cut-off frequency of current	100~3000Hz	950	Always
P0-98	Current regulator integration time	0.0~100.0(msec)	8.0	Always
P0-99	Current loop output filter	0.000~1.000(msec)	0	Always

Manufacturer parameters, can be used directly in most occasions.

4.2.2 P1 Parameter group

(50) **P1-00** Manual feed speed

It is valid for internal position control and speed control.

No.	Definition	Predetermined area	Default	Change
P1-00	Index function speed / internal	0.1~P0-34	500	Always
P1-01	Multi-step speed 1 / internal	0.1~P0-34	500	Always
P1-02	Multi-step speed 2 / internal	0.1~P0-34	1000	Always
P1-03	Multi-step speed 3 / internal	0.1~P0-34	1000	Always
P1-04	Multi-step speed 4 / internal	0.1~P0-34	1000	Always
P1-05	Multi-step speed 5 / internal	0.1~P0-34	1000	Always
P1-06	Multi-step speed 6/ internal	0.1~P0-34	1000	Always

P1-07	Multi-step speed 7 / internal	0.1~P0-34	500	Always

Set the rotation speed in the internal position mode.

Set the rotation speed of manual forward command and manual reverse command in speed mode.

Use the ON/OFF combination of X1, X2, X3, and X4 signals to change the rotation speed.

It can be changed even while the servo motor is rotating.

It has nothing to do with the number of the parameter and the size of the set value.

Multi-speed selection:

X4	X3	X2	X1	Speed in speed mode	Speed in internal position mode
OFF	OFF	OFF	OFF	Analog speed command [VREF] input terminal	Parameter P1-00
OFF	OFF	OFF	ON	Parameter P1-01	Parameter P1-01
OFF	OFF	ON	OFF	Parameter P1-02	Parameter P1-02
OFF	OFF	ON	ON	Parameter P1-03	Parameter P1-03
OFF	ON	OFF	OFF	Parameter P1-04	Parameter P1-04
OFF	ON	OFF	ON	Parameter P1-05	Parameter P1-05
OFF	ON	ON	OFF	Parameter P1-06	Parameter P1-06
OFF	ON	ON	ON	Parameter P1-07	Parameter P1-07

For detailed description of internal position speed and indexing function speed, please refer to internal position mode

(51) **P1-16/P0-17/P0-18/P0-19** Output pulse frequency division (to be added)

No.	Definition	Predetermined area	Default	Change
P1-16 P1-17	Output pulse frequency division numerator (to be added)	0~100000000	1	Outage
P1-18 P1-19	Output pulse frequency division denominator (to be added)	• 0~10000000	16	Outage

(52) **P1-20~P1-23** CONT1~3 Signal polarity / CONT Filter time

No.	Definition	Predetermined area	Default	Change
P1-20	CONT1~3 Signal polarity	0~0xffff, bitn=1 means opposite polarity	0	Outage
P1-21	CONT1 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly	0	Always

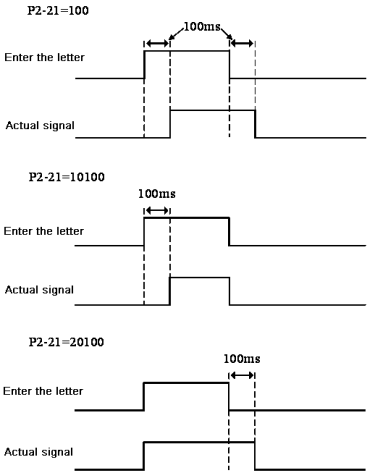
P1-22	CONT2 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly 2. Down edge dly	0	Always
P1-23	CONT3 Filtering time (Ten thousand digits are the filtering form)	0-22000 Ten thousand digits: 0. Two-way dly 1. Up edge dly 2. Down edge dly	0	Always

The signal polarity setting value is 0~0xFFFF, 0 means the output signal is not inverted, 1 means the output signal is inverted.

Example: The setting value is 0x03, which means CONT1 and CONT2 are inverted. Inversion is to invert the input effective level.

The highest bit is the filtering form, where 0: filtering on both rising and falling edges; 1: filtering on the rising edge; 2: filtering on the falling edge.

The last 4 bits are the filter time, and the setting range is 0~2000.



(53) **P1-26** OUT1~2 Signal polarity

No.	Definition	Predetermined area	Defaul	Change
P1-26	OUT1~2 Signal polarity	0~1023	0	Outage

0 means that the output signal is not inverted, and 1 means that the output signal is inverted.

Example: The set value is 0x03, which means OUT1 and OUT2 are inverted. Inversion is to invert the output effective level.

(54) **P1-27~P1-32** Electronic gear

No.	Definition	Predetermined area	Defaul	Change
P1-27	Electronic gear molecule 1	0~100000000	1	Always
P1-28				
P1-29	Electronic gear molecule 2	0~100000000	1	Always
P1-30				
P1-31	Electronic gear molecule 3	0~100000000	1	Always
P1-32				

Use the input signal ("electronic gear selection 0, 1" assigned to the CONT signal) to set the value of the electronic gear ratio.

Electronic gear selection 1	Electronic gear selection 0	Electronic gear
OFF	OFF	Electronic gear 0
OFF	ON	Electronic gear 1
ON	OFF	Electronic gear 2
ON	ON	Electronic gear 3

Please do not change the electronic gear ratio when positioning is interrupted or home return.

(55) **P1-33/P1-34** Command pulse ratio

No.	Definition	Predetermined area	Default	Change
P1-33	Command pulse ratio 1	0.01~100.00	1	Always
P1-34	Command pulse ratio 2	0.01~100.00	10	Always

Set the multiplication ratio of the command pulse. When the pulse ratio input is valid, this ratio will be equivalently multiplied by the electronic gear ratio to adjust the real-time dynamic gear ratio.

The input signal (the "command pulse ratio 1, 2" assigned to the CONT signal) is in the valid state. If the command pulse ratio 1 and 2 input signals are all valid, this function is turned off and the corresponding electronics gear ratio are still used directly.

(56) **P1-35/P1-36/P1-37** Speed position mode torque limit selection

No.	Definition	Predetermined area	Default	Change
P1-35	Select torque limit	0：CONT Input torque limit 0, 1 setting	0	Conditio n is valid
P1-36	Second torque limit value	0~300%	200	Always
P1-37	The third torque limit value	0~300%	200	Always

The effective torque limit value is as follows:

1. During position control and speed control (P3-33 = 0)

CONT signal		Status of each restriction	Effective torque limit	
Torque limit 1	Torque limit 0	TL：TREF(Analog torque limit)	CCW：Power running CW：Regeneration	CW：Power running CCW：Regeneration
OFF	OFF	No conditional judgment	Forward torque limit	Reverse torque limit
OFF	ON	TL ≧ Forward and reverse torque limit	Forward torque limit	Reverse torque limit
		TL < Forward and reverse torque limit	TL	TL
ON	OFF	The second torque limit ≧ Forward rotation, reverse rotation torque limit	Forward torque limit	Reverse torque limit
		The second torque limit < Forward rotation, reverse rotation torque limit	The second torque limit	The second torque limit
ON	ON	TL ≧ The second torque limit	The second torque limit	The second torque limit
		TL < The second torque limit	TL	TL

Please set positive voltage for TL. The negative voltage limit is 0. Negative settings are limited to 0.

When P3-33 = 1, the torque limit value is always the value of TL.

2．During torque control

According to the forward torque limit and the reverse torque limit.

3．**Torque limit during deceleration and stop operation (position control, speed control) (P3-33 = 0)**

CONT signal		Status of each restriction	Effective torque limit	
Torque limit 1	Torque limit 0	TL：TREF(Analog torque limit)	CW Decelerate to stop	CCW Decelerate to stop
OFF	OFF	Forward torque limit ≧ Third torque limit	Third torque limit	Third torque limit
		Forward and reverse torque limit < Third torque limit	Forward torque limit	Reverse torque limit
OFF	ON	TL, forward and reverse torque limit ≧ Third torque limit	Third torque limit	Third torque limit
		TL, forward and reverse torque limit < Third torque limit	Compare TL and forward torque limit, the smaller one	Compare TL and reverse torque limit, the smaller one

ON	OFF	The second torque limit, forward rotation, reverse rotation torque limit ≧ the third torque limit	Third torque limit	Third torque limit
		Second torque limit, forward torque limit, reverse torque limit < third torque limit	Compare the second torque limit and the forward torque limit, the smaller one	Compare the second torque limit and the reverse torque limit, the smaller one
ON	ON	TL, the second torque limit ≧ the third torque limit	Third torque limit	Third torque limit
		TL, the second torque limit <the third torque limit	Compare TL and the second torque limit, the smaller one	Compare TL and the second torque limit, the smaller one

When P3-33 = 1, the torque limit value is always the value of TL.

4. The third torque limit value

This parameter is valid during position control or speed control.

Under the following conditions, the setting value of this parameter is the torque limit value.

① Emergency deceleration and stop caused by servo off enable

② Emergency deceleration and stop caused by emergency stop

③ Emergency deceleration and stop caused by ±OT signal

(57) **P1-39** High-speed pulse low-pass filter frequency

No.	Definition	Predetermined area	Default	Change
P1-39	High-speed pulse low-pass filter	0~500(kHz)	0	Outage

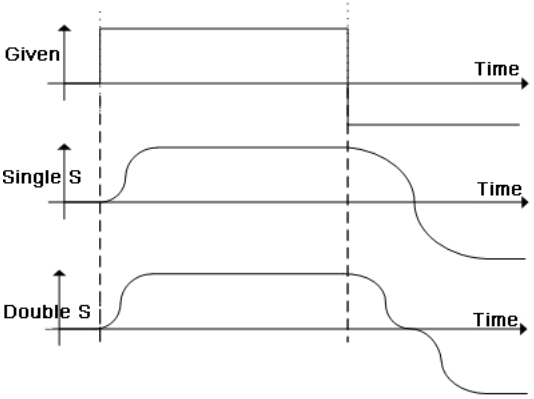
Filtering parameters for given pulses in position mode can filter out some high-frequency interference pulses. In use, please set the filter parameters after leaving a margin according to the highest frequency of the transmitted pulse.

Example: If the highest frequency of the input pulse is 100k, after leaving 50% margin, this value can be set to 150k, so that higher frequency pulses can have a better filtering effect.

(58) **P1-41** Curve type

No.	Definition	Predetermined area	Default	Change
P1-41	Curve type	0: T-shaped curve	0	Outage

The S-curve types are as follows:



The S-curve is only useful in the speed mode. To adjust the running compliance of the position mode operation, you can adjust P0-60 and P2-00.

(59) **P1-42** Adjusting function switch (reserved)

No.	Definition	Predetermined area	Default	Change
P1-42	Adjusting function switch	0~1	0	Always

The adjustment function switch is now controlled by the input terminal assigned to the CONT signal "adjustment effective" signal, so this parameter is temporarily reserved.

(60) **P1-43 to P1-46** Adjusting ratio

No.	Definition	Predetermined area	Default	Change
P1-43	Adjustment ratio 1	0.00~1.50	0.1	Always
P1-44	Adjustment ratio 2	0.00~1.50	0.2	Always
P1-45	Adjustment ratio 4	0.00~1.50	0.4	Always
P1-46	Adjustment ratio 8	0.00~1.50	0.8	Always

The set value of the input signal (assigned to the CONT signal " Adjustment 1, Adj 2, Adj 4, Adj 8") is ON and the set value is in the effective state.

When the effective signal of adjustment (CONT No. 43 function) is ON, the speed can be changed according to the override specified by the adjustment 1/2/4/8. The speed can be increased to 150 [%] of the current speed (below the maximum speed). The function is turned on after the stroke enable terminal is valid. First calculate the stroke ratio according to the input related terminals of the stroke function, and then multiply the current input speed reference with the calculated stroke ratio to get the actual speed reference.

Proportion of adjustment = All effective adjustment related terminals input the coefficient corresponding to this terminal.

For example, if under the default parameters, the terminals of adjustment 1 and 2 are valid,

the adjustment ratio=P1-43+P1-44=0.1+0.2=0.3.

If the terminal 2 and 8 are valid, the ratio of the adjustment=P1-44+P1-46=0.2+0.8=1.0.

When you need to modify the ratio represented by each terminal, you can modify the corresponding P1-43-P1-46.

(61) **P1-50**

No.	Definition	Predetermined area	Default	Change
P1-50	Carrier frequency (spare)	12	12	Outage
P1-51	Dead time	2.0~5.0(usec)	2.8	Outage

Manufacturer parameters.

(62) **P1-52/P1-53/P2-54** Inc/ABS selection

No.	Definition	Predetermined area	Default	Change
P1-52	Inc/ABS selection	0-0x116	0	Outage
P1-53	Absolute encoder configuration	0: 17 bits, 1: 20 bits, 2: 23 bits	0	Outage
P1-54	Lines of incremental encoder	180~10000	2500	Outage
P1-55	Encoder error protection time	0~3000(msec)	525	Outage

Use these parameters to configure the encoder type of the motor.

P1-52 parameters are divided into 4 bits for setting:

bit0-3: INC/ABS selection: 0: incremental, incremental system 1: single-turn, incremental system 2: multi-turn, absolute system 3: multi-turn, incremental system 4: multi-turn, ignore Multi-turn alarm 5: Multi-turn, as single-turn (to be added)

bit4-7: Whether it is a wire-saving encoder 0: not 1: yes

bit8-11: Special processing for Z signal 1: half-turn Z

Use the incremental encoder with ordinary wiring to directly select 0x001.

Use the wire-saving incremental encoder to select 0x011, and set the UVW of the encoder for a limited time to P1-55 for the corresponding delay coordination. For example: if the UVW limited signal value is 500ms-510ms after the encoder is powered on, please set P1-55 to 505ms.

There are many situations when using an absolute value encoder:

The servo can choose how to use the information of the absolute value encoder, and it is also divided into an absolute value system and an incremental system. In the absolute value system, the drive saves multi-turn data through an external battery. At this time, compared with the incremental system, there is no need to perform the origin return action every time the power is turned on.

Absolute value system features:

◇An external battery is required, and an alarm (BAT1/BAT2) will appear when the battery voltage is low.

◇There is no need to perform home return action every time the power is turned on, and the feedback position may not be zero after restarting.

◇The effective stroke is limited by the multi-turn encoder, and the multi-turn data range is -32768~32767. If the multi-turn data overflows, it will alarm (LOT).

Note: When a multi-turn data overflow alarm (LOT) occurs, only resetting the fault can clear the error, but the overflowed multi-turn data still exists. At this time, the mechanical stroke should be moved into the effective range or the multi-turn data should be cleared.

Note: The method to clear multi-turn data is to perform Fn-14 operation through the panel.

Incremental system features:

◇No external battery is required, and the low battery voltage alarm will not appear.

◇ It is necessary to perform home return action after each power-on, and the feedback position will be zero after restarting.

◇There is no limit of multi-turn data overflow, and it can always rotate to a fixed direction.

When P1-52 bit0-bit3=2 or 4, the servo drive works under the absolute value system. The difference between them is that when set to 4, the multi-turn data overflow alarm is ignored. However, the alarm is only ignored at this time, and the multi-turn data will overflow and cause errors. For example, when it exceeds 32767, it becomes -32768, and the feedback position changes from a positive value to a negative value.

Note: If the system does not need to use multi-turn data, or if the motor keeps rotating in a fixed direction, P1-52 bit0-bit3 =1 or 3 can be set at this time, and the servo drive works in an incremental system.

P1-53 selects the number of bits of the absolute encoder. It is necessary to determine the corresponding number of encoder bits during operation.

P1-54 selects the line number of the incremental encoder.

P1-55 is the error protection time of the encoder. Please set this part in accordance with the data of the encoder.

(63) **P1-56 to P1-66** Motor parameters

No.	Definition	Predetermined area	Default	Change

P1-56	Motor rated speed	50~6000rpm	2500	Outage
P1-57	Motor rated current	0.1~100.00A	5	Outage
P1-58	Motor rated voltage	20~80V	48	Outage
P1-59	Motor torque coefficient	0.01~5.00	1	Outage
P1-60	Number of motor pole pairs	1~16	4	Outage
P1-61	Motor stator resistance	0.01~100.00(Ω)	1.84	Outage
P1-62	Motor quadrature inductance	0.01~80.00mH	3.2	Outage
P1-63	Motor shaft inductance	0.01~80.00mH	3.2	Outage
P1-64	Motor back electromotive force	10~1000(v/kRPM)	68	Outage
P1-65	Motor rotor inertia	0.001~30.000(gm^2)	1.06	Outage
P1-66	Motor electrical time constant	0.5~300.00(ms)	3.19	Outage

Note: If you need to customize the motor parameters, first set P0-64 to 0 and then set the motor parameters.

4.2.3 P2 Parameter group

(64) **P2-00** Moving average S-shaped time

No.	Definition	Predetermined area	Default	Change
P2-00	Moving average S-shaped time	0~500(msec)	0	Always

见 P0-60

(65) **P2-01** Convergent integral filtering

No.	Definition	Predetermined area	Default	Change
P2-01	Convergent integral filtering	0.00~20.00(msec)	0.5	Always

It is set in a specific application to filter the end convergence integration setting.

Too much setting of this parameter will cause positioning delay.

(66) **P2-02** Position loop convergence integration time

No.	Definition	Predetermined area	Default	Change
P2-02	Position loop convergence integration time	1.0~1000.0(msec)	1000	Always

It is used when it is necessary to improve the insertion accuracy of each axis when performing differential operation of two or more servo motors on an X-Y table, etc.

When setting, please set the position loop integral time constant ≥ speed loop integral time constant × 5.

If the setting value is too small, it will cause positioning overshoot and motor oscillation.

(67) **P2-03** Position loop differential

No.	Definition	Predetermined area	Default	Change

P2-03	Position loop differential	0.00~1.00(msec)	0.05	Always

(68) **P2-04** End convergence position deviation

No.	Definition	Predetermined area	Default	Change
P2-04	End convergence position	0~10000 (pulse)	20	Always

When the difference between the command position and the feedback position is less than this value, no end convergence integral is applied.

(69) **P2-10** Load inertia ratio

No.	Definition	Predetermined area	Default	Change
P2-10	Load inertia ratio	0.0~100.0	0	Always

Affect the system response in all control modes.

Affect the observation accuracy of the speed observer (P1-22).

The load inertia ratio is set by the ratio of the load inertia of the mechanical system relative to the motor shaft (converted on the motor shaft side) to the motor inertia.

Load inertia ratio = motor shaft converted load inertia moment / motor inertia moment

(70) **P2-11** Speed loop feedforward coefficient

No.	Definition	Predetermined area	Default	Change
P2-11	Speed loop feedforward coefficient	0.000~1.500	0	Always

If you increase the setting, you can reduce the speed deviation and enhance the responsiveness.

Speed loop feedforward is a command produced after the speed command is differentiated. The speed loop feedforward can be input to the servo unit at the same time as the speed command.

(71) **P2-12** Speed feedback method

No.	Definition	Predetermined area	Default	Change
P2-12	Speed feedback method	0~0x31 bit0-3 0: Encoder	0x10	Outage

Bit operation mode:

bit0~bit3: speed feedback mode. When it is 0, the M method speed measurement mode; when it is 1, the speed observer.

bit4~bit7: Speed observer response level. From 1 to 3, the observer control bandwidth gradually increases, the speed measurement delay gradually decreases, and the observation accuracy gradually decreases.

Since the speed observer needs encoder feedback as a reference point for calculation, the observer is used for a 2500-line encoder, which can reduce the speed feedback delay, but

it cannot improve the speed feedback accuracy. If better feedback is required, it still needs to be replaced with a bus encoder.

(72) **P2-13** Speed feedback filter time constant

No.	Definition	Predetermined area	Default	Change
P2-13	Speed feedback filter time	0.00~10.00 (msec)	0	Always

The primary filter time constant.

If you increase the setting, the system response will decrease. Under the same speed loop gain, the motor may chatter.

(73) **P2-14** Speed loop PI regulator

No.	Definition	Predetermined area	Default	Change
P2-14	Speed loop PI regulator	0: Normal; 1: PDFF; 2: High	0	Outage

0: PID regulator.

1: PDFF regulator, increasing Kf (P2-15) can reduce the overshoot, but at the same time sacrificing part of the system response.

2: high beat adjuster, used in occasions with high frequency response requirements.

(74) **P2-15**

No.	Definition	Predetermined area	Default	Change
P2-15	PDFF-Kf	0.00~2.00	1	Always

Increasing Kf (P2-15) can reduce the overshoot, but at the same time sacrificing part of the system response.

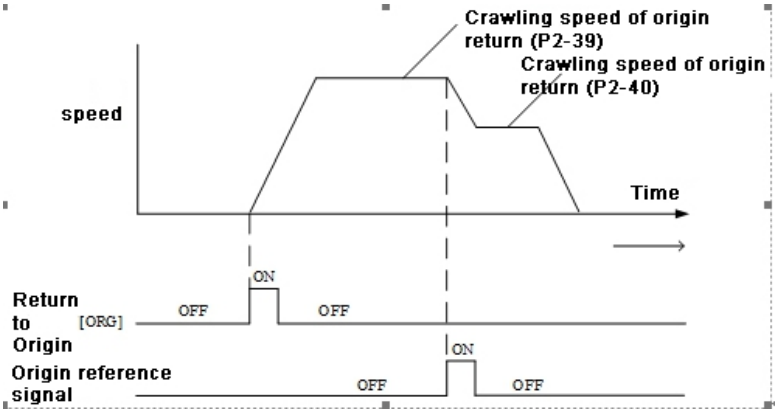
(75) **P2-38** Position data decimal point position (reserved)

No.	Definition	Predetermined area	Default	Change
P2-38	Position data decimal point position (reserved)	Reserved	0	Always

(76) **P2-39** Origin return speed

No.	Definition	Predetermined area	Default	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always

Set the motion speed of home return.



(77) **P2-40** Return to origin crawling speed (Low speed)

No.	Definition	Predetermined area	Default	Change
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always

Set the operating speed after the origin reference signal detection.

(78) **P2-41** Origin return configuration

No.	Definition	Predetermined area	Default	Change
P2-41	Origin return configuration	0x1245	0	Outage

Set some parameters of origin return, including origin return mode, return trigger mode, reference point setting reference signal, skip signal.

The specific meanings of the different digits are as follows:

bit0~3 Origin return reference point mode

0: After the origin return is started, search for the REF external reference point in the forward direction at the first speed.

1: After the origin return is started, the first speed is reversed to find the REF external reference point.

2: After the origin return is started, after looking for the REF external reference point in the forward rotation at the first speed, look forward to the Z signal as the origin signal.

3: After the origin return is started, after searching for the REF external reference point in the forward rotation at the first speed, the Z signal is searched backward as the origin signal.

4: After the origin return is started, after searching for the REF external reference point in reverse at the first speed, look forward to the Z signal as the origin signal.

5: After the origin return is started, after searching for the REF external reference point in reverse at the first speed, the Z signal is searched backward as the origin signal.

bit4~7 Origin return trigger mode

0: Turn off origin return function,

1: High level trigger,

2: Rising edge trigger,

3: Automatic trigger once at power-on and level trigger;

4: Trigger once at power-on and trigger on rising edge

bit8~11 Reference point set the origin reference signal

0: REF external reference point is directly the origin signal.

1: Direct Z signal is used as origin signal.

2: After searching for the external reference point, use the Z signal as the origin signal.

bit12~15 Whether to run the first speed when the REF external signal is valid

0: No

1: Yes

(79) **P2-44/P2-45** Origin signal on-position delay ms

No.	Definition	Predetermined area	Default	Change
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always

Origin return on-position delay refers to the delay time after reaching the origin, so that the motor stops completely.

The return-to-origin completion delay refers to the time that the state is valid after the return-to-origin is completed.

(80) **P2-46/P2-47** Preset position high/low bits

No.	Definition	Predetermined area	Default	Change
P2-46	Preset position high bits	0-0xFFFF	0	Always
P2-47	Preset position low bits	0-0xFFFF	0	Always

Set the offset position of the origin. The motor will reach the set offset position after returning to the system zero point.

(81) **P2-48/P2-49** (to be added)

No.	Definition	Predetermined area	Default	Change
P2-48	Z phase bias	-2147483647~2147483647	0	Always
P2-49				

(82) **P2-50** (to be added)

No.	Definition	Predetermined area	Default	Change
P2-50	Origin LS timing selection	0-1 (to be added)	0	Always

(83) **P2-51** (to be added)

No.	Definition	Predetermined area	Default	Change
P2-51	Select origin return OT operation	0-1 (to be added)	0	Always

(84)**P2-52/P2-53** Positive software OT detection position high/low bits

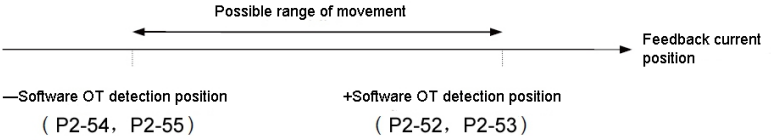
No.	Definition	Predetermined area	Default	Change
P2-52 P2-53	Positive software OT detection position	-2147483647~2147483647	2000000000	Outage
P2-54 P2-55	Negative software OT detection position	-2147483647~2147483647	-2000000000	Outage
P2-56	Software OT is valid/invalid (if P0-09=7)	0: Do not check the software OT; 1: OT is not regarded as an error; 2: OT reports a software error	0	Outage

1) Software OT valid/invalid

Unlike the +OT and -OT of the external input signal, if the current position of the servo motor exceeds the set value, it will be forced to stop.

When setting, make +soft OT detection position ＞ -soft OT detection position.

If P2-56 is set to 0, the software OT will not be detected. If it is set to 1, OT will not be regarded as an error and will only stop the motor at OT. 2. OT will be regarded as an alarm emergency stop, and then the enable will be disabled.



2) Position command form

Normal PTP: It operates within the range of −0xFFFFFFFF to 0xFFFFFFFF [unit amount].

It can be used for ABS/INC designation of positioning data and various position detection functions.

Infinite length: It can be rotated repeatedly in the same direction.

The position is preset at every start, and all position data settings are treated as INC.

The OT function, software OT, and hardware OT function of the input signal are in an invalid state.

(85) **P2-57** Position command i form (to be added)

No.	Definition	Predetermined area	Default	Change
P2-57	Position command i form	(If P0-09=7) 0-1 (to be added)	0	Conditio

(86) **P2-58** Positioning data valid/invalid

No.	Definition	Predetermined area	Default	Change
P2-58	Positioning data valid/invalid	0-1 (to be added)	0	Always

(87) **P2-59** Sequential start valid/invalid

No.	Definition	Predetermined area	Default	Change
P2-59	Sequential start valid/invalid	0~2 (to be added)	0	Always

(88) **P2-60** (to be added)

No.	Definition	Predetermined area	Default	Change
P2-60	Stop timing decimal point position	0~10 (to be added)	10	Always

(89) **P2-61/P2-62** Back to origin acceleration/deceleration time

No.	Definition	Predetermined area	Default	Change
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Set the acceleration and deceleration during the homing operation.

The time setting of acceleration and deceleration is the time setting to reach 0～1000 [r/min].

(90) **P2-63 to P2-66**

No.	Definition	Predetermined area	Default	Change
P2-63	Forward stroke (must be a positive number)	0~2147483647	2000000000	Always
P2-64				
P2-65	Backward stroke (must be a positive number)	0~2147483647	2000000000	Always
P2-66				

The set stroke can be used as the boundary of the zero-return mode. If the corresponding origin is not found when the boundary is reached, the servo will report an error, so this value generally needs to be slightly larger.

Related actions for returning to origin

No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0020	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always

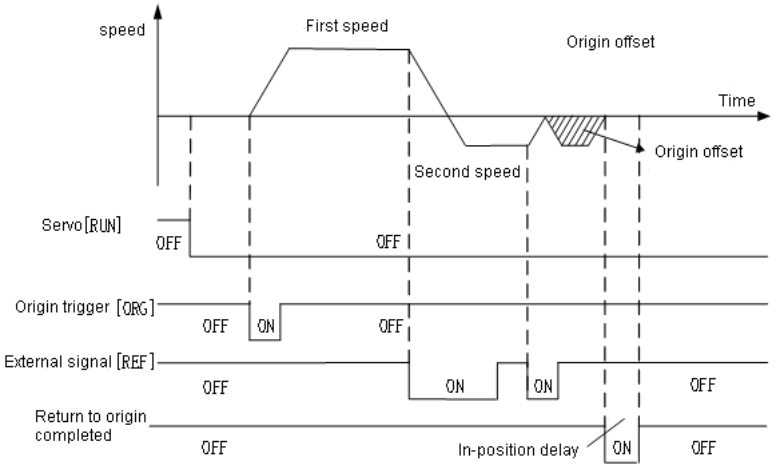
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) When the home position return [ORG] is started (OFF to ON), the motor rotates forward at the home position return first speed (P2-39).

(2) If the external reference point signal REF is detected, the reverse operation will be performed at the second speed (P2-40) of homing.

(3) After reaching the reference point, directly use the external reference point REF as the origin signal. After moving the origin offset position (P2-46, P2-47), it will stop. The stop point is taken as the origin. After the setting value of P2-44, the origin return completion signal will be turned on to complete the origin return.



No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0021	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always

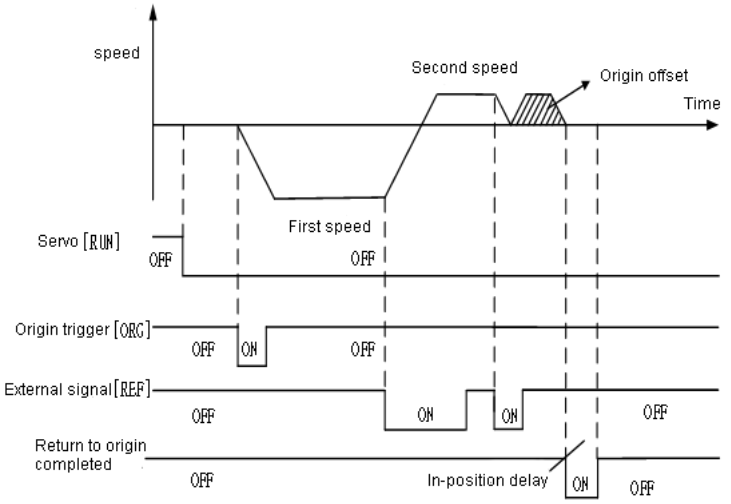
P2-47				
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) When the home position return [ORG] is started (OFF to ON), the motor rotates forward at the home position return first speed (P2-39).

(2) If the external reference point signal REF is detected, the forward operation will be performed at the second speed (P2-40) of homing.

(3) After reaching the reference point, directly use the external reference point REF as the origin signal. After moving the origin offset position (P2-46, P2-47), it will stop. The stop point is taken as the origin. After the setting value of P2-44, the origin return completion signal will be turned on to complete the origin return.



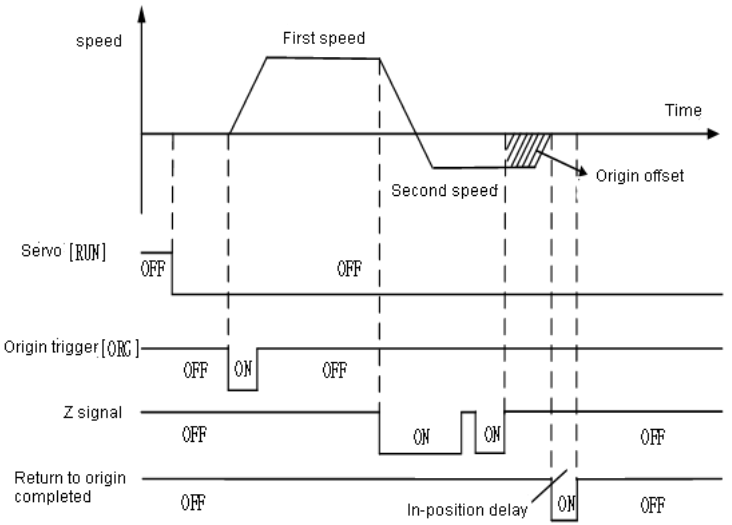
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0120	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always

P2-47				
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) When the home position return [ORG] is started (OFF to ON), the motor rotates forward at the home position return first speed (P2-39).

(2) If the Z signal is detected, directly use the Z signal as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



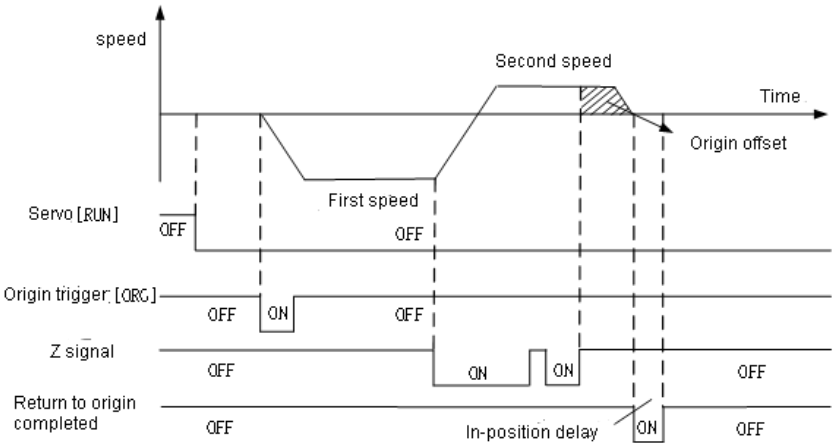
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0121	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always
P2-47				

P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses at the first speed of return to origin (P2-39).

(2) If the Z signal is detected, directly use the Z signal as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



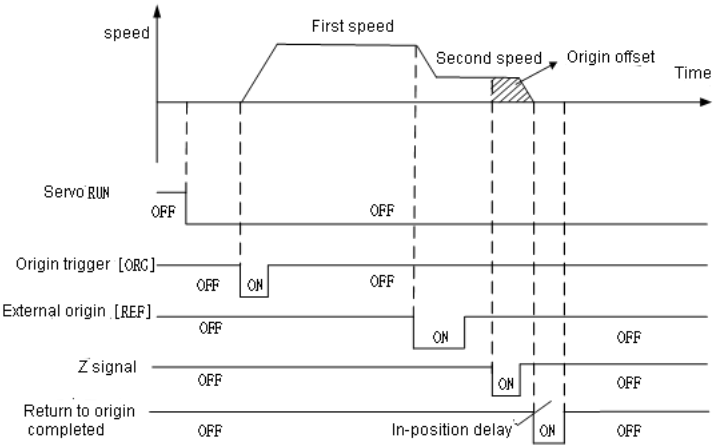
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0222	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) When the home position return [ORG] is started (OFF to ON), the motor rotates forward at the home position return first speed (P2-39).

(2) If the external reference point signal REF is detected, it will continue forward rotation at the second speed of origin return (P2-40).

(3) If the Z signal is detected during forward rotation at the second speed, directly use the Z signal as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



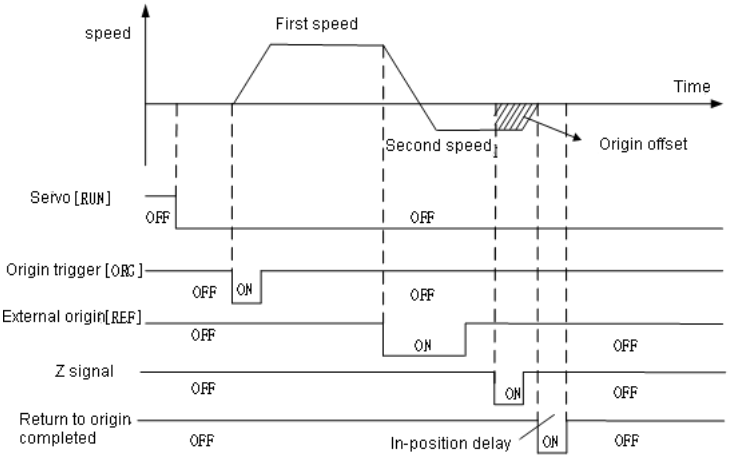
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0223	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) When the home position return [ORG] is started (OFF to ON), the motor rotates forward at the home position return first speed (P2-39).

(2) If the external reference point signal REF is detected, it will continue the reverse rotation at the second speed of home return (P2-40).

(3) If the Z signal is detected during the reversal at the second speed, the Z signal is directly used as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0224	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

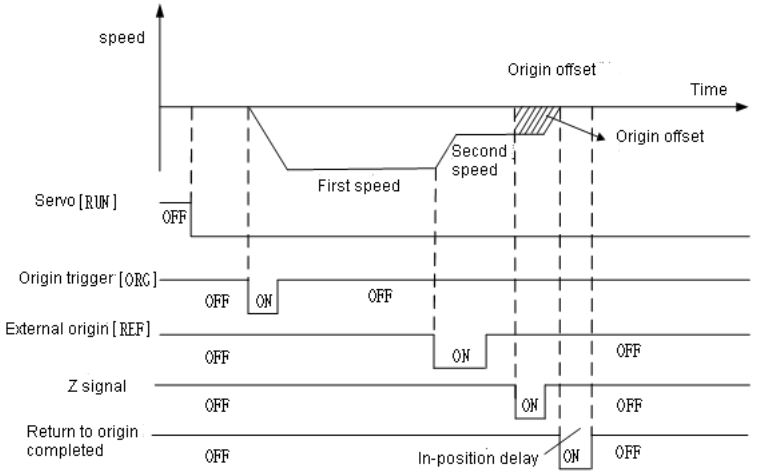
Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses at

the first speed of return to origin (P2-39).

(2) If the external reference point signal REF is detected, the reverse operation will be performed at the second speed (P2-40) of homing.

(3) If the Z signal is detected during the reversal at the second speed, the Z signal is directly used as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



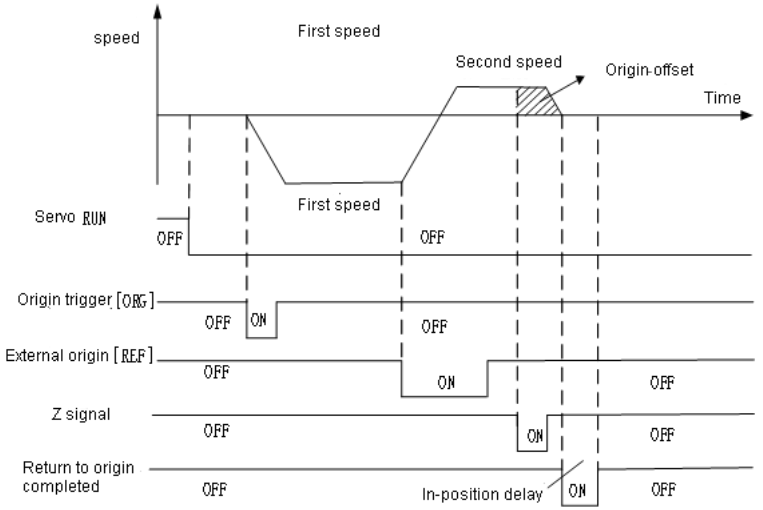
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0225	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses at the first speed of return to origin (P2-39).

(2) If the external reference point signal REF is detected, it will move forward at the second speed (P2-40) of the origin return.

(3) If the Z signal is detected during the reversal at the second speed, the Z signal is directly used as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



Application of Return to Origin in Overtravel

After the origin return is started, when the motor searches for the reference point at the first speed, when the moving part exceeds the designed safe movement range, the limit switch starts to act, and the motor immediately reverses and continues to search for the reference point at the first speed until the limit No reference point signal is received during the switching process, indicating that the proximity switch connected to the REF port has failed, and an alarm signal (GOH) will be sent out and shutdown.

No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0222	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always

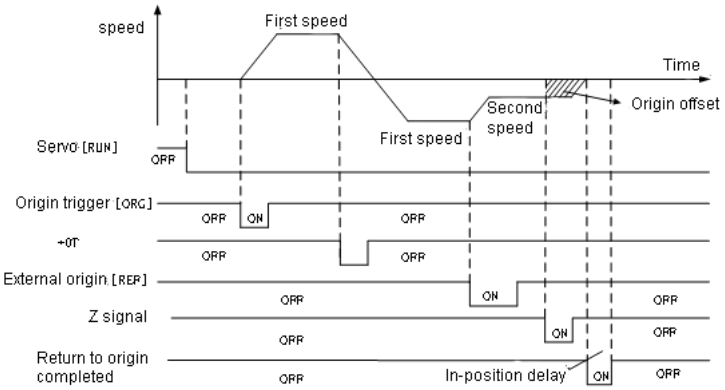
P2-47				
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor rotates forward at the first speed of return to origin (P2-39).

(2) If the positive limit switch signal is detected, the first speed (P2-39) will be reversed. If the external reference point signal REF is detected, the reverse action will be performed at the second speed (P2-40) of the origin return.

(3) If the Z signal is detected, directly use the Z signal as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0224	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46 P2-47	Preset position	-2147483647~2147483647	0	Always
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always

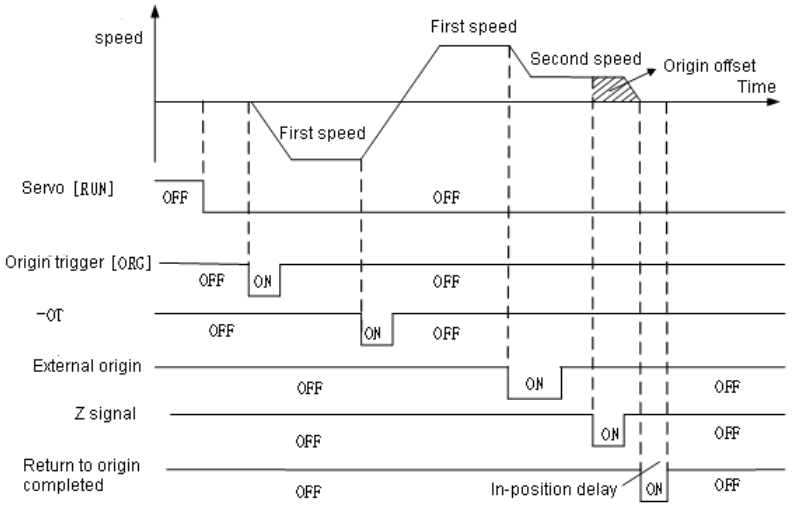
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses at the first speed of return to origin (P2-39).

(2) If the positive limit switch signal is detected, it will move forward at the first speed (P2-39) of the origin return. If the external reference point signal REF is detected, it will move forward at the second speed (P2-40) of the origin return.

(3) If the Z signal is detected, directly use the Z signal as the origin signal. Move the origin offset position offset (P2-46, P2-47) to stop, take the stop point as the origin, and after the P2-44 set value, the origin return completion signal turns ON to complete the origin return.



No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0222	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always
P2-47				

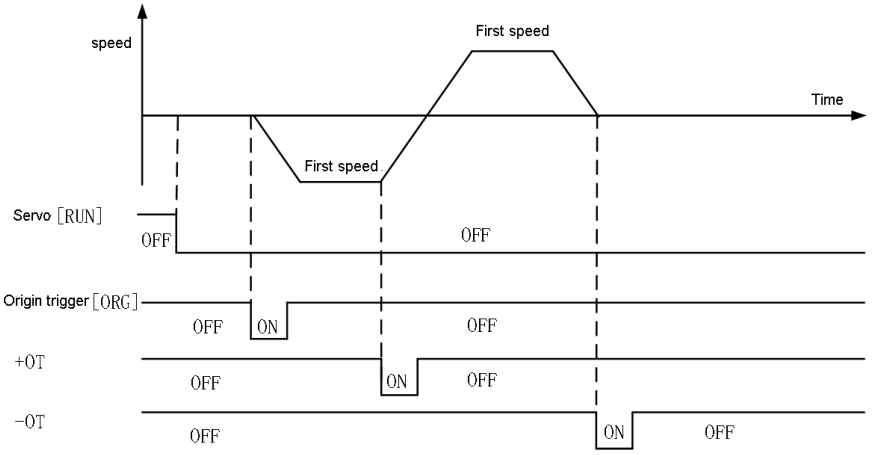
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses at the first speed of return to origin (P2-39).

(2) If the positive limit switch signal is detected, the first speed (P2-39) will be reversed.

(3) If the reference point signal is not received during the reverse operation until the limit switch is touched, it means that the proximity switch connected to the REF port has failed, and an alarm signal (GOH) must be sent out and shutdown.



Application of external reference point REF

When the drive is powered on, the external reference point REF is in the ON state. Bit11~14 of (P2-41) can be set to determine whether it is necessary to run the first speed of home return (P2-39) during home return.

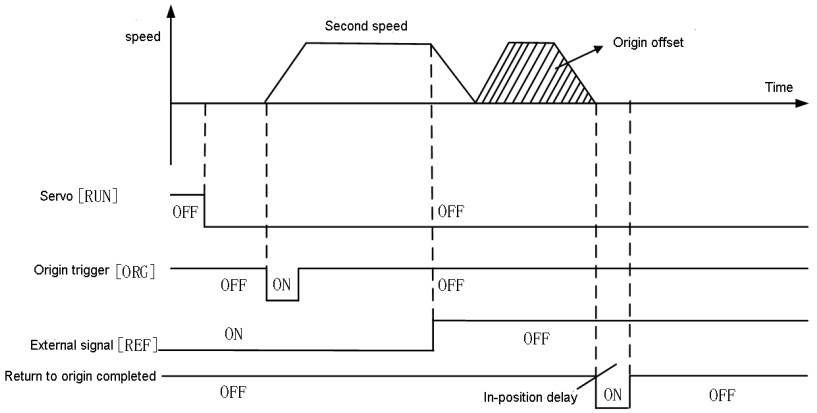
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x1020	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always

P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always
P2-47				
P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the home position return [ORG] is activated (OFF to ON), the motor rotates forward at the home position return second speed (P2-40).

(2) After reaching the reference point, directly use the external reference point REF as the origin signal. After moving the origin offset position (P2-46, P2-47), it will stop. The stop point is taken as the origin. After the setting value of P2-44, the origin return completion signal will be turned on to complete the origin return.



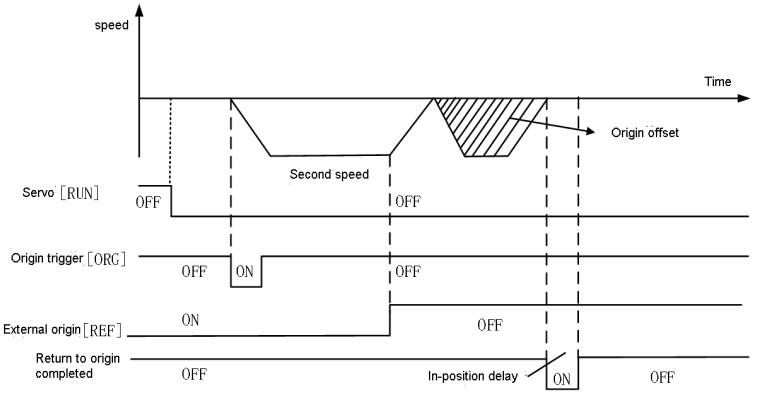
No.	Definition	Predetermined area	Setting	Change
P2-39	Origin return speed	0.1~1000.0(rpm)	500	Always
P2-40	Return to origin crawling speed	0.1 • ~1000.0(rpm)	50	Always
P2-41	Origin return configuration	0x1245	0x0021	Outage
P2-44	Origin signal on-position delay	0-5000 (msec)	50	Always
P2-45	Origin signal output delay	0-5000 (msec)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always
P2-47				

P2-61	Acceleration time back to origin	1~10000 (msec)	100	Always
P2-62	Deceleration time back to origin	1~10000 (msec)	100	Always

Follow the steps below.

(1) Since the return to origin [ORG] is activated (from OFF to ON), the motor reverses and operates at the second speed of return to origin (P2-40).

(2) After reaching the reference point, directly use the external reference point REF as the origin signal. After moving the origin offset position (P2-46, P2-47), it will stop. The stop point is taken as the origin. After the setting value of P2-44, the origin return completion signal will be turned on to complete the origin return.



4.2.4 P3 Parameter group

(91) **P3-00/P3-01** Point-to-point control parameters 1,2

No.	Definition	Predetermined area	Default	Change

P3-00	Point-to-point control parameters 1	bit0~3 Point-to-point trigger mode 0: high level, 1: rising edge bit4~7 operating mode 0: 1/0 mode, multi-segment position; 1: discontinuous programming mode; 2: continuous programming mode; 3: infinite loop bit8~11 Addressing mode 0: Normal, 1: Sequential addressing, 2: Reverse order addressing, 3: Optimal addressing bit12~15 Coordinate system mode 0: Relative position, 1: Absolute position	0x1001	Outage
P3-01	Point-to-point control parameters 2	bit0~3 M code output mode 0: output when starting 1: output when positioning is completed bit4~7 combination code logic: 0: imitating Delta combination logic 1: imitating Delta combination logic	0x0011	Outage

(92) **P3-04** Number of cycles Cooperating mode 2

No.	Definition	Predetermined area	Default	Change
P3-04	Number of cycles Cooperating	1~30000	1	Always

The number of cycles can be selected, and the maximum number of cycles is 30,000.

(93) **P3-06/P3-07/P3-08** Single lap setting of indexing function

No.	Definition	Predetermined area	Default	Change
P3-06	Single lap setting of indexing function	-2147483647~2147483647	10000	Outage
P3-07				
P3-08	Programming mode enables the	1~32	16	Outage

The single-turn value and the number of divisions of the indexing function can be set.

(94) **P3-10 to P3-41** Position given

No.	Definition	Predetermined area	Default	Change
P3-10	Multi-terminal position given 0	-2147483647~2147483647	0	Always
P3-11				
P3-12	Multi-terminal position given 1	-2147483647~2147483647	0	Always
P3-13				

P3-14 P3-15	Multi-terminal position given 2	-2147483647~2147483647	0	Always
P3-16 P3-17	Multi-terminal position given 3	-2147483647~2147483647	0	Always
P3-18 P3-19	Multi-terminal position given 4	-2147483647~2147483647	0	Always
P3-20 P3-21	Multi-terminal position given 5	-2147483647~2147483647	0	Always
P3-22 P3-23	Multi-terminal position given 6	-2147483647~2147483647	0	Always
P3-24 P3-25	Multi-terminal position given 7	-2147483647~2147483647	0	Always
P3-26 P3-27	Multi-terminal position given 8	-2147483647~2147483647	0	Always
P3-28 P3-29	Multi-terminal position given 9	-2147483647~2147483647	0	Always
P3-30 P3-31	Multi-terminal position given 10	-2147483647~2147483647	0	Always
P3-32 P3-33	Multi-terminal position given 11	-2147483647~2147483647	0	Always
P3-34 P3-35	Multi-terminal position given 12	-2147483647~2147483647	0	Always
P3-36 P3-37	Multi-terminal position given 13	-2147483647~2147483647	0	Always
P3-38 P3-39	Multi-terminal position given 14	-2147483647~2147483647	0	Always
P3-40 P3-41	Multi-terminal position given 15	-2147483647~2147483647	0	Always

By setting the number of pulses, up to 16 internal positions can be set.

(95) **P3-42 to P3-57** Delay unit ms

No.	Definition	Predetermined area	Default	Change
P3-42	Delay 1	0~5000(ms)	100	Always
P3-43	Delay 2	0~5000(ms)	100	Always
P3-44	Delay 3	0~5000(ms)	100	Always
P3-45	Delay 4	0~5000(ms)	100	Always

P3-46	Delay 5	0~5000(ms)	100	Always
P3-47	Delay 6	0~5000(ms)	100	Always
P3-48	Delay 7	0~5000(ms)	100	Always
P3-49	Delay 8	0~5000(ms)	100	Always
P3-50	Delay 9	0~5000(ms)	100	Always
P3-51	Delay 10	0~5000(ms)	100	Always
P3-52	Delay 11	0~5000(ms)	100	Always
P3-53	Delay 12	0~5000(ms)	100	Always
P3-54	Delay 13	0~5000(ms)	100	Always
P3-55	Delay 14	0~5000(ms)	100	Always
P3-56	Delay 15	0~5000(ms)	100	Always
P3-57	Delay 16	0~5000(ms)	100	Always

Signal delay:

After setting the internal position, the output signal turns ON. After the original internal position in-position delay setting time, the output terminal changes from ON to OFF, and then execute other instructions.

4.2.5 Internal position start method

16 positioning data can be set on the servo drive, and the internal position start [TIRG] signal changes from OFF to ON to start positioning. Even if the home position return is not completed, the internal position start signal is valid.

Address No.	POS3	POS 2	POS 1	POS 0	TRIG	Corresponding internal location
1	OFF	OFF	OFF	OFF	↑	Internal location 1
2	OFF	OFF	OFF	ON	↑	Internal location 2
3	OFF	OFF	ON	OFF	↑	Internal location 3
4	OFF	OFF	ON	ON	↑	Internal location 4
5	OFF	ON	OFF	OFF	↑	Internal location 5
6	OFF	ON	OFF	ON	↑	Internal location 6
7	OFF	ON	ON	OFF	↑	Internal location 7
7	OFF	ON	ON	ON	↑	Internal location 8
8	ON	OFF	OFF	OFF	↑	Internal location 9
9	ON	OFF	OFF	ON	↑	Internal location 10
10	ON	OFF	ON	OFF	↑	Internal location 11
11	ON	OFF	ON	ON	↑	Internal location 12

12	ON	ON	OFF	OFF	↑	Internal location 13
13	ON	ON	OFF	ON	↑	Internal location 14
14	ON	ON	ON	OFF	↑	Internal location 15
15	ON	ON	ON	ON	↑	Internal location 16

Internal position parameter setting

Items	Predetermined area	Parameters
Internal location data	16 positions	P3-10~P3-41
Speed	16 speed	P1-00~P1-15
Complete signal time setting	0~5000mS	P3-42~P3-57
Acceleration time	0~10000mS	P0-35
Deceleration time	0~10000mS	P0-36
D0 output	Set to 50, signal output when positioning is completed	P0-15-P0-17

Continuous operation of the internal position

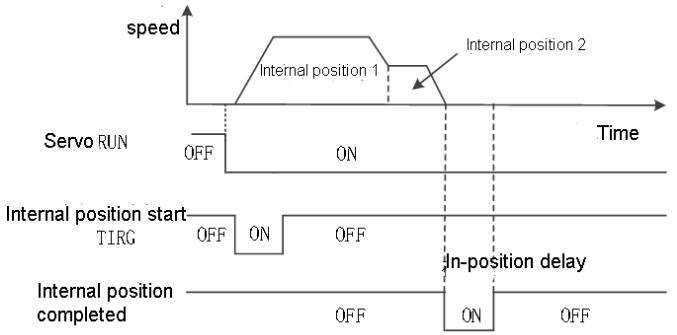
Start by continuously running to the specified internal position with internal position positioning, and after the internal position is completed, it will automatically move to the content of the target position issued in the next paragraph.

If there is a continuous designation in internal position 1, then move to internal position 2.

Similarly, the internal position 2 has a continuous designation, move to the internal position 3 and so on.

After each position is completed, the in-position delay time is set to 0, and the moving speed is continuously variable.

For example:



(96) **P3-60** Bleeding resistance value/power

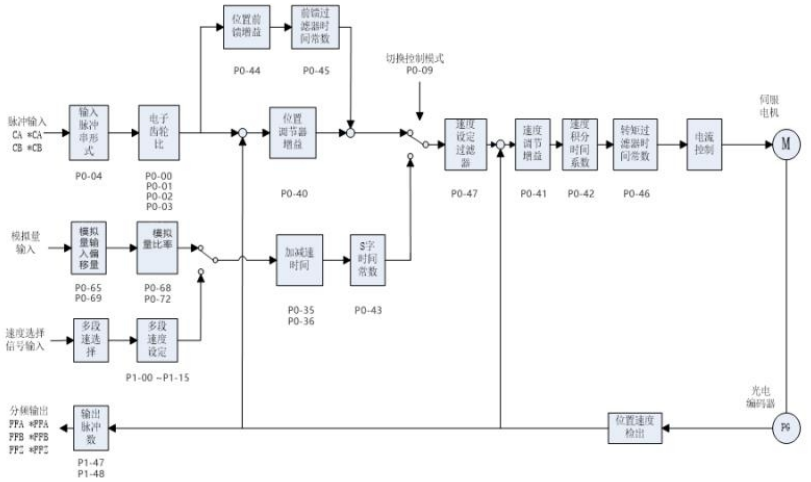
No.	Definition	Predetermined area	Default	Change
P3-60	Bleeding resistance value	1-1000(Ω)	16	Always
P3-61	Bleeding resistance power	0-10000(W)	0	Always

By changing the two parameters, the overheating protection function of the bleeder resistor can be set together.

When the servo is used under frequent start and stop requirements, it is recommended to use an external bleeder resistor. If you use an external bleeder resistor, please set the corresponding resistance to P3-60 and set the corresponding power to P3-61. After setting, you need to power off and restart.

After restarting, the servo will monitor the external bleeder resistor. If the external bleeder resistor is overheated, it will alarm RH1. At this time, check whether the resistance and power are set correctly. If they are set correctly, a larger braking resistor needs to be replaced.

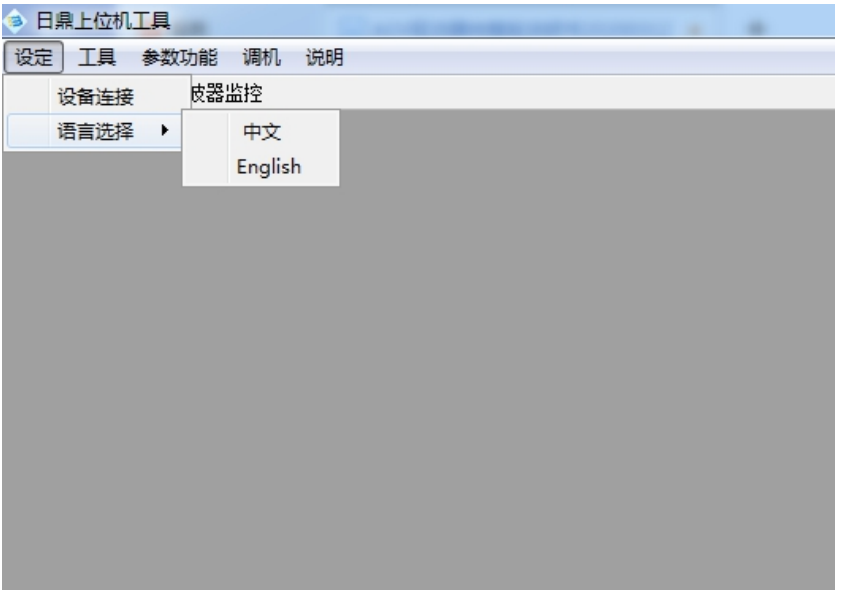
Control structure diagram：



Chapter 5 Main Servo Operation Functions

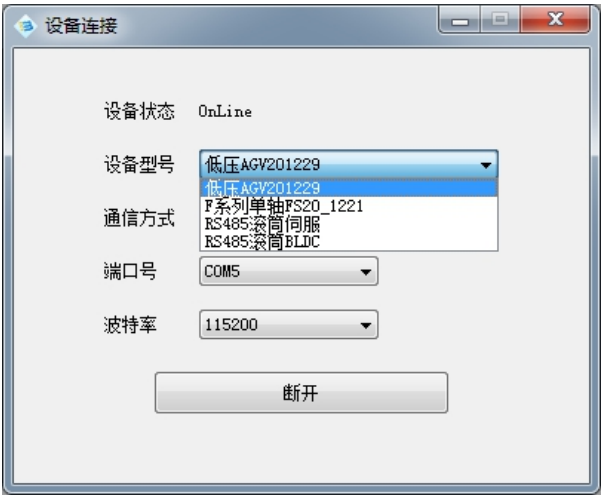
5.1 RiDing ToolBin PC operation instructions

1. Open the RiDing ToolBin PC software, the following dialog box appears, select the language mode:



2. Select the connected device model

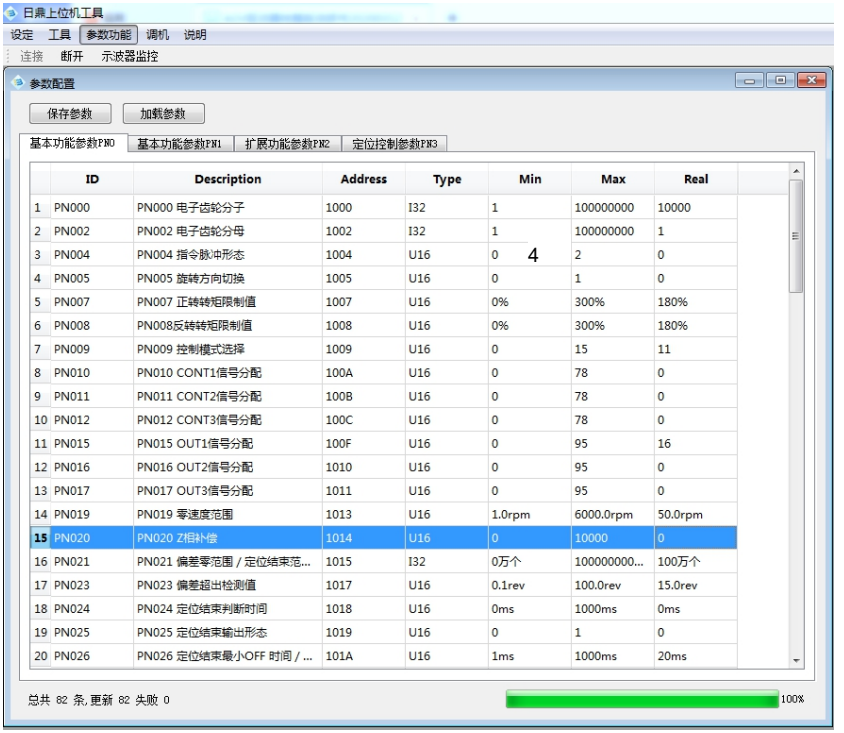
Single device connection, select the device model "low voltage AGV":



3. Select the communication method "MODBUS", click connect:

5.2 Parameter settings

Click the menu "parameter function" to enter the parameter configuration:



1. Basic function parameters PN0 is PN000～PN099

   Basic function parameters PN1 is PN100～PN170

   Basic function parameters PN2 is PN200～PN266

   Basic function parameters PN0 is PN300～PN364

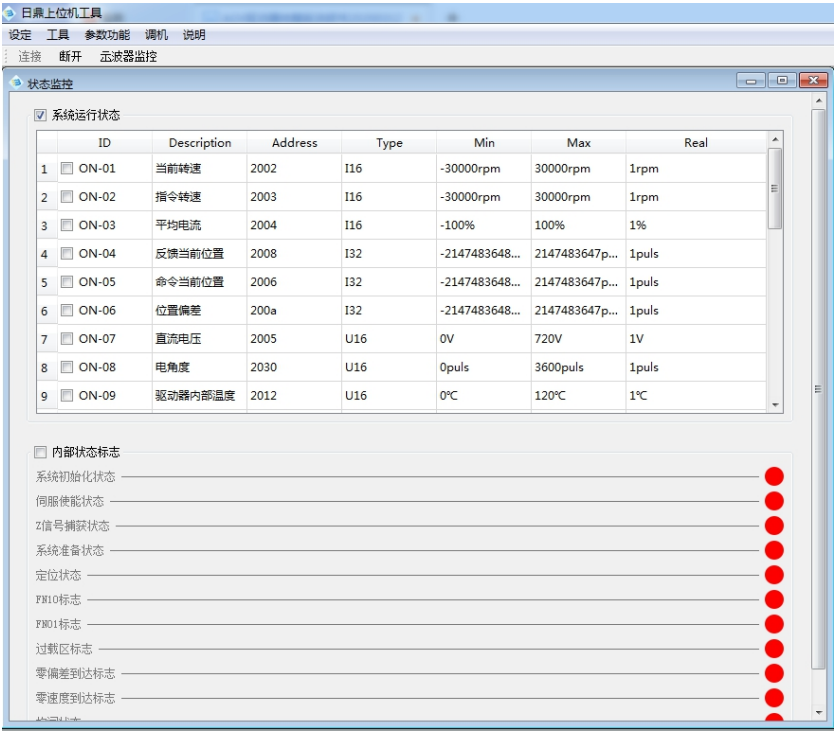
2. Right-click the "Update All" menu, and the single machine can update all parameters.
3. Stand-alone "Save Parameters" can save the drive parameters.
4. Stand-alone "Load Parameters" can load existing parameters into the drive to achieve one key update parameters

Note: The motor code must be set for the first debugging;

After all parameters are set, be sure to turn off the power first, and then re-power on.

5.3 Status monitoring

Click the menu "Tools" → Status Monitoring, the following window appears:



5.3.1 System operating status

Check the corresponding item

(1) **On-01 Current speed**

Display the current rotation speed of the servo motor.

Even if the load (mechanical system) rotates, it still shows the correct value.

It is expressed in units of 1 [r/min]. Add a negative sign for reverse rotation (clockwise to the motor shaft).

(2) **On-02 Command speed**

The speed command sent to the current servo motor, including speed command voltage, multi-stage speed, pulse train and other command speeds.

It is displayed in units of 1[r/min]. Add a negative sign for reverse rotation (clockwise to the motor shaft).

(3) **On-03 Average torque**

The average value of the torque commanded by the servo drive to the servo motor. The rated value is expressed as 100%.

Within the range of 0% to (maximum torque), it is displayed on a scale of 1%.

(4) **On-04 Feedback current location**

Display the amount of servo rotation. The displayed value is the rotation amount of the motor shaft encoder (10000 pulses/revolution).

(5) **On-05 Command current position**

The servo drive displays the position of the servo motor being controlled (pulse compensation is not considered).

(6) **On-06 Position deviation**

The difference between the command position and the feedback position is displayed. The deviation is the converted value of the encoder pulse number.

(7) **On-07 Bus voltage display**

Bus voltage display, divided by $\sqrt{2}$ can be converted into AC voltage.

(8) **On-08 Rotor electrical angle**

The current magnetic field angle of the rotor

(9) **On-09 Internal temperature of the drive**

If the current internal temperature of the drive reaches the set value of Pn-62, an AH alarm will appear.

(10) **On-10 Analog voltage value**

Display analog voltage

(11) **On-11 Input terminal signal**

Displays the ON/OFF of the serial input signal of the servo drive. When the input signal is ON, the corresponding display bit is displayed as 1.

(12) **On-12 Output terminal signal**

Displays the ON/OFF of the sequence output signal of the servo drive. When the output signal is ON, the corresponding display position is 1.

(13) **On-13 Load inertia ratio**

(14) **On-14 Maximum current**

Display the current phase line current.

(15) **On-15 Input burst frequency**

Display the pulse train frequency input to the pulse train input terminal, the minimum unit is 0.1 [kHz].

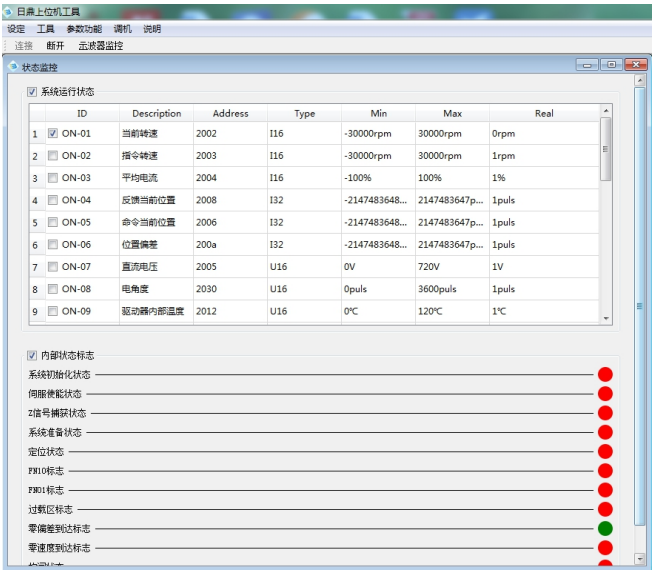
Display range: -999.9kHz~999.9kHz.

(16) **On-16** Motor code

Display form: J—**

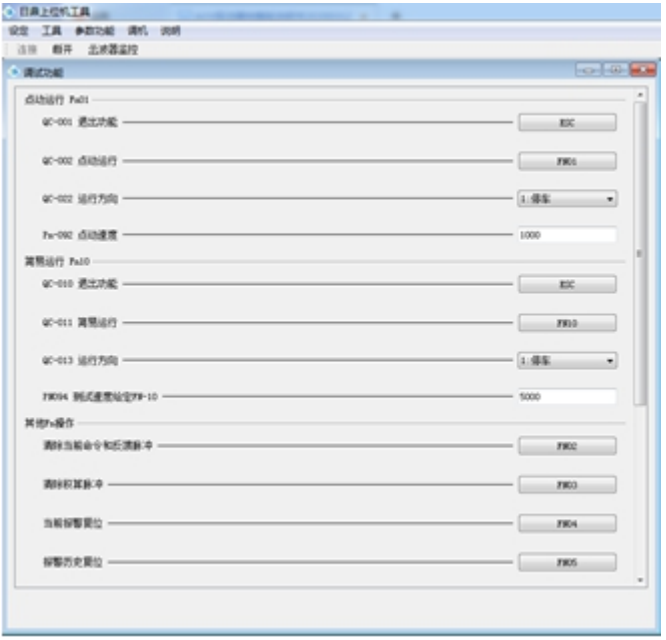
5.3.2 Internal status flag

Check the "Internal Status Flag" and the green flag lights up to indicate the effective state of the drive:



5.4 Debug function

Click the menu "Tuning" → Debug function, the following window will appear:



5.4.1 Jog operation Fn01

QC-022 selects the direction of rotation, clicks the QC-002 jog operation "FN01" button, and the servo motor starts to rotate. Click the QC-001 exit function "ESC" button, the motor stops rotating. The rotation speed of the servo motor is set according to P0-92 parameters.

5.4.2 Easy operation Fn10

QC-013 selects the direction of rotation, clicks the QC-011 jog operation "Fn10" button, and the servo motor starts to rotate. Click the QC-010 exit function "ESC" button, the motor stops rotating. The rotation speed of the servo motor is set according to P0-94 parameters.

5.4.3 Other Fn operations

(1) **FN-02** Clear current command and feedback pulse

Clear the current command and feedback pulse of the servo drive.

(2) **FN-03** Clear accumulated pulse

Clear the command integrated pulse and return integrated pulse of the servo drive.

(3) **FN-04** Alarm reset

Reset the alarm currently detected by the servo drive.

※Alarm reset operation sometimes cannot cancel some alarms. In this case, you can reset it after re-energizing.

Resettable alarm use FN04				Resettable alarm after power on	
OC2	Overcurrent 2	OF	Deviation exceeds	EC	Encoder abnormal
OS	Over speed	AH	Drive overheating	EH	Current sampling circuit damaged
OL	Overload	OC1	Overcurrent 1	DE	Memory exception
LU	Insufficient voltage	HU	Overvoltage		
RH1	Overheating of regenerative resistor				

(4) **FN-05** Clear historical alarm records

Eliminate the alarm detection record recorded by the servo drive.

(5) **FN-06** Parameter initialization

Initialize the parameters.

(6) **FN-07** Automatic compensation adjustment

The current input voltage of the command control sequence input terminal [Vref] is kept at 0V.

If the FWD (REV) signal is used to cut off all the X1 and X2 terminals of the multi-speed selection, the output shaft of the servo motor will immediately rotate according to the analog speed command voltage.

When the speed command voltage is compressed to 0V, the output shaft position of the servo motor will rotate at a slight speed.

→ If necessary, use the "Zero Speed Clamping Function".

The adjustment sequence of the compensation voltage is as follows.

① Add 0V to the [Vref] terminal. Regardless of whether the run command is given or not.

② Click Fn07 to perform compensation auto-tuning.

(7) **FN-13** Absolute encoder zero calibration

Calibrate the zero position of the servo.

(8) **FN-14** Absolute encoder clears multiple turns

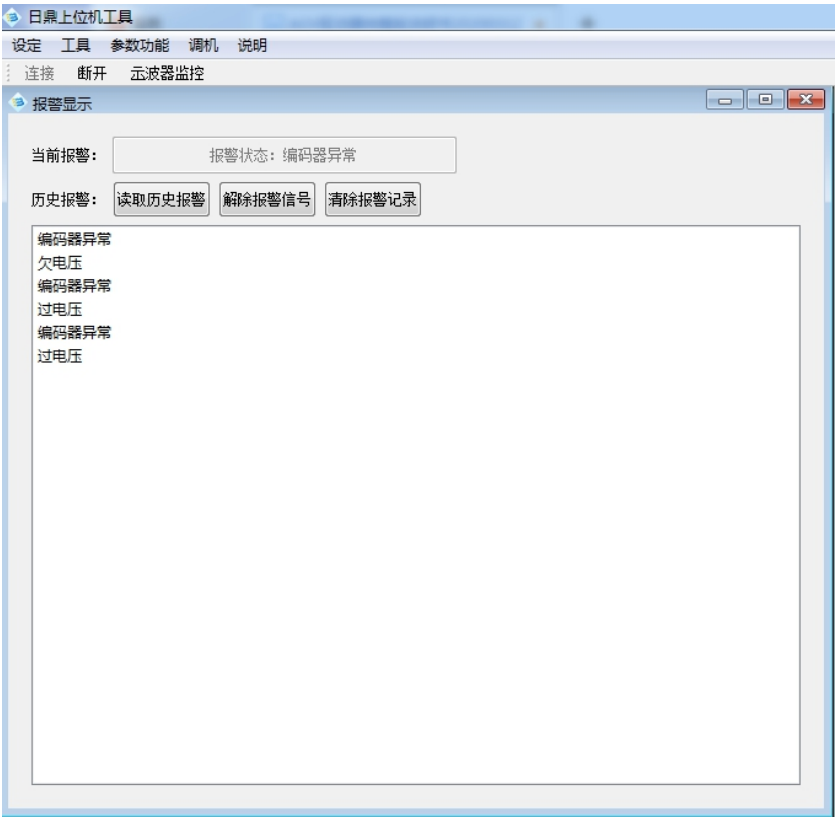
Clear the number of multi-turns and their positions recorded by the servo absolute encoder.

(9) **FN-17** Software reset

Clear the feedback position recorded by the servo absolute encoder, and make sure to set the place where you just did this operation as the origin after powering on again.

5.5 Alarm

Click the menu "Tools" → Alarm display, the following window appears:



Current faults and historical faults are displayed on the page, and the explanation of alarm content and handling methods are shown in Chapter 6.

Chapter 6 Servo Alarm

6.1 Alarm content

The content of the alarm detection:

After the alarm is detected, on the touch panel on the servo drive, the code indicating the alarm information will automatically jump out and flash.

If multiple alarms are detected at the same time, the touch panel will display them in the following order of priority.

Priority order	Display	Name
1	OC1	Overcurrent 1
2	OC2	Overcurrent 2
3	EH	Current sampling circuit is damaged
4	PLD	CPLD failure
5	EC	Encoder communication abnormal
6	OS	Over speed
7	HU	Overvoltage
8	EP	Bleed circuit failure
9	RH1	Overheating of regenerative resistor
10	AH	Drive overheating
11	DE	Memory exception
12	OL	Overload
13	LU	Low voltage (less than 0.73 times the rated voltage)
14	OF	Deviation exceeds
15	CE	Motor code error
16	ND	No motor code
17	BAT1	Battery alarm 1
18	BAT2	Battery alarm 2
19	LOT	Absolute encoder multi-turn alarm
20	GOH	Zero error
21	PPOT	Positive soft limit alarm
22	PNOT	Negative soft limit alarm
23	PST	Point-to-point location planning error
24	FS	FPGA failure

25	CO01	402 State machine does not switch
26	CO02	301 State machine does not switch

6.2 Alarm explanation and alarm processing method

Alarm code	Alarm name	Operating status	Reason	Processing method (for reference only)
OS	Overspeed	Appears when the drive is powered on	Drive circuit failure	Replace the drive
			Encoder failure	Replace the servo motor
		Appears when the motor just starts	Load inertia is too large	1. Reduce load inertia
				2. Replace with larger power drives and servo motors
			Encoder zero error	1. Replace the servo motor
				2. Send back to the manufacturer to re-adjust the encoder zero point
			Motor U, V, W phase sequence error	Check wiring, correct wiring
			Encoder lead error	
		Occurs during the operation of the motor	The pulse frequency of the input command is too high	The upper computer correctly sets the input command pulse frequency
			Electronic gear ratio is too large	Correctly set the appropriate electronic gear ratio
			The acceleration and deceleration time constant is too small, so that the speed overshoot is too large (during speed control)	1. Increase acceleration and deceleration time constant
				2. S-shaped time constant (parameter P0-43) set larger
				3. The speed response during action (parameter P0-41) is set higher
			Encoder failure	Replace the servo motor
			Servo system parameters are not adjusted well, causing overshoot	1. Reset the relative gain of the regulator
				2. It is difficult to set the gain to an appropriate value, replace the appropriate motor

HU	Main circuit overvoltage	Appears when the drive is powered on	Drive circuit failure	Replace the drive
			Power supply voltage is too high	Check whether the driver On-07 value is greater than 380V, and check whether the power supply is too large
		Occurs during the operation of the motor	The brake resistor wiring is disconnected	Reconnect the line
			Braking resistor is damaged	Under the condition of power off, measure whether the resistance of the braking resistor is consistent with the label. If it is judged to be damaged, replace the braking resistor
			The internal brake transistor of the drive is damaged	Replace the drive
			The internal brake circuit of the drive is damaged	
			Insufficient braking resistor capacity	1. Reduce start and stop frequency
				2. Increase acceleration/deceleration time constant
				3. Reduce the current limit value
				4. Reduce load inertia
				5. Reduce running speed
				6. External braking resistor with sufficient capacity
			Servo motor inertia is not enough	Replace the servo motor with greater inertia
LU	Main circuit undervoltage	Appears when the drive is powered on	Poor contact of main power line	Check whether the main power indicator light between the power terminal blocks of the driver is on. If not, check whether the wiring is well connected.
			The power supply is unstable and the power supply voltage is low	Check whether the on-07 value of the driver is less than 0.73 times of the rated voltage

				Determine whether the power supply is stable
			Temporary power cut for more than 20ms	Check the power supply
			Internal component failure of driver	Replace the drive
		Occurs during the operation of the motor	Insufficient power supply capacity	Check the power supply
			Instantaneous power off	
OF	Position deviation exceeds	Appears when the drive is powered on	Drive circuit failure	Replace the drive
		Appears when the motor just starts	Motor U, V, W lead wire error	Correct wiring
			Encoder lead error	
			Position proportional gain too small	Increase position proportional gain
			Insufficient output torque	1. Check the torque limit
				2. Reduce the load capacity
				3. Replace the high-power servo driver and servo motor
			Pulse command frequency too high	When differential input, check whether on-15 is below 500, when collector open circuit input, check whether on-15 is below 200, if not, reduce the pulse frequency
		Occurs during the operation of the motor	Driver power circuit fault	Replace the drive
			Drive parameters not adjusted properly	Increase the position gain
			Pulse command frequency is too high	For differential input, check whether On-15 is below 500, and for open-collector input, whether it is below 200. If not, reduce the pulse frequency

			The input power supply voltage is insufficient	On load voltage drops below the working voltage, choosing the right transformer and install regulator
AH	Driver overheated	Alarm when the power is turned on, when the ambient temperature is normal	Drive circuit failure	Replace the drive
		Occurs during the operation of the motor	The cooling fan doesn't work	Check the temperature value displayed by ON-09. If the fan is not turned On over 40℃, replace the servo driver
			The ambient temperature is high, and the working environment is not good for heat dissipation	Maximize the ventilation effect of the environment
			Cannot consume regenerative power	Extend the deceleration time
EC	Encoder communication abnormal	Appears when the drive is powered on	Encoder cable error	Check whether the wiring of the encoder is correct and whether there is any disconnection
		Occurs during the operation of the motor	Poor contact of encoder wire	Check whether the encoder wire is in good contact
			Encoder is damaged	Replace the servo motor
			The internal detection circuit of the drive is faulty	Replace the drive
EH	Current sampling circuit is damaged	Appears when the drive is powered on	The internal current sampling circuit of the drive is damaged	Replace the drive
DE	Memory exception	Appears when the drive is powered on	Memory is damaged	Replace the drive
			Abnormal communication between memory and	

			main chip	
OL	Overload	Appears when the drive is powered on	Drive circuit failure	Replace the drive
		Occurs during the operation of the motor	Run beyond rated torque	1. Check load
				2. Reduce start and stop frequency
				3. Replace with larger power drives and servo motors
			Drive power line U, V, W wiring is wrong	Check the wiring to confirm that U, V, W are correctly wired
			The motor is unstable and has oscillation	1. Increase gain
				2. Increase acceleration and deceleration time
				3. Reduce load inertia
			Servo motor is abnormal	Replace the servo motor
OC1	Overcurrent 1	Appears when the drive is powered on	Drive circuit failure	Replace the drive
		Occurs during the operation of the motor	There is a short circuit between the drive power lines U, V, W	Check the power line
			The acceleration and deceleration time is too small	Increase acceleration and deceleration time
			The control loop parameters are too rigid	Reduce rigidity, that is, reduce position gain and speed gain
			The output current is too large	Decrease the maximum current limit value parameter P0-25
			Poor grounding, external interference	Properly grounded
			The internal circuit of the driver is damaged, lack of equal	Replace the drive

OC2	Overcurrent 2	Occurs during the operation of the motor	Drive failure	Replace the drive
ND	No motor code	Appears when the drive is powered on	The corresponding motor code needs to be set before the drive is used	Motor code setting method: Set P0-64: Motor code. For the motor code, please check the manual or the code item on the motor nameplate.
CE	Motor code error	Appears after modifying the motor code	The set motor code does not match the drive	Please reconfirm the motor code
PLD	CPLD failure	Appears when the drive is powered on	CPLD and DSP communication failure	Replace the drive
RH1	Overheating of bleeder resistor	Occurs during the operation of the motor	The bleeder resistance does not match the operating conditions	1 Check whether the parameters P3-60 and P3-61 are consistent with the actual bleeder resistance 2. Replace the bleeder resistor with a higher power
BAT1	Battery alarm 1	Occurs during the operation of the motor	The battery voltage starts to drop	Replace the battery when the drive is powered on
BAT2	Battery alarm 2	Occurs during the operation of the motor	The battery voltage has dropped to a low level and the recording position has been lost	1. Replace the battery when the drive is powered on 2. Since the position data has been lost, it must be reset to zero
LOT	Absolute encoder multi-turn alarm	Motor runs in one direction for a period of time	In the absolute value system, the rotation in one direction exceeds 32767 laps, and the position record is sent incorrectly.	1 Check the application type and set the appropriate P1-52 2 After doing FN14 near the working range, find the origin again
GOH	Zero error	After returning to zero for a period of time	The origin cannot be found after hitting the left and right limit switches	1. Check whether the origin switch signal is normal 2. Check whether the setting of the return to origin is correct

PPOT	Positive soft limit alarm	Run in the forward direction of the motor for a period of time	Run to the software positive OT limit point	Confirm that there is no problem with the direction and value of the given command
PNOT	Negative soft limit alarm	Run in the reverse direction of the motor for a period of time	Run to the software negative OT limit point	Confirm that there is no problem with the direction and value of the given command
CO01	402 State machine does not switch normally	The server is running in canopen mode	Canopen and the like directly require enabling without setting the operating mode	Check whether the operating mode is set on the host computer
CO02	301 State machine does not switch normally	The server is running in canopen mode and enabled	The 301 state machine was restarted when the 402 state machine was switched to enable	Check whether the host computer has this illegal operation, it is best to use SDO to determine whether the state is first, and then switch the 301 state machine

Appendix: AGV driver 485 communication supplements

1 AGV Drive station number and baud rate selection

1. Communication related parameters

No.	Definition	Predetermined Area	Default	Change
P0-79	Check bit/stop bit selection (Modbus)	RTU: 1: 8N2 (None) 3: 8O1 (odd) 5: 8E1 (even)	1	Outage
P0-80	Whether the communication is	0: Store 1: Don't store	0	Outage
P0-81	To be added	0-1	0	Always
P0-82	485 CAN Station No	1-127	1	Outage
P0-83	485 Baud rate	0=4800，1=9600，2=19200，3=38400，4=57600，5=115200	1	Outage
P0-84	CAN Baud rate	0=125k， 1=250k ，2=500k，3=1M	3	Outage

Please set according to the corresponding communication parameters.

2. The address of access parameter is different from DHE: the form of communication address is x + YYH, where X represents 0-3 group, followed by YY represents the address in hexadecimal system. For example, for address of p0-04: 0x004h, p0-99 corresponds to address of 0x063 (63h = 99), p1-00 corresponds to address of 0x100h, p1-99 corresponds to address of 0x163h

The commonly used parameter of electronic gear ratio (p0-00-p0-03) is different from the definition of data length of DHE, which takes up two 16 bits words respectively. When reading, please read two bytes at a time. When writing, it is also recommended to use 0x10 (multi word writing instruction) to write two words at a time, or use 06 single word writing command to write high byte first and then low byte.

For example, the communication write electronic gear molecule is 1：

Original DHE: One command 01 06 00 00 00 01 48 0A// Write 1 to unit 00

F series：One command 01 10 00 00 00 02 04 00 00 00 01 32 6F// Write two words into 00, and the total content is 0x00000001

Or 2 instructions: 01 06 00 00 00 00 89 CA// Write 0 to unit 00

: 01 06 00 01 00 01 19 CA// Write 1 to unit 00 and combine it with unit 00 to form 0x00000001

Address unit:

0000H~07FFH：Parameter area

3. (IMPORTANT) the addresses of the command area and the status area have been changed. In DHE, the command area and the status area are in the form of 800H + XH. In F series, the command area is in the form of 1000h + XH, and the status area is in the form of 2000h + XH. The offset has not been changed. The relative positions and definitions of the status area and the command area are consistent with those before. A compatible version will be issued after DHE

Command area address: 1000h-1fffh

1000h: The multi speed section of the operation mode register has been modified.

+00h (): operation mode setting

D0~D3：00＝position； 01＝speed； 10＝torque；

D4~D5：00＝stop； 01＝FWD； 10=REV； 11=Reserved；

D6~D7：As the multi-stage speed is changed into 16 sections, the definition is temporarily retained, and the multi-stage speed definition is switched to d12-d15

D8：SCI enable

D9：SCI emergency stop

D10: SCI reset

D12~D15：0000= Multi speed(MS) invalid； 0001= MS 1； 0010= MS 2； 0011= MS 3；

0100= MS 4； 0101= MS 5； 0110= MS 6； 0111= MS 7；

1000= MS 8； 1001= MS 9； 1010= MS 10； 1011= MS 11；

1100= MS 12； 1101= MS 13； 1110= MS 14； 1111= MS 15；

+02H：Set value of running speed (Ten thousandth ratio of rated speed，0.0001)

+03H：Given value of running torque (percentage，0.0001)

+04H：High bit of operation position given value

+05H：Low bit of operation position given value (After the high bit is sent, the low bit is valid)

+06H：Virtual IO, (not implemented)

+07H：Virtual IO, (not implemented)

+08H：(to be added)

=3 Clear feedback pulse and current command

=4 alarm reset

=14 Multi-turn reset

=15 Absolute position reset

Status area address:

2000H~201fH：Status area

+00H：Current running status word　　+01H：Error code

+02H：Current speed　　+03H：Command speed

+04H：Average torque　　+05H：DC voltage

+06H：Command integrated pulse (Lo)　　+07H：Command integrated pulse (Hi)

+08H：Returns the integrated pulse (Lo)　　+09H：Returns the integrated pulse (Hi)

+0AH：Position deviation (Lo)　　+0BH：Position deviation (Hi)

+0CH：Encoder feedback (Lo) (Clear after disable)

+0DH：Encoder feedback (Hi) (Clear after disable)

+0EH：Speed loop feedback pulse LO (Do not clear after disable)

+0FH：Speed loop feedback pulse HI (Do not clear after disable)

+10H：electrical angle　　+11H：Pulse input frequency

+12H：Radiator temperature　　+13H：Analog given voltage

+14H：IO input situation (Add virtual input later)

+15H：IO output situation (Add virtual output later)

+16H：CANOPEN mode given position (Lo)PUU

+17H：CANOPEN mode given position (Hi) PUU

+18H：CANOPEN mode feedback position (Lo)PUU

+19H：CANOPEN mode feedback position (Hi) PUU

+1dH：Maximum torque within 3s

Note: The input line of the driver is not connected to the ground. When the computer is grounded, when the command is sent to the driver through the upper computer, the return value is continuously received due to the interference of the ground line.

4. Bit0-bit3 of the P0-80 parameter can be used to set whether the communication setting parameters are stored in the EEPROM. For occasions that require a long time to read and write and the parameters do not require recording, it is recommended to set it to 1.