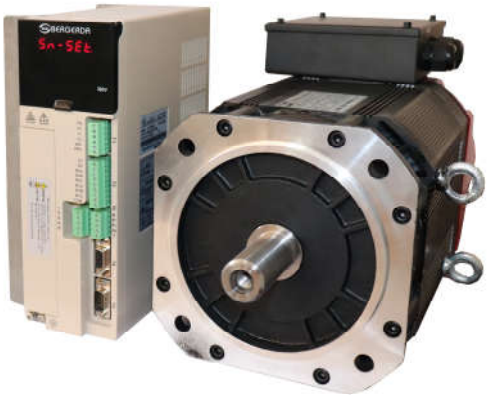
S Series Spindle System Manual



Hangzhou Bergerda Automation Technology Co., Ltd

Please read this manual carefully before installing/debugging/using the product.

Thank you for choosing the S series induction asynchronous motor driver. Please read this technical manual before use. The main contents of this manual include:

* Check, install and wire the drive.
* Digital panel operation steps, status display, abnormal alarms and processing.
* Servo system control mode, test run and adjustment steps.
* An overview of all the parameters of the drive.
* Model specifications of the drive.

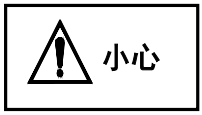
In order to facilitate daily inspections, maintenance, and understanding of the causes of abnormalities and countermeasures, please keep this manual in a safe place for easy reference. Note: Please hand this manual to the final user to maximize the effectiveness of the drive.

● Due to product improvements, the contents of the manual may change without notice.

● The company will not be responsible for any changes to the product by the user, and the warranty for the product will be void.

Please pay special attention to the following warning signs when reading this manual.

An operation that indicates a mistake can have catastrophic consequences - death or serious injury!



An operation that indicates an error may cause injury to the operator and may damage the equipment!

Indicates that improper use may damage the product and equipment

Contents

Chapter 1 Product Inspection and Installation

Overview

S series AC servo spindle drive is a high quality, multi-functional, low noise which independently developed and produced by Hangzhou Bergerda Automation Technology Co., Ltd. The S series AC servo spindle drive realizes full-closed servo control of the spindle motor. It integrates speed control and position control. It can easily control the position, speed, acceleration and output torque of the spindle motor to achieve high-precision turning and milling. Processing such as grinding is superior to traditional variable frequency drives in heavy cutting. Its unique control function can meet the needs of machine tool spindles, textile machines, machining centers and other applications. The wide application of the S series AC servo spindle drive will bring infinite vitality to the field of machine spindle drive control.

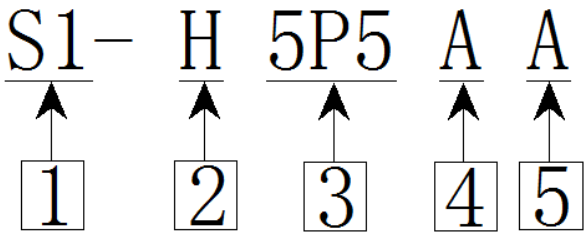
1.1 Product inspection

This servo product has been fully functional tested before leaving the factory. In order to prevent the product from being unusual due to negligence transport, please check the following items after unpacking:

1)Check that the drive and motor models are the same as you ordered.

2) Check the appearance of the drive and motor for damage and scratches.

1.1.1 Drive model



Code	Name	Description
1	Servo drive series	S1 type AC servo drive;
2	Voltage level	L：220V； H：380V；
3	Rated power	5.5KW；
4	Encoder model	A：Incremental encoder；B：Absolute encoder； C：Rotary encoder；D：Magnetic encoder；
5	version	A：regular version；B：Special version；

1.1.2 S series drive standard accessories

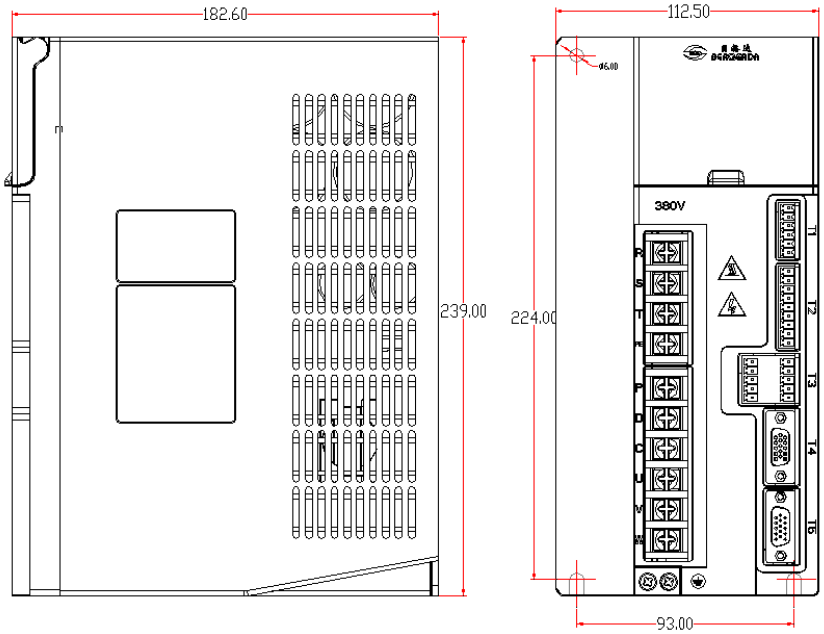
① T1（6-position terminal）、T2（9-position terminal）、T3（5-digit A/B terminal）、T4（3 rows of 15 pins）plug 1set
② Encoder cable T5 (3 rows of 15 holes) plug 1set
③ Motor power cable, encoder cable 1 set **Optional**
④ RS485 communication cabe （Model :CABLE01） 1 **Optional**
⑤ Braking resistor 1
⑥ Manual 1

1.1.3 Brake resistor model selection

S1-HXXPX		2P2	4P0	5P5	7P5	11P0	15P0	18P5
Corrugated braking resistor	PowerW	300	600	800	1000	600	800	1000
	Resistance Ω	100	50	40	32	50	40	32
	Quantity	1	1	1	1	2	2	2
Filter magnetic ring	ID ϕ mm	15	15	18	18	23	23	23
	Thickness H mm	13	13	13	13	15	15	15

Note: The above attachment data is recommended by the manufacturer's standard. If you have any special application, please contact the supplier.

1.1.3 Drive installation size



S series AC servo spindle drive installation dimension drawing

!!!! Note: R/S/T is the 380V power input terminal; P D is shorted to use the internal braking resistor, use external resistor to indirectly connect the PC port to the external braking resistor, no wrong connection!

1.2 Drive specification

Basic specification	Model		S1	
	Input power		Single-phaseAC342~418V	
			50/60Hz	
	Cooling method		Natural cooling	Cooling air cooling
	Control mode		SVPWM control	
	Encoder		Provincial line/incremental encoder	
Internal function	Display and operation		Six-digit seven-segment display LED: four function operation keys.	
	Control mode		Position Control / Speed Test Run / Jog Run / Internal Positioning PLC Function / RS485 Communication / Internal Speed / Internal Torque.	
	Brake function		Built in	
	Protection function		Undervoltage, overvoltage, overload, overcurrent, encoder anomaly, braking, position error, etc.	
Position control mode	Command control method		External pulse	
	External command pulse input	modus	Pulse + Direction CW/CCW A/B Orthogonal.	
		Maximum frequency	Differential: 1MHZ Open collector: 200KHZ.	
	Electronic gear ratio		1～32767/1～32767	
	Speed control range		Speed ratio：1:5000	
	Speed change rate		Speed volatility：＜±0.03（load 0～100%）＜±0.05（power supply -15%～+10%）.	
	Instruction smoothing		Linear time constant 1 ms～10000ms（0r/min←→1000r/min）.	
	Frequency characteristics		300HZ	
Input / output signal	Position signal output	Output type	ABZ phase line drive output / Z phase collector open circuit output.	
		Frequency division ratio	1 / 255～1 Frequency division	
	input signal	8-point opto-isolated input	Input points can be defined as any 12 kinds.See parameter settings	
	output signal	4-point open collector	1) Servo preparation; 2) Servo alarm output; 3) Positioning completed; 4) Zero speed arrival; 5) Position arrival; 6) Speed arrival; Ports are freely definable.	
Operating temperature			Work:0℃～55℃，Storage:-20℃～80℃。	

1.3 Drive installation

1.3.1 Installation environmental conditions

The environment in which the drive is installed has a direct impact on the normal function of the drive and its service life. Therefore, the installation environment of the drive must meet the following conditions:：

Item	S series servo spindle drive
Use temperature / humidity	0℃～55℃（No frost）; Below 90% RH (no condensation).
Storage temperature/humidity	-20℃～80℃; 90%RH（No condensation）
Atmospheric Environment	In the control cabinet, there is no corrosive gas, flammable gas, oil mist or dust;
vibration	Less than 0.5G (4.9m/s2) 10 Hz -60Hz (non-continuous operation);
Protection level	IP54

When installing several drives in a closed environment, please pay attention to the space to ensure sufficient heat dissipation. Also, add a cooling fan to make the drive temperature lower than 55 °C.

Install the drive in a vertical position with the front facing forward and the top facing up for heat dissipation.

Take care during assembly to avoid drilling debris and other foreign objects falling into the drive.

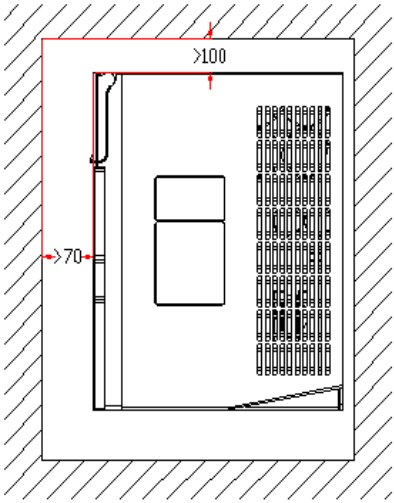
Use M5 screws to fix it during installation.

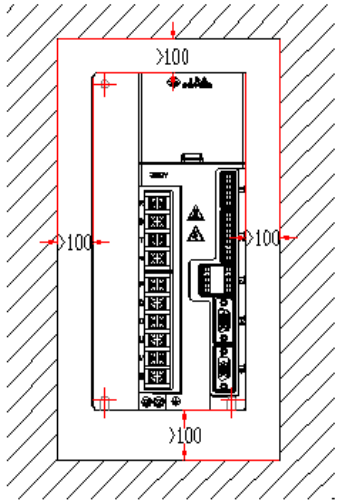
When there is a vibration source nearby (punch), if it is unavoidable, please use a vibration absorber or install an anti-vibration rubber gasket.

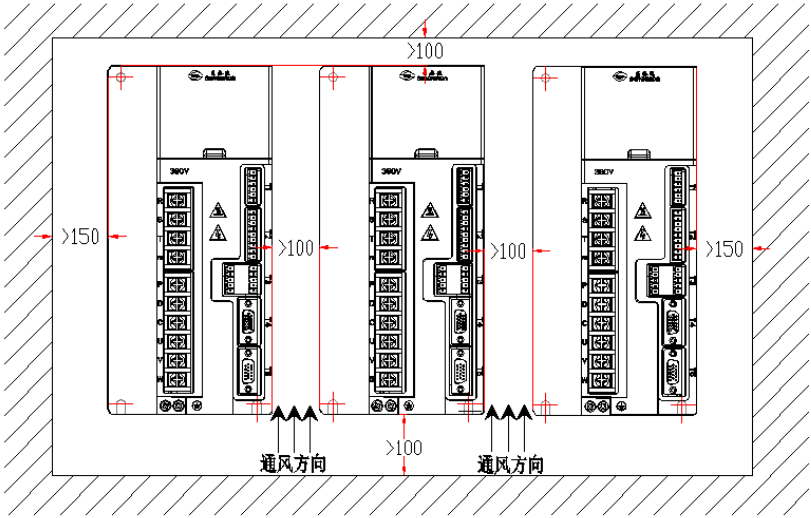
When there is a large noise source such as a large magnetic switch or a fusion splicer near the driver, it is easy to cause the driver to be erroneously operated by external interference. In this case, a noise filter needs to be installed; however, the noise filter increases the leakage current, therefore, an insulating transformer is required at the input of the driver.

1.3.2 Servo mounting direction and spacing

The following shows the installation interval between a single unit and multiple drive units. In actual installation, a large interval should be left as far as possible to ensure good heat dissipation conditions

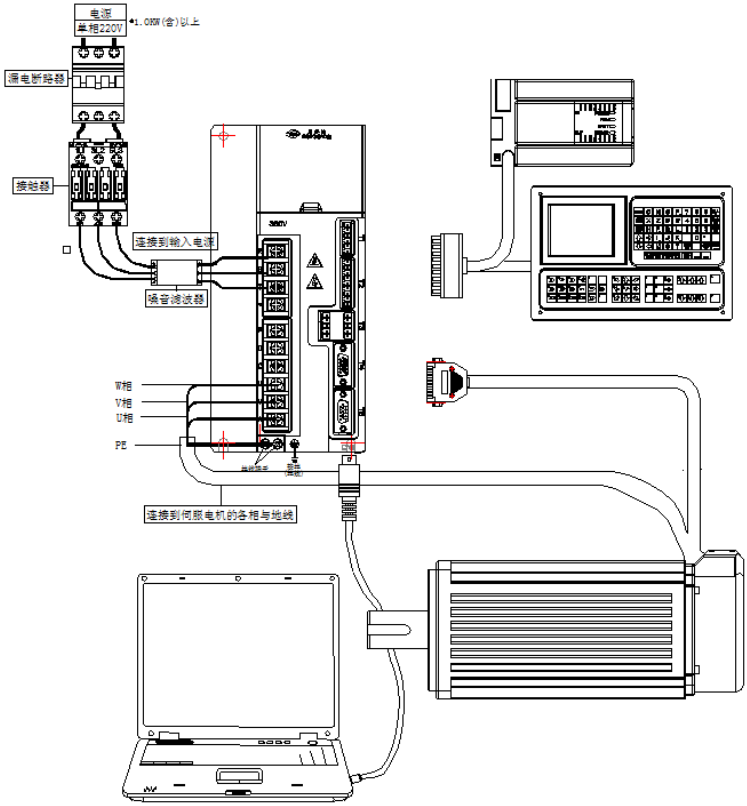






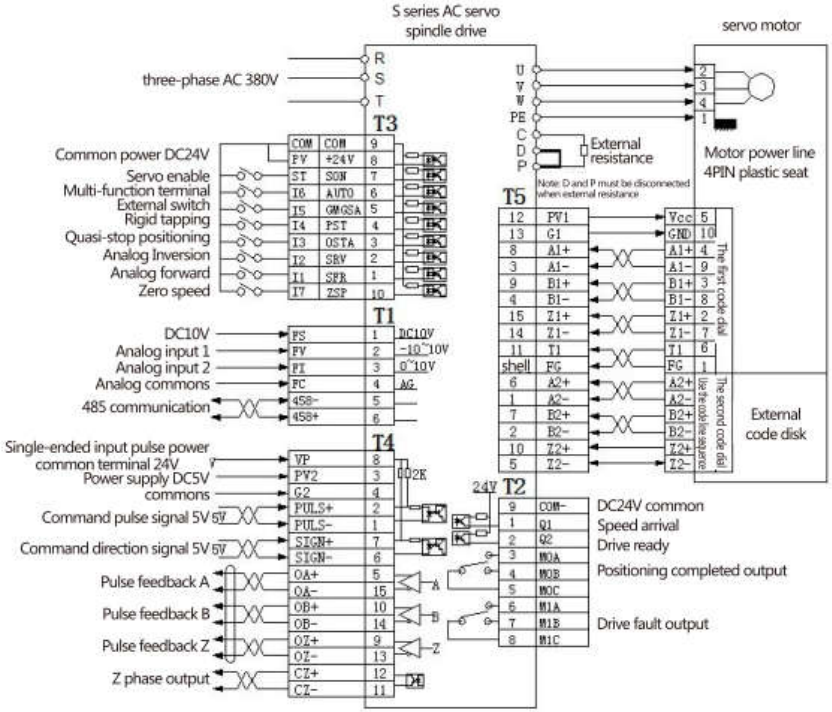
Chapter 2 Servo Drive and Motor Wiring

2.1 Driver power supply and peripheral wiring



S1 type driver peripheral wiring

2.2 Standard control mode wiring legend



S1 type standard control mode wiring diagram

2.3 Electrical connection of the terminals

2.3.1 Control terminal

The interface terminals of the S series servo spindle drive unit are configured as shown in the following table. T1 is a control terminal containing communication and analog quantity, analog quantity includes voltage and current analog quantity, communication adopts 485 communication, interface is single row 6pin socket；T2 is the I/O signal output terminal, two I/O port optocoupler outputs, two I/O ports are relay outputs, and the interface is a single row 9 pin socket. T3 is the I/O signal input port. It adopts two-way optocoupler to meet the wiring of different upper computers. The interface is a double-row 10pin socket. T4 is the encoder output and pulse signal input port. The signal output includes ABZ position output and single-ended Z signal output. The pulse input includes single pulse, CW/CCW and AB quadrature pulse. The port uses 3 rows of 15pin sockets. T4 is the port containing two encoder inputs, where the first encoder is the spindle motor encoder and the second encoder is the external encoder, which also contains the motor thermal protection input signal. It has 3 rows of 15pin sockets.

port	species	name	Pin	System default function	Signal standard
T1	Analog input	FS	1	Internal power supply 10V for speed setting	DC10V
		FC	4	Analog common	0V
		FV	2	-10V～+10V Analog input	Analog signal
		FI	3	0~10V/4~20mA Optional analog input	
	communication	485-	5	485 communication output negative	RS485
		485+	6	485 communication output positive	
T2	Control power supply	COM-	9	Signal output power supply DC24V common	0V
	Programmable optocoupler output	Q1	1	Speed reached (default Pd14 setting)	DC24V Optocoupler output
		Q2	2	Drive preparation (default Pd15 setting)	
	Relay output	M0A/M0B/M0C	3/4/5	Positioning completed (default Pd16 setting)	AC250V 1A DC30V 1A
		M1A/M1B/M1C	6/7/8	Drive alarm output (set by Pd17)	

T3	Control signal input	I1	1	Analog forward	Input port function can be customized by PD6-PD13
		I2	2	Analog inversion	
		I3	3	Quasi-stop positioning	
		I4	4	Rigid tapping	
		I5	5	External switch	
		I6	6	Multi-function terminal	
		ST	7	Servo enable	
		I7	10	Zero speed	
		PV	8	External input power supply 24V (output signal)	DC24V
	Control power supply	COM	9	External input power supply 24V (input signal)	DC24V/0V
T4	Encoder output	PV2/G2	3/4	5V DC power supply / common	RS422 standard
		OA+/OA-	5/15	Encoder A phase output	
		OB+/OB-	10/14	Encoder B phase output	
		OZ+/OZ-	9/13	Encoder Z phase output	
		CZ+/CZ-	12/11	Encoder single-ended Z output	
	Pulse signal input	VP	8	Single-ended input pulse power supply 24V	24V
		PULS+ /PULS-	2/1	Quadrature pulse A phase input / CCW input / single pulse puls input	5V pulse signal
		SIGN+ /SIGN-	7/6	Quadrature pulse B phase input / CW input / single pulse sign input	
T5	Encoder input	PV1/G1	12/13	Encoder 5V power supply / power supply common	Same to encoder standard
		A1+/A1-	8/3	First encoder A phase input	
		B1+/B1-	9/4	First encoder B phase input	
		Z1+/Z1-	15/14	First encoder C phase input	
		A2+/A2	6/1	Second encoder A phase input	
		B2+/B2-	7/2	Second encoder B phase input	
		Z2+/Z2-	10/5	Second encoder C phase input	
	Thermal protection input	T1	11	Motor thermal protection input signal	

Wiring of signal terminals

- Wire selection: Use shielded cable (preferably stranded shielded cable), the cross-sectional area of the core is ≥0.12mm2 (AWG24-26), and the shield must be connected to the FG terminal.
- Cable length: The cable length should be as short as possible. The CN1 cable should not exceed 3 meters, and the feedback signal CN2 cable should not exceed 20 meters.
- Wiring: Keep away from power line wiring to prevent interference. Please install a surge absorbing element for the inductive component (coil) in the relevant line; the DC coil is connected in parallel with the freewheeling diode, and the AC coil is connected in parallel with the RC absorption circuit.

2.3.2 Power supply, power terminal definition (S series)

Terminal mark	Signal definition	Features
R	Main circuit power supply three-phase	Main circuit power input terminal ~ 380V 50Hz; Note: Do not connect to the motor output terminals U, V, W.
S		
T		
P	External braking resistor selection terminal	Built-in braking resistor: P and D short circuit connection
D		With external braking resistor: P and D open, external resistor connected between P and C
C		
⏚	System ground	1, grounding terminal grounding resistance <100Ω; 2. The servo motor output and power input are grounded at the same point.
W	Servo motor output	The servo motor output terminal must be connected to the motor W, V, and U terminals.
V		
U		

2.3.3 Wiring of power line terminals

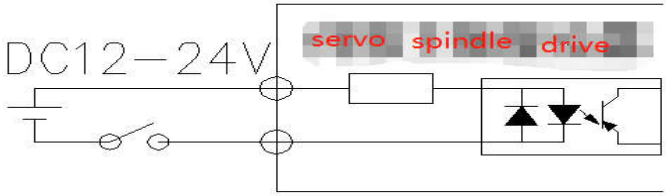
- L1、L2, L3, PE, U, V, W terminals, line cross-sectional area ≥ 2.5mm2 (AWG14-16). Grounding: The grounding wire should be as thick as possible. The driver and servo motor should be grounded at the PE terminal one point, and the grounding resistance is <100Ω.
- It is recommended to supply power from a three-phase isolation transformer to reduce the possibility of electric shock.
- It is recommended that the power supply be powered by a noise filter to improve the anti-interference ability.

Install a non-fuse (NFB) circuit breaker to shut off the external power supply in the event of a drive failure.

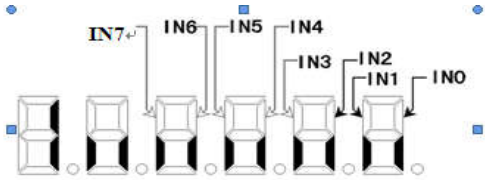
2.4 Signal interface schematic

2.4.1 Digital input interface circuit

- The digital input interface circuit can be controlled by a relay or open collector transistor circuit. The power is supplied by the user, DC12~24V, current ⩾100mA; note; if the current polarity is reversed, the high and low level of the driver will be negated. Input signals IN1-IN7 can refer to this connection



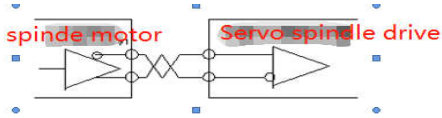
When the input signal is in communication with OV, the signal is ON and active. It can be judged by checking the display menu UN-17. When the input point is ON, the corresponding digital tube bar will light. When the input is OFF, the corresponding digital tube will be extinguished. The display content is reasonably applied to facilitate debugging and maintenance of the servo input signal.



Input terminal display (stroke light is On, OFF is OFF)

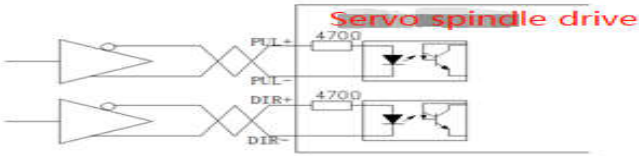
2.4.2 Servo motor photoelectric encoder input interface

In the differential output mode, AM26LS32, MC3487 or similar RS422 line driver is used as the receiver.

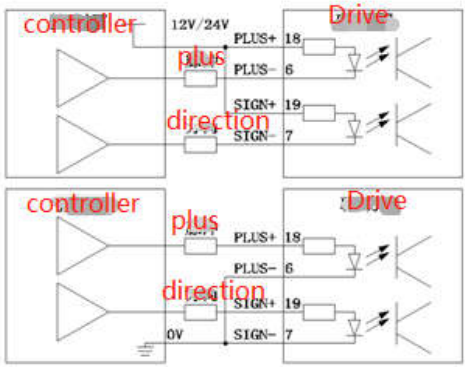


2.4.3 Pulse signal input interface circuit

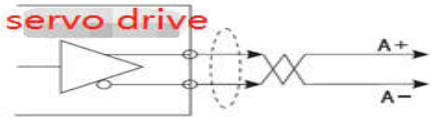
In order to correctly transmit the pulse amount data, it is recommended to use the differential driving method; in the differential driving mode, the AM26LS31, MC3487 or similar RS422 line driver is used as the single-ended driving mode as shown below, which will reduce the operating frequency.



Method 1: According to the pulse quantity input circuit, the driving current is 10 to 25 mA, and the condition that the maximum voltage of the external power source is 24 V is determined, and the value of the resistance R is determined. Empirical data: VCC = 24V, R = 1.3 ~ 2k; VCC = 12V, R = 510 ~ 820Ω. The external power supply is provided by the user, but it must be noted that if the polarity of the power supply is reversed, the servo drive unit will be damaged. The details are as follows:

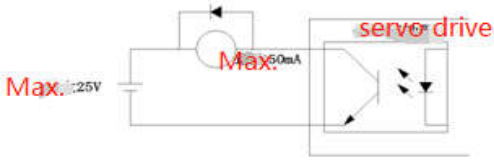


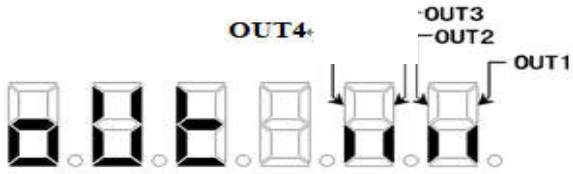
2.4.4 Drive speed output interface



2.4.5 Digital output interface circuit

When using an external power supply, be aware of the polarity of the power supply. Conversely, the polarity will cause the drive to be damaged. The digital output is open-collector mode. The external voltage is limited to 24V and the maximum current is 10mA. In terms of load, when using an inductive load such as a relay, it is necessary to add a diode in parallel with the inductive load. If the polarity of the diode is opposite, the driver will be damaged. The state of the output signal can be observed by UN-18.





Input terminal display (stroke light is On, OFF is OFF)

Chapter 3 Operation and Display

3.1 Keyboard operation

The servo panel consists of 6 LED digital tube displays and 4 buttons for displaying various statuses, setting parameters, and so on. The button functions are as follows:：

 ：The serial number, value is increased, or the option is forward.

 ：The serial number, value is reduced, or the option is back.

 ：Return to the previous operation menu, or cancel the operation.

 ：Go to the next level of operation menu or enter confirmation.

Note：  、  Keep pressing, the operation is repeated, and the longer the hold time, the faster the repetition rate.

*** The 6-digit LED digital tube displays various states and data of the system, the decimal point display of all digital tubes or the rightmost digital tube flashes to indicate that an alarm has occurred.

*** The operation is performed according to the multi-layer operation menu. The first layer is the main menu, including eight operation modes, and the second layer is the function menu under each operation mode. The following figure shows the block diagram of the main menu operation:

Display state	Display meaning
	Status monitoring
	parameter
	Parameter operation
	Internal speed operation
	Jog operation
	Open loop operation

3.2 Monitoring method

Select “Un-” in the first layer ， and press ↵ to enter the monitoring mode.； There are 22 display states.， The user can select the desired display mode with ▲、▼ .

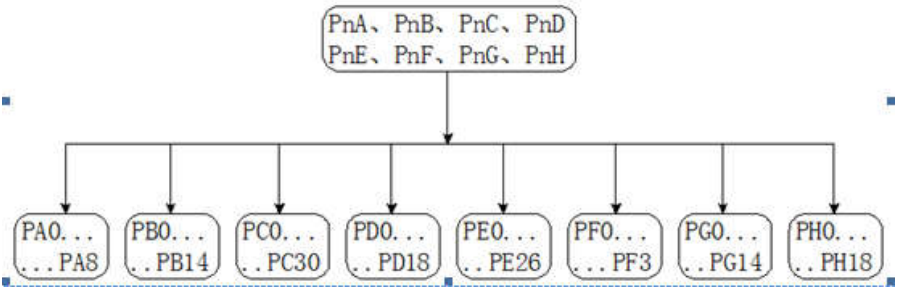
Display state	Display code	Display meaning	example
		Motor speed	Motor speed 500
		current position 5 digits lower	
		Current position 5 digits higher	
		Command pulse 5 digits lower	
		Command pulse 5 digits higher	
		Position deviation 5 digits lower	
		Position deviation 5digits higher	
		Motor torque	
		Motor current	
		Current line speed	
		control method	
		Pulse frequency	

		Speed command	
		Torque command	
		Absolute position of the rotor	
		Blank	
		Input signal status	
		Output signal status	
		Code wheel signal status	
		Operating status	
		Alarm code	
		U/V/W count display	
		Analog channel FV AD value	
		Analog channel FI AD value	
		DC bus voltage	
		Second code wheel speed	
		Absolute position of the second code wheel	

3.3 Parameter settings

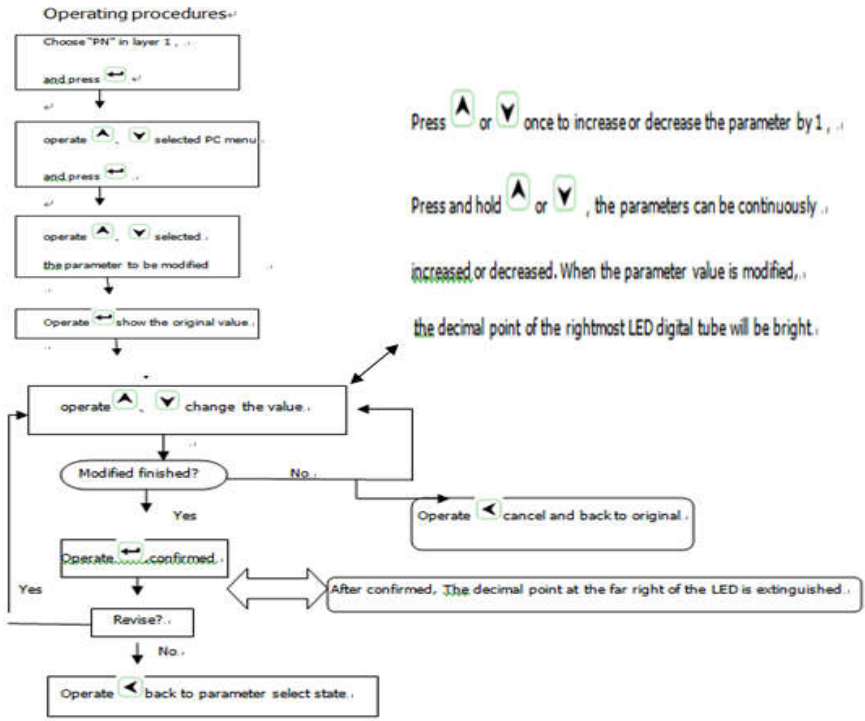
3.3.1 Parameter structure

Parameter structure



3.3.2 Parameter settings

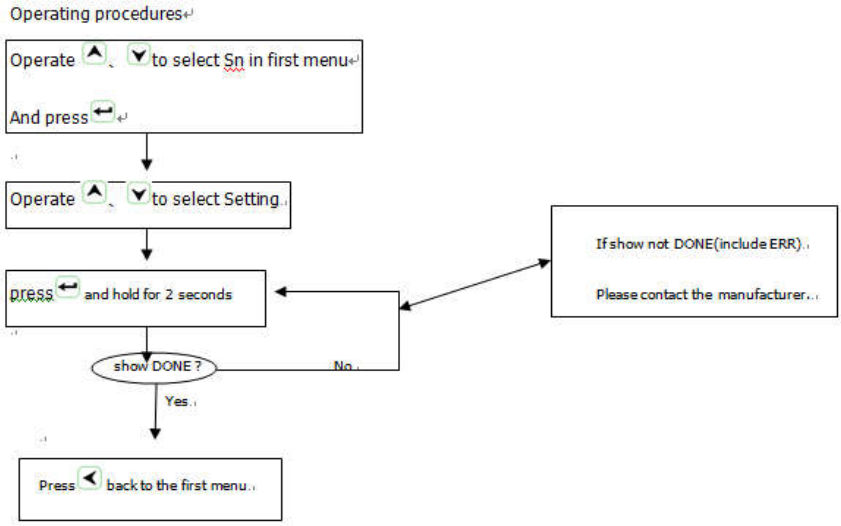
Choose “PN” in layer 1，and press ↵ to enter the parameter setting mode. Optional PA-PH parameters.Press ↵ enter the PA-PH arbitrary parameter list and use the ▲、▼ to select the parameter number.Press ↵ ，display the value of this parameter,use ▲、▼ to modify the parameter value.Press ▲ or ▼ once to increase or decrease the parameter by 1，Press and hold ▲ or ▼ ，the parameters can be continuously increased or decreased. When the parameter value is modified, the decimal point of the rightmost LED digital tube will be bright.Press ↵ to confirm that the modified value is valid，At this time, the decimal point of the LED digital tube on the right is turned off. The modified value will be reflected in the control immediately，After pressing ▲ or ▼ you can continue to modify the parameters. After the modification, press ◀ to return to the parameter selection state. If you are not satisfied with the value being modified, do not press ↵ to confirm,press ◀ to cancel,the parameter will return to the original value, and return to the parameter selection state.



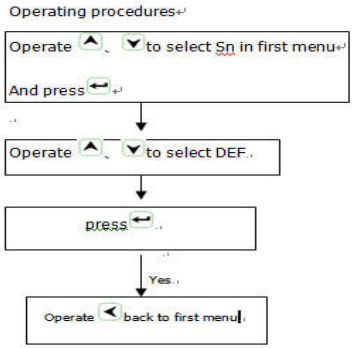
3.4 Parameter management

Parameter management mainly deals with operations between memory and EEPROM. Select "Sn-" in the first layer,and press to enter the parameter management mode. First you need to select the operating mode. There are 5 modes, which can be selected with the 、 key. Take “parameter write” as an example, select “Sn-Set”, and then press and hold for more than 2 seconds. If the write operation is successful, the display will show “DONE”, if it fails, it will display “ERR”.Press the again to return to the operating mode selection state.

- **Sn－SEt** parameter written It indicate that the parameters in the memory are written to the parameter area of the EEPROM. The user modifies the parameters and only changes the value of the parameter in the memory. The next time the power is turned on, the original value will be restored. If you want to change the parameter value permanently, you need to perform the parameter write operation, write the parameters in the memory to the parameter area of the EEPROM, and use the modified parameter after power-on.

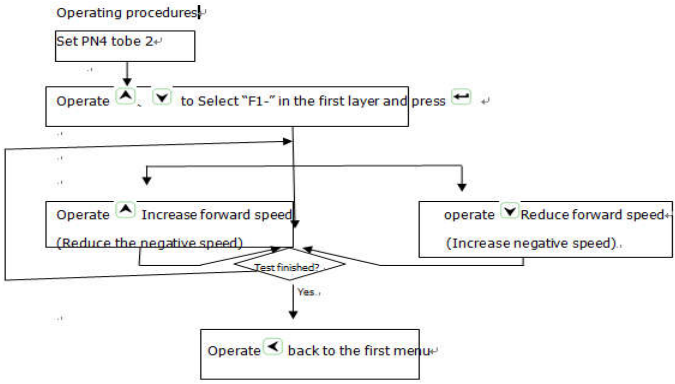


- **Sn—rd** Parameter read. It indicates that the data of the parameter area of the EEPROM is read into the memory. This process is automatically executed once at power-on. At the beginning, the memory parameter values are the same as in the EEPROM parameter area. However, if the user modifies the parameters, the parameter values in the memory will be changed. When the user is dissatisfied with the modified parameters or the parameters are disordered, the parameter reading operation is performed, and the data in the parameter area of the EEPROM can be read into the memory again. Restore to the parameters just power-on.
- **Sn—SS** Parameter backup
- **Sn—rS** Restore backup area parameters to current memory
- **Sn—dEF** Restore the default. Indicates that the default value (factory value) of all parameters is read into the memory and written into the parameter area of the EEPROM. The default parameter will be used the next time the power is turned on. When the user confuses the parameters and cannot work normally, all the parameters can be restored to the factory state by using this operation. Because the default values of the parameters corresponding to different drive models are different, the correctness of the motor ID (parameter PA1) must be guaranteed when using the default parameters.



3.5 F1 Operation mode (panel test function)

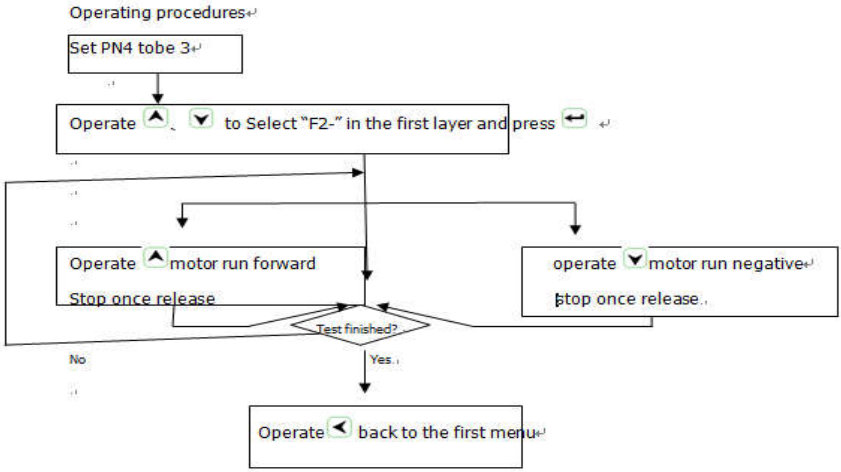
Select "F1-" in the first layer and press ↵ to enter the speed trial mode. The speed test run prompt is "S" and the value unit is r/min. The speed command is provided by the button. With the ▲ 、▼ keys, the speed command can be changed and the motor runs at the given speed. ▲ control speed increases positively，▼ control speed decreases positively (inverse increase). When the display speed is positive; the motor rotates forward and the display speed is negative; the motor reverses. Note: (1) The speed mode is continuous motion, please ensure that the motion axis has sufficient running distance to avoid the impact limit. (2) If the external does not have an enable signal, set the PA6 parameter to 1. Otherwise the motor will not rotate.



3.6 F2 operation mode (jog test function)

Select “F2-” in the first layer and press the key to enter the jog mode. The JOG run prompt is "J", the value unit is r/min, and the speed command is provided by the button. After entering the F2 operation, press the key and hold, the motor runs at the jog speed, release the button, the motor stops, keeps the zero speed;Press and hold, the motor runs in reverse according to the jog speed, release the button, the motor stops, keeps zero speed

The jog speed is set by parameter PC6.



Note: If there is no external enable signal, please set the PA6 parameter to 1. Otherwise the motor cannot rotate

3.7 Other

F4 is the zero function of photoelectric encoder, which is used by motor manufacturers. Users should not use it.

F5 open loop operation, Used when motor line sequence is not equal，Users are advised to operate by professional technicians.

Chapter 4 Parameters

The S series AC servo spindle drive has multiple sets of parameters to adjust, and the user parameters can be adjusted to meet most needs. Do not change the parameters of the motor, or unpredictable results. Among them, PA is a common parameter, PB is a position control parameter, PC is a speed control parameter, PD is an I/O control parameter, PE is a positioning and rigid tapping parameter, and PG is a current control parameter. PH is the matching parameter of the motor. PF communication control parameters.

4.1 Detailed list of function meanings of each parameter

PA Common parameters:

No.	Name	Features	Parameter range
PA0	user password	1, the password is divided into levels, corresponding to user parameters, system parameters; 2, to modify the motor ID (PA1) must be set to 0, the user parameter password is 168. System parameters, please consult the manufacturer.	0~32767
PA1	MotorID	For the matching motor model. Each motor has only one unique ID number. The password PA0 is first set to 0 to modify this parameter. After the setting is completed, the SN-DEF needs to be executed to be effective. Please operate this parameter with caution.	0~1000
PA2	Software version	View the current drive software version.	0~32767
PA3	Initial display status	Select the display status of the display after the drive is powered on: 0: Display motor speed; 1: Display the current position 5 digits lower; 2: Display the current position 5 digits higher; 8: Display motor current; 11: Display position command pulse frequency; 12: Display speed command; 13: Display torque command; 14: Shows the absolute position of the rotor in one revolution.	0~27
PA4	control method	This parameter sets the drive control method: 0: Position control mode	0~5

		1: Analog speed/tapping; 2: Speed test run; 3: Jog control mode; 4: I/O speed control; 5: Open loop operation mode;	
PA5	FPGA version No.	Displays the current FPGA version.	0-32767
PA6	Forced enable	0: Servo enable is controlled by external I/O; 1: Internal forced enablement;	0~1
PA7	alarm record	Historical alarm record	0~100
PA8	Production Date		0~32767

PB Position control parameter:

No.	Name	Features	Parameter range
PB0	Position proportional gain	Set the proportional gain of the position loop regulator: The larger the setting value, the higher the gain and the greater the stiffness. Under the same frequency command pulse condition, the position lag is smaller. However, too large value may cause oscillation or overshoot.	1~6000
PB1	Position feed forward gain	The feedforward gain of the position loop increases, and the high-speed response characteristic of the control system increases, but the position loop of the system is unstable and oscillates easily. The feedforward gain of the position loop is typically zero unless a very high response characteristic is required.	0~3000
PB2	Feedforward gain low pass filtering	Set the low-pass filter cutoff frequency of the position loop feedforward. The higher the cutoff frequency, the better the position tracking, but it is easy to oscillate.	1~580
PB3	Position command pulse form	Set the input form of the position command pulse. 0: Pulse + direction; 1: CCW/CW; CCW is viewed from the axial direction of the servo motor and rotates counterclockwise, defined as positive; CW is viewed from the axial direction of the servo motor	0~2

		and rotates clockwise, defined as reverse; 2: A/B quadrature pulse.	
PB4	Pulse gear ratio molecule	Electronic gear ratio molecule	1~32767
PB5	Pulse gear ratio denominator	Electronic gear ratio denominator.	1~32767
PB6	Position instruction reversed	0: Normal; 1: The direction is reversed.	0~1
PB7	Location reach	Set the positioning completion pulse range under position control: This parameter provides the basis for the drive unit to determine whether the positioning is completed in the position control mode.	0~32767
PB8	Position out of tolerance alarm range	Set the position error detection range: In the position control mode, when the count value of the position deviation counter exceeds the value of this parameter, the servo drive unit gives a position error alarm.	0~32767
PB9	Turn off the tolerance alarm function	0: Position alarm detection is valid; 1: Position alarm detection is invalid;	0~1
PB10	Position command pulse filter	Smoothing the command pulse, with exponential acceleration and deceleration, the value represents the time constant; the filter will not lose the input pulse, but the instruction delay will occur; when set to 0, the filter will not work.	0~20000 ×0.1ms
PB11	Code wheel output pulse A/B phase modulation	0: Code wheel output pulse A/B phase is normal 1: Code wheel output pulse A/B phase modulation	0~1
PB12	Position command FPGA filter	Set the pulse pass frequency, set to 500 to indicate the maximum pass frequency of the system is 500KHZ.	1~1000
PB13	Output electronic gear ratio molecule	Each feedback pulse from the encoder is output through the gear in the drive unit.	1-32767
PB14	Output electronic gear ratio denominator	Each feedback pulse from the encoder is output through the gear in the drive unit.	1-32767

PC Speed control parameters:

No.	Name	Features	Parameter range
PC0	Speed proportional gain	Set the proportional gain of the speed loop regulator: 1, the larger the setting value, the higher the gain, the greater the stiffness; 2, the larger the load inertia, the larger the set value.	5Hz ~2000Hz
PC1	Speed integral time constant	Set the integral time constant of the speed loop regulator: 1, the smaller the setting value, the faster the integration speed, the greater the stiffness; 2, the larger the load inertia, the larger the setting value. The setting of frequent low-power occasions is relatively small, preventing overshoot.	1ms ~1000ms
PC2	Speed integral separation point	When the speed deviation exceeds the set value, the speed PI becomes P.	100～800 r/min
PC3	Speed detection low pass	Set the speed detection low-pass filter characteristics: 1, the smaller the value, the lower the cutoff frequency, the smaller the noise generated by the motor. If the load inertia is large, the set value can be appropriately reduced. The value is too small, causing the response to slow down, which may cause oscillation; 2. The larger the value, the higher the cutoff frequency and the faster the speed feedback response. If a higher speed response is required, the set value can be increased as appropriate.	1~580%
PC4	Maximum speed setting	Maximum speed setting under analog speed operation	0~12000
PC5	Speed reaches the set value	Set the speed value when the output signal reaches the valid state.	0~1000
PC6	Jog speed setting	Set the jog speed.	1~3000r/min
PC7	Analog channel selection	0: FV channel (+-10V); 1: FI channel (0-10V) 2: FI channel (4-20MA); 3: FI channel (0-10V, direction control enabled);	0~3
PC8	Analog command deadband range	When the analog voltage command is lower than this value, the analog command input is invalid and the motor does not turn.	0~120 *0.1V
PC9	Analog command zero	Adjust the offset of the analog voltage to make it balanced	-1000~1000

PC10	Blank		
PC11	Analog command filter coefficient	Analog command filtering setting, 1000 is not filtered	1-1000
PC12	Analog command gain	Adjust the maximum output speed corresponding to the maximum analog input	0~5000
PC13	FV channel (+-10V) polarity is reversed	0: FV channel (+-10V) polarity is normal 1: FV channel (+-10V) polarity is reversed	0-1
PC14	acceleration time	The set value is the acceleration time of the motor from 0r/min to 1000r/min. The acceleration characteristics are linear.	0~3000ms
PC15	deceleration time	The set value is the deceleration time of the motor from 0r/min to 1000r/min.	0~3000ms
PC16	Zero speed approval range	When the speed is less than the set value, it is recognized as 0 turn.	0~1000
PC17	Internal speed 1	Internal speed control mode: The speed is controlled by the state of the external I/O point. For example: SC3 SC2 SC1: PC17: OFF OFF OFF PC18: OFF OFF ON PC19: OFF ON OFF PC20: OFF ON ON PC21: ON OFF OFF PC22: ON OFF ON PC23: ON ON OFF PC24: ON ON ON	-12000~12000
PC18	Internal speed 2		
PC19	Internal speed 3		
PC20	Internal speed 4		
PC21	Internal speed 5		
PC22	Internal speed 6		
PC23	Internal speed 7		
PC24	Internal speed 8		
PC25	Off enable parking	0: Free stop; 1: Deceleration stop;	0～1
PC26	Can turn off the speed of the motor after enabling	Set the maximum allowable speed of the motor	0～5000 *0.1rpm
PC27	Motor rated speed	Motor rated speed	0～12000
PC28	Zero speed clamp	Position gain in the zero speed	0～6000

	position gain	clamp state of the motor	
PC29	Zero speed clamp speed gain	Speed gain in the zero speed clamp state of the motor	0～2000
PC30	Zero speed clamp speed integral constant	Speed integral constant of the motor under zero speed clamp	0～10000

PD IO Control parameters：

No.	Name	Features	Parameter range
PD0	Input terminal low 4 bits forced ON	Forced ON if the input signal is four bits lower.	0~15
PD1	Input terminal high 5 bits forced ON	Forced ON if the input signal is five digits higher.	0~31
PD2	Input terminal low 4 bits negated	The lower four bits of the input signal are inverted to match the level of the input signal contact.	0~15
PD3	Input terminal high 5 bits reverse	The upper five bits of the input signal are inverted to match the level of the input signal contact.	0~31
PD4	Output terminal 4 bit inversion	The output signal is inverted to match the level of the output signal.	0~15
PD5	Input terminal 7 definition	0、Do not use port; 1、Enable; 2、Rigid tapping; 3、Orientation; 4、Zero speed clamp; 5、Analog control direction setting; 6、Analog control direction setting (10 inversion, 01 forward, other invalid); 7、Internal speed selection (SC1); 8、Internal speed selection (SC2); 9、Internal speed selection (SC3); 10、Reduction ratio selection; 11、Reduction ratio selection (00 first gear, 01 second gear, 10 third gear, 11	0~13
PD6	Input terminal 1 definition		0~13
PD7	Input terminal 2 definition		0~13
PD8	Input terminal 3 definition		0~13
PD9	Input terminal 4 definition		0~13
PD10	Input terminal 5 definition		0~13
PD11	Input terminal 6 definition		0~13
PD12	Input terminal 10 definition		0~13

PD13	Thermal alarm terminal definition	fourth gear); 12、Alarm clear;	0~13
PD14	Output terminal 1 definition	Set the function of output port 1: 0: Servo ready 1: Servo alarm output 2: Positioning completed 3: Zero speed 4: Location arrival 5: Speed arrival 6: Position/speed status output	0~6
PD15	Output terminal 2 definition		0~6
PD16	Output terminal 3 definition		0~6
PD17	Output terminal 4 definition		0~6
PD18	Set IO with RS485	0:Port customization; 1: RS485 definition.	0~1

PE Positioning and rigid tapping parameters:

No.	Name	Features	Parameter range
PE0	Whether the rigid tapping is in the position mode	0: speed, 1: position	0~1
PE1	Position proportional gain for rigid tapping	Position proportional gain setting during rigid tapping	1~6000
PE2	Speed proportional gain for rigid tapping	Speed proportional gain setting during rigid tapping	5~2000Hz
PE3	Speed integral time constant for rigid tapping	Speed integral time constant gain setting during rigid tapping	1~10000ms
PE4	Targeting	Choose a Targeting method: 0: The first code wheel is quickly positioned; 1: The first code wheel is positioned in the forward direction; 2: One-way positioning of the first code wheel; 3: The second code wheel is quickly positioned; 4: The second code wheel is positioned in the forward direction; 5: One-way positioning of the second code wheel; 6: Inductive switch positioning; 7: Inductive switch unidirectional positioning;	0~7

PE5	Positioning position	Set the desired location	0~32767
PE6	Positioning speed	Set the desired positioning speed	0~3000rpm
PE7	Positioning completed recognition range	Set the positioning tolerance range	0~1000
PE8	Position proportional gain	Set position proportional gain when positioning	0~2000
PE9	Positioning speed proportional gain	Set the speed proportional gain when positioning	5~2000Hz
PE10	Speed integral time constant for positioning	Set the speed integral time constant during positioning	1~10000ms
PE11	Position proportional gain for positioning completion	Set position proportional gain after positioning is completed	0~6000
PE12	Positioning completion speed proportional gain	Set the speed proportional gain after positioning is completed	5~2000Hz
PE13	Positioning completion speed integral time constant	Set the speed integral time constant after positioning is completed	1~1000ms
PE14	Find the speed of the sensor switch after finding the deceleration point	Set the speed when looking for the sensor switch	0~1000rpm
PE15	Forward positioning allows overshoot range	Set the forward positioning position tolerance range	0~1000
PE16	First gear reduction ratio molecule	Set the first gear reduction ratio molecule	1~32767
PE17	First gear reduction ratio denominator	Set the first gear reduction ratio denominator	1~32767
PE18	Second gear reduction ratio molecule	Set the second gear reduction ratio molecule	1~32767
PE19	Second gear reduction ratio denominator	Set the second gear reduction ratio denominator	1~32767
PE20	Third gear reduction ratio molecule	Set the third gear reduction ratio molecule	1~32767

PE21	Third gear reduction ratio denominator	Set the third gear reduction ratio denominator	1~32767
PE22	Fourth gear reduction ratio molecule	Set the fourth gear reduction ratio molecule	1~32767
PE23	Fourth gear reduction ratio denominator	Set the fourth gear reduction ratio denominator	1~32767
PE24	Deceleration position	Set the deceleration point position	0~65536
PE25	The second code wheel direction is reversed	0: normal; 1: direction reversal	0~1
PE26	Inductive switching signal FPGA filtering	Inductive switching signal FPGA filtering	1~10000

PF Communication parameters:

No.	Name	Features	Parameter range
PF0	RS485 address	Multiple drive setting station number	0-255
PF1	Communication frequency	Communication frequency selection: 0:4800; 1:9600; 2:19200; 3:38400; 4:57600; 5:115200;	0~5
PF2	Check form	0: odd parity; 1: even parity;	0~1
PF3	Whether to set IO with RS485	0: Port customization, 1: RS485 definition.	0~1

PG Current loop parameter:

No.	Name	Features	Parameter range
PG0	Current proportional gain	1, the larger the setting value, the higher the gain, the smaller the current tracking error, but the gain will cause oscillation or noise; 2, related to servo and motor; 3, independent of load.	1～500

PG1	Current integration time constant	1, the smaller the setting value, the faster the integration speed, the smaller the current tracking error. However, if the integral is too small, oscillation or noise will occur; 2, related to servo and motor; 3, independent of load. 4. Under the condition that the system does not oscillate, it should be set as large as possible.	1~10000
PG2	Motor rated current	Set the rated motor current. The set value is a valid value.	1～500×0.1A
PG3	Overload multiple	Set the maximum overload factor allowed by the system.	0～300%
PG4	Split point of current integration	When the current error exceeds the set value, the current loop changes from PI to P, and the value is a percentage of the rated current.	100~10000
PG5	Excitation current	The magnetic field holds current when the motor is stopped.	0~300
PG6	Current command low pass filter coefficient	Set the current command low pass filter cutoff frequency. It is used to limit the current command frequency band, avoid current surge and oscillation, and make the current response smooth.	1~1500Hz
PG7	Excitation time constant	Motor parameters	1~20000
PG8	Current detection coefficient	Current detection coefficient, system setting, cannot be changed arbitrarily;	1~10000
PG9	Proportional coefficient multiplier after current integral separation	Set multiple	0~300%
PG10	Current command low pass filter setting	1, set the current command filter characteristics. It can suppress the resonance generated by the torque (the motor emits sharp vibration noise); 2. The smaller the value, the lower the cutoff frequency and the lower the noise generated by the motor. If the load inertia is large, the set value can be appropriately reduced. The value is too small, causing the response to slow down and may cause instability.	1~1500

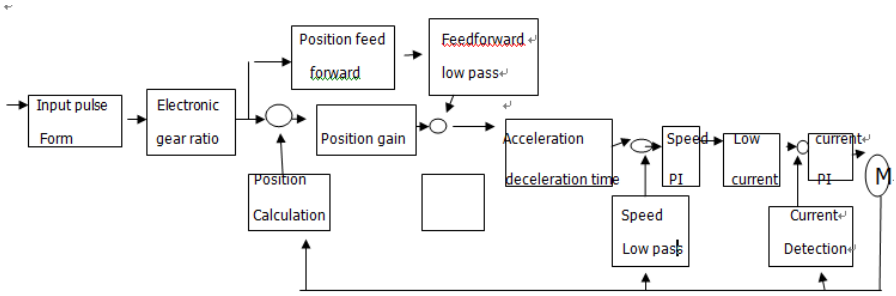
PG11	Zero speed clamp excitation current	Percentage of excitation current using zero speed clamp	1~300%
PG12	Rigid tapping excitation current	Rigid tapping excitation current percentage	1~300%
PG13	Directional excitation current	Use positioning excitation current percentage	1~300%
PG14	Weak magnetic control speed point	Start weakening magnetic after reaching the set speed	0~3000rpm

PH Motor and protection parameters：

No.	Name	Features	Parameter range
PH0	Motor inertia	Set the motor inertia parameter.	1~32767
PH1	Motor rated torque	Set the rated motor torque.	1~32767
PH2	Motor rated speed	Set the rated motor speed.	300～6000 r/min
PH3	Maximum motor speed	Set the maximum motor speed。	0～12000 r/min
PH4	Overload multiple	Set the maximum overload factor allowed by the system.	0～400%
PH5	Overload torque detection point	Set the starting torque value of the overload protection, the rated percentage. When the current torque of the motor is higher than this value, the internal overload counter of the system works. After the count value is exceeded, the system outputs an overload alarm.	0～200%
PH6	Overload characteristic point torque	Set the torque of the overload point. This parameter and PH7 together form the overload characteristic of the motor. It is set according to the motor overload characteristic parameter. Pay attention to PH6>PH5.	0～500%
PH7	Maximum overload time of the overload point	Refer to PH6.	1~32767
PH8	Speed amplifier	A speed saturation alarm is generated when the system internal	1～30000

	saturation fault detection time	speed regulator continuous saturation time exceeds this value. Used to prevent mechanical jamming or other causes, resulting in excessive current.	
PH9	Do not detect speed integral saturation error	0: detection; 1: no detection;	0～1
PH10	Maximum braking time	Set a single maximum braking time	2～500ms
PH11	Number of code lines	Enter the number of code lines	500~10000
PH12	Number of 2nd code lines	Enter the number of 2nd code lines	500~10000
PH13	Motor thermal overload detection starting point	Thermal overload is calculated using the I*I*T method.	100～300%
PH14	Motor thermal overload characteristic torque	This parameter setting is greater than PH13。	100～300%
PH15	Thermal overload time	Set the maximum time for thermal overload.	1～30000S
PH16	Motor pole number	Set the number of magnetic poles of the servo motor. Different models of different manufacturers may have different motors. You cannot change this parameter at will.	1～8
PH17	Module current limit	Set the module's maximum output current value	1～3000
PH18	Motor overheat protection	0: Software protection; 1: IO protection;	0～1

4.2 Parameter debugging block diagram model



4.3 Servo key parameter description

Since the default motor matching parameters have been optimized, in most applications it is not necessary to adjust the parameters (except for the electronic gear ratio) and can be used directly. But the actual machinery is complex and diverse. If an exception occurs during debugging or requires a very high response, you will need to adjust the parameters to meet your needs. The principle of debugging is the first current loop, then speed loop, and the last position loop. Current loops are generally not adjusted unless in individual cases. The speed response is too fast, causing a current surge. Causes AL11 alarm. Then can adjust PG2 to solve.

Speed loop: Where a higher speed response is required, PC0 can be increased or PC1 can be reduced. But the PC0 setting is too large to easily vibrate. In the case where the load inertia is too large, if the load motor motion decelerates, it will stop unstable and shake left and right. At this time, PC1 needs to be increased to solve it.

Position loop: Where a higher position response is required, PB0 can be increased to obtain. In some occasions, PB1 needs to be enlarged to meet. However, the PB0 PB1 setting is too large to easily vibrate. The premise of setting is to debug PB0 first, and PB1 is only used when it is short distance and high response.

Electronic gear ratio: **1) If calculated from the speed angle, the following formula can be used:**

f ×(PB4/PB5)=10000

Where f is the pulse sent by the host computer, the unit should be the number of pulses / per revolution. That is, if you know that the host computer emits a certain number of pulses and rotates the motor or load for one revolution, the electronic gear ratio setting number can be calculated according to the above formula.

2) Calculate directly by positional accuracy:

(Lead/pulse equivalent) × (PB4/PB5) = 10000

If the lead screw lead is 5mm, the motor and the lead screw are directly connected, and the motor moves 5mm in one turn. If the required accuracy is 0.001mm, the motor will take 5,000 pulses to make one revolution; that is, PB4=10 and PB5=5.

Pulse input form: support pulse plus direction and CW/CCW (positive and reverse pulse) input, set PB3.

4.4 Parameter debugging steps in practical applications

In the process of debugging or application, if vibration, noise or control accuracy is not enough, the parameters of the system can be adjusted to meet the control requirements as follows.

When the motor is in the static lock state, if there is vibration or sharp noise, please adjust the current proportional gain parameter value smaller; if the oscillation does not occur, the parameter should be set as large as possible. The larger the current, the better the current tracking effect and the faster the motor response; however, if too large will easy to cause vibration or noise.

（1）：Speed control mode parameter adjustment:

1）The set value of [Speed Proportional Gain] is set as large as possible without oscillation. In general, the larger the load inertia, the larger the set value should be;

2）The set value of [Speed integral time constant] is set as small as possible according to the given conditions. When the setting is too small, the response speed will increase, but it will easily oscillate. Therefore, as long as the oscillation does not occur, try to set it smaller. When the setting is too large, the speed will change greatly when the load changes.

（2）：Position control mode parameter adjustment:

1）First set the appropriate [speed proportional gain] and [speed integral time constant] according to the above method;

2) [Position feed forward gain] is set to 0%;

3) The set value of [Position Proportional Gain] is set as large as possible within the stable range. When the setting is too large, the tracking characteristic of the position command is good, and the hysteresis error is small, but when the positioning is stopped, the oscillation is easily to occur. When the setting is small, the system is in a stable state, but the position tracking characteristics are deteriorated, and the hysteresis error is large;

4) If the position tracking feature is required to be particularly high, the position feed forward gain setting can be increased; however, if it is too large, it will cause overshoot.

Chapter 5 Operation and Debugging

5.1 Special precautions for debugging:

1)The servo spindle driver connects the AC three-phase 380V power supply to the power input terminal three-phase connection L1, L2, L3;;

3) Motor power line U, V, W, PE, line sequence can not be reversed, external braking resistor is connected to P and D terminals;

4) The above part is the connection mode of the spindle drive. If the connection is wrong, it may cause burnt, the motor does not turn, alarm, etc. Please check the connection carefully to avoid wrong connection and reverse.

5.1.1 Power-on sequence

After the power is turned on, the servo alarm signal is output after 1S, and the signal output is ready after 1.5S. After 10ms, the response is enabled. The motor is energized and locked within 10ms; waiting for operation.

5.2 Open loop operation

1) Turning on the control circuit power and the main circuit power, and the display of the driving unit is lit;If an alarm appears, check the connection.

2) Set the following parameters:

Parameter No.	parameter name	Definition	Set value
PA0	Parameter password	Special commissioning	12
PA4	Control mode	5: Open loop mode	5
PA6	Servo enable	0：External enable 1：Forced enable	1

3) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor.

4) Adjust the pulse frequency of the input signal to make the motor run as commanded.

5.3 Position control mode operation

1) Turning on the control circuit power and the main circuit power, and the display of the driving unit is lit;If an alarm appears, check the connection.

2) Set the following parameters：

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	0：Position mode	0
PB3	Position command pulse input mode	0：Single pulse 1：CW/CCW 2：A/B quadrature pulse	0
PB4	Gear ratio molecule		1
PB5	Gear ratio denominator		1
PA6	Servo enable	0: External enable 1: Forced enable	1

3）Related parameters: See the PB parameter list for details;

4) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

5) Adjust the pulse frequency of the input signal to make the motor run as commanded.

5.4 Speed trial run

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm occurs, please check the connection;

2) Set the following parameters:

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	0: position mode; 1: analog speed / tapping; 2: Speed trial run	2
PA6	Servo enable	0: external enable; 1: Forced enable.	1

3) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

4) Through the key operation, enter the F1 speed trial running operation state, the speed trial running prompt is “S”, the numerical unit is r/min, the system is in the speed trial running mode, the speed command is provided by the button, the speed command is changed by the key   , the motor should be run at a given speed.

5.5 Jog operation

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm appears, check the connection.

2) Set the following parameters:

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	0: position mode 1: analog speed / tapping 2: Speed trial run 3: Jog control mode	3
PA6	Servo enable	0: external enable; 1: Forced enable.	1

3) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

4) Through the key operation, enter the F2 jog running operation state, the JOG running prompt is “J”, the numerical unit is r/min, the system is in the speed control mode, and the speed magnitude and direction are determined by the parameter PC6. Press the key motor to run at the speed and direction determined by the PC6 parameter. Press the key to reverse the motor at the given speed.

5.6 Simulated speed operation

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm occurs, please check the connection;

2) Setting function parameters：

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	0: position mode; 1: analog speed / tapping;	1
PA6	Servo enable	0: external enable; 1: Forced enable;	1
PC7	Analog channel selection	0: FV channel (+-10V); 1: FI channel (0-10V); 2: FI channel (4-20mA);	Optional

3）Port definition:

When the PC7 selects the FV channel, the analog input is connected to the 2 port of T1, and when the PC7 selects the FI channel, the analog port is connected to the 3 port of T1. The analog input can be observed through UN23 and UN24.

4) Analog speed control related parameters：

PC13：FV channel (+-10V) polarity is reversed, the polarity is used to control the rotation direction; PC8: analog command dead zone range, determine the effective command minimum voltage value; PC9: analog command 0 point, specify the analog voltage corresponding to zero speed. PC12: Analog command gain, which adjusts the maximum output speed corresponding to the maximum analog input. For other related parameters, please refer to the PC parameter list.

5）When using the analog FI channel, the motor rotation direction enable is determined by the I/O input signal. The default is T3 port 1 and 2; you can also input the PD6-PD12 parameter to customize the rotation direction enable port.

6) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

7) Control the simulation speed by adjusting the amount of analog;

5.7 Rigid tapping operation

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm occurs, please check the connection;

2) Set the function parameters:

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	0: position mode; 1: analog speed / tapping；	1
PA6	Servo enable	0: external enable; 1: Forced enable;	1
PE0	Rigid tapping method selection	0: speed mode; 1: position mode;	Optional

3）Port definition:

When the position tapping mode is used, PE0=1, the tapping is controlled according to the external input pulse; when the speed tapping mode is used, PE0=0, the analog control speed is used for tapping, and the analog speed control process is detailed in the section 5.6 Simulating speed operation. The tapping mode is started according to the I/O port. The startup I/O port can be customized. The default is the port 4 of T3.

4）Rigid tapping related parameters:

PE1: position proportional gain for rigid tapping, PE2: speed proportional gain for rigid tapping; PE3: speed proportional integral time constant for rigid tapping;

5) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

5.8 I/O internal speed control operation

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm occurs, please check the connection;

2) Set the function parameters:

Parameter No.	parameter name	Definition	Set value
PA4	Control mode	4：I/O speed control;	4
PA6	Servo enable	0: external enable; 1: Forced enable;	1
PC17-PC24	Internal speed 1-8	Set the corresponding speed	

3）Port definition:

The input port of SC1/SC2/SC3 is defined by setting the value of PD6-PD13, and the PC17-PC24 is selected according to the level signal of SC1/SC2/SC3 to set the speed;

4) I/O port internal speed control related parameters:

See PC parameter list;

5) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

6) The speed is switched by adjusting the signal corresponding to SC1/SC2/SC3;

5.9 Positioning

1) The control circuit power and the main circuit power are turned on, and the display of the drive unit is lit. If an alarm occurs, please check the connection;

2) Set the function parameters and related parameters:

Parameter No.	parameter name	Definition	Set value
PE4	Positioning method selection	0-7: Total 8 positioning methods are selected	Optional
PA6	Servo enable	0: external enable; 1: Forced enable;	1

3）Port definition:

The corresponding port is defined as a positioning signal input port by setting a value of PD6-PD13 to 3. When there is a signal input, the positioning is performed according to the setting requirements; the sensor switch positioning signal input port T3 of port 5, the PD10 needs to be set to 0 when using.

PE4 positioning mode selection has 0-7 total 8 ways to choose, where in the first code wheel is positioned as a motor encoder and the second code wheel is positioned as an external encoder. The inductive switch positioning signal is input into the drive by the defined I/O port feedback.

4) I/O port internal speed control related parameters:

PE5	Positioning position	Set the desired location	Set value
PE6	Positioning speed	Set the speed required for positioning	--
PE7	Positioning completed recognition scope	Set the positioning tolerance range	--
PE8	Position proportional gain	Set position proportional gain when positioning	--
PE9	Positioning speed proportional gain	Set the speed proportional gain when positioning	--
PE10	Speed integral time constant for positioning	Set the speed integral time constant during positioning	--
PE11	Position proportional gain for positioning completion	Set the position proportional gain at zero speed after positioning is completed.	--

PE12	Positioning completion speed proportional gain	Set the speed proportional gain at zero speed after positioning is completed	--
PE13	Positioning completion speed integral time parameter	Set the speed integral time constant at zero speed after positioning is completed.	--
PE15	Forward positioning allows overshoot range	Set the forward positioning position tolerance range	--

PE14-PE24 position positioning deceleration point and deceleration gear setting parameters;

5) After confirming that there is no alarm and any abnormal conditions, the servo enable (SON) is turned ON, and the motor is energized at zero speed. If the enable signal is not wired, you can set PA6 to 1 to automatically enable the motor;

Chapter 6 RS485 Communication

6.1 RS485 communication hardware interface

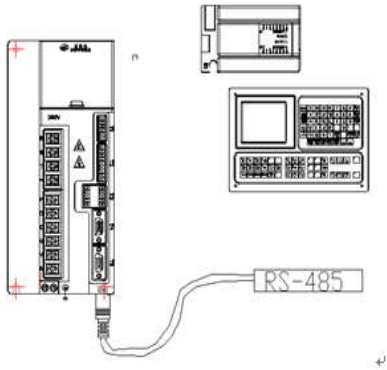
6.1.1 communication

This driver adds RS485 communication function, which can drive servo system, change parameters, monitor servo system status and many other functions. To suit specific application needs.

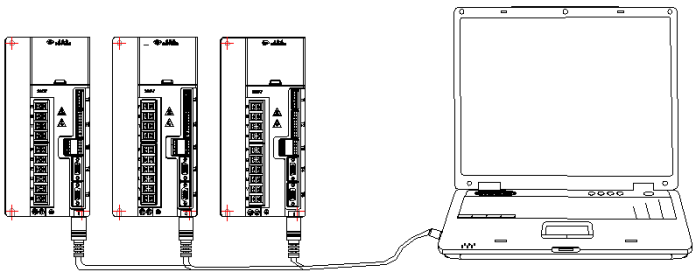
6.1.2 External connection diagram

External sketch

Controller such as HMI/PLC



6.1.3 Multiple external connection diagrams



6.2 Communication protocol

The servo system adopts the standard asynchronous serial master-slave MODBUS communication protocol. Only one device host in the network can establish a protocol. The other device slaves can only respond to the host by providing data or according to the commands of the host. The host refers to a personal computer, an industrial control device or a PLC, and the slave refers to the servo system.

When the communication command is sent by the sending device (host) to the receiving device (slave), the slave device that meets the corresponding address code receives the communication command, and reads the information according to the function code and related requirements. If the CRC check is correct, the corresponding task is executed, and the execution result (data) is returned to the host. The returned information includes the address code, function code, executed data, and CRC check code. If the CRC check error occurs, no information will be returned.。

Communication frame structure adopts RTU mode

6.2.1 Communication command code and data description

function code	Definition	Operation (binary)
03	Read register data	Read data from one or more registers
06	Write one-way register	Write a set of binary data to a single register
10	Write multiple registers	Write multiple sets of binary data to multiple registers

6.2.2 Function code "03": Read multiple register input

For example, the host should read the three slave register data with address 01 and start address 0116.

The address and data of the slave (PDM) data register are:

Register address	Register data (hexadecimal)	Corresponding to PDM power
0116	1784	UA
0117	1780	UB
0118	178A	UC

The format of the packet sent by the host:

Host sending	Number of bytes	Message sent	Remarks
Slave address	1	01	Send to slave at address 01
function code	1	03	Read register
initial address	2	0116	Starting address is 0116
Data length	3	0003	Read 3 registers (6 bytes total)
CRC code	2	E5F3	The CRC code is calculated by the host

The format of the message returned by the slave (PDM) response:

Slave response	Number of bytes	Returned Mesage	Remarks
Slave address	1	01	From slave 01
function code	1	03	Read register
Read word	1	06	3 registers total 6 bytes
Register data 1	2	1784	Content with address 0116 memory
Register data 2	2	1780	Content with address 0117 memory
Register data 3	2	178A	Content with address 0118 memory
CRC code	2	5847	The CRC code is calculated by the slave

6.2.3 Function code "06": write one-way register

For example, the host should save the data 07D0 to the slave register with the address 002C (the slave address code is 01). After the communication data is saved, the original storage information of the PDM table with the address 002C is:

address	Originally stored data (hexadecimal)
002C	04B0

The format of the packet sent by the host:

Host sending	Number of bytes	Message sent	For Example
Slave address	1	01	Send to slave at address 01
function code	1	06	Write one-way register
initial address	2	002C	Register address to be written
data input	2	07D0	Corresponding new data
CRC code	2	4BAF	CRC code calculated by the host

The format of the message returned by the slave (PDM) response is exactly the same as the format and data content of the message sent by the host.

6.2.4 Function code "10": Write multiple registers

The host uses this function code to save multiple data to the data memory of the PDM table. The registers in the Modbus communication protocol refer to 16 bits (ie 2 bytes) with the high order first. Thus the memory of the PDM is two bytes. Since the Modbus communication protocol allows up to 60 registers to be saved at a time, PDM allows up to 60 data registers to be saved at a time.

For example, the host should save 0064, 0010 to the slave register at address 002C, 002D (slave address code is 01).

After the communication data is saved, the information stored in the PDM table with the address 002C/002D is:

address	Originally stored data (hexadecimal)
002C	04B0
002D	1388

The format of the packet sent by the host:

Host sending	No. of bytes	send Message	Example
Slave address	1	01	Send to slave 01
function code	1	10	Write multiple registers
initial address	2	002C	The starting address of the register to be written
Save data word length	2	0002	Word length of the saved data (2 words total)
Save data byte length	1	04	Byte length of the saved data (4 bytes total)
Save data 1	2	04B0	Data address 002C
Save data 2	2	1388	Data address 002D
CRC code	2	FC63	CRC code calculated by the host

The format of the message returned by the slave (PDM) response:

Slave response	No. of bytes	send Message	Example
Slave address	1	01	From slave 01
function code	1	10	Write multiple registers
initial address	2	002C	Starting address is 002C
Save data word length	2	0002	Save 2 words of data
CRC code	2	8001	CRC code calculated by the slave

6.2.5 Error check code (CRC check):

The master or slave can use the check code to determine whether the received information is correct. Due to electronic noise or some other interference, the information sometimes has an error during transmission. The error check code (CRC) can check whether the information of the host or the slave during the transmission of the communication data is incorrect, and the wrong data can be discarded (regardless of Whether it is sent or received), which increases the security and efficiency of the system.

The CRC (redundant cyclic code) of the MODBUS communication protocol contains 2 bytes, that is, a 16-bit binary number. The CRC code is calculated by the transmitting device (host) and placed at the end of the transmitted information frame. The device receiving the information (slave) recalculates the CRC of the received message, and compares whether the calculated CRC matches the received one. If the two do not match, it indicates an error.

Only 8 data bits are used in the CRC calculation.The start bit and the stop bit, if there is a parity bit and a parity bit, do not participate in the CRC calculation.

●The calculation method of the CRC code is:

1. Preset a 16-bit register to be hexadecimal FFFF (that is all 1); call this register a CRC register;
2. The first 8-bit binary data (the first byte of the communication information frame) is differentiated from the lower 8 bits of the 16-bit CRC register, and the result is placed in the CRC register;
3. Move the contents of the CRC register one bit to the right (toward the lower bits), pad the highest bit with 0, and check the shifted out bit after the right shift;
4. If the shift bit is 0: repeat step 3 (shift one bit to the right again);If the shift bit is 1: the CRC register is XORed with the polynomial A001 (1010 0000 0000 0001);
5. Repeat steps 3 and 4 until the right shift is 8 times, so that the entire 8-bit data is processed.
6. Repeat steps 2 through 5 to process the next byte of the communication information frame;
7. After all the bytes of the communication information frame are calculated according to the above steps, the high and low bytes of the obtained 16-bit CRC register are exchanged;
8. The final CRC register content is: CRC code.

6.3 Communication error information and data processing:

When the PDM table detects an error other than the CRC code error, it must send back information to the host. The highest position of the function code is 1, that is, the function code returned by the slave to the host is 128 based on the function code sent by the host. The following codes indicate that an unexpected error has occurred.

If the information received by the PDM from the host has a CRC error, it will be ignored by the PDM table.

The format of the error code returned by PDM is as follows (except CRC code):

Address code: 1 byte

Function code: 1 byte (the highest bit is 1)

Error code: 1 byte

CRC code: 2 bytes.

The PDM response returns the following error code:

81. Illegal function code. The received function code PDM table is not supported.

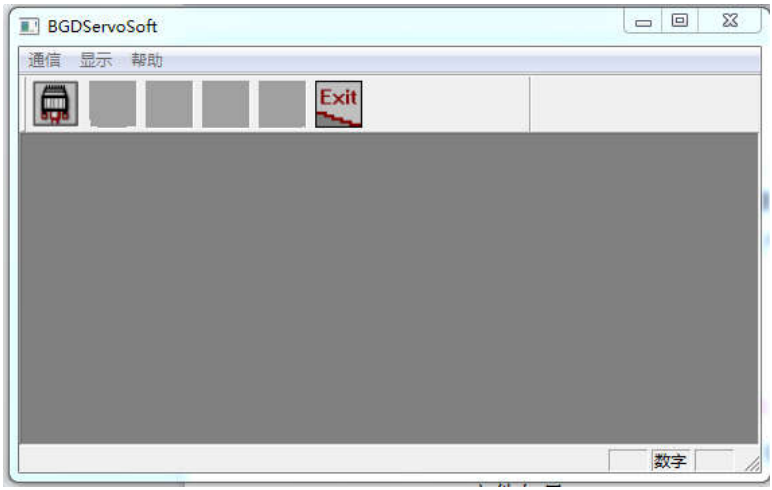
82. Illegal data location. The specified data location is outside the scope of the PDM table.

83. Illegal data value. Received the data value sent by the host beyond the data range of the corresponding address of the PDM.

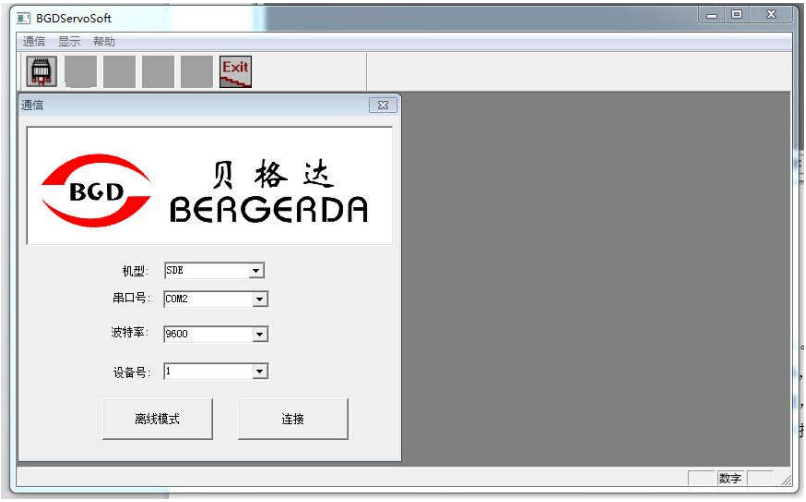
6.4 S series spindle drive debugging software description and use

This servo debugging software is green software and does not need to be installed. After obtaining the software from the manufacturer, it can be stored directly on the computer. To connect the computer to the drive, you must use the factory-specific debug communication line (model CABLE02). Using other communication lines can result in damage to the drive or inability to communicate.

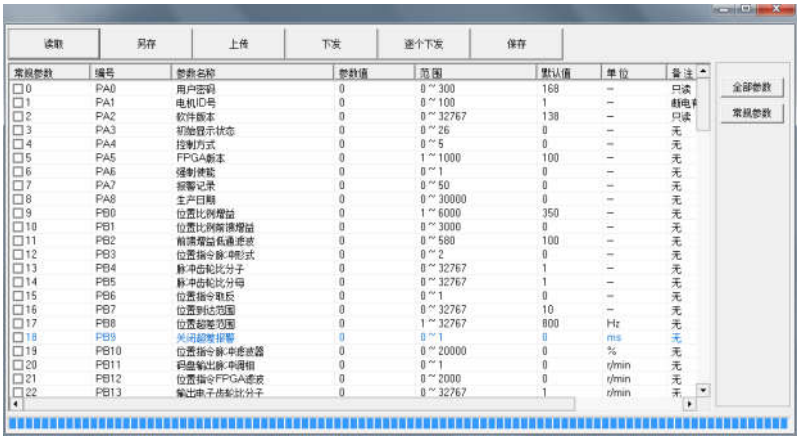
1. Double-click BGD Servo to enter the first interface as shown below:



2. Click the serial port setting software to automatically identify the COM port. The baud rate should be selected according to the drive settings. If there is no match, a communication error will occur. The default baud rate of the software and the drive is 9600. The station number is selected according to the drive settings.Once the drive model is selected, Other parameters default, save, and then click the "Connect" button, the software and the drive can communicate normally. Offline mode is used to not connect to the drive and view other software information.



Serial port setting interface



Parameter setting interface

3. Click Parameter Settings. This interface mainly views and modifies the drive parameters. It can be modified individually or in batches to greatly improve the debugging efficiency of the drive.

Function Description:

Read: Read the external parameter file to the current computer software.

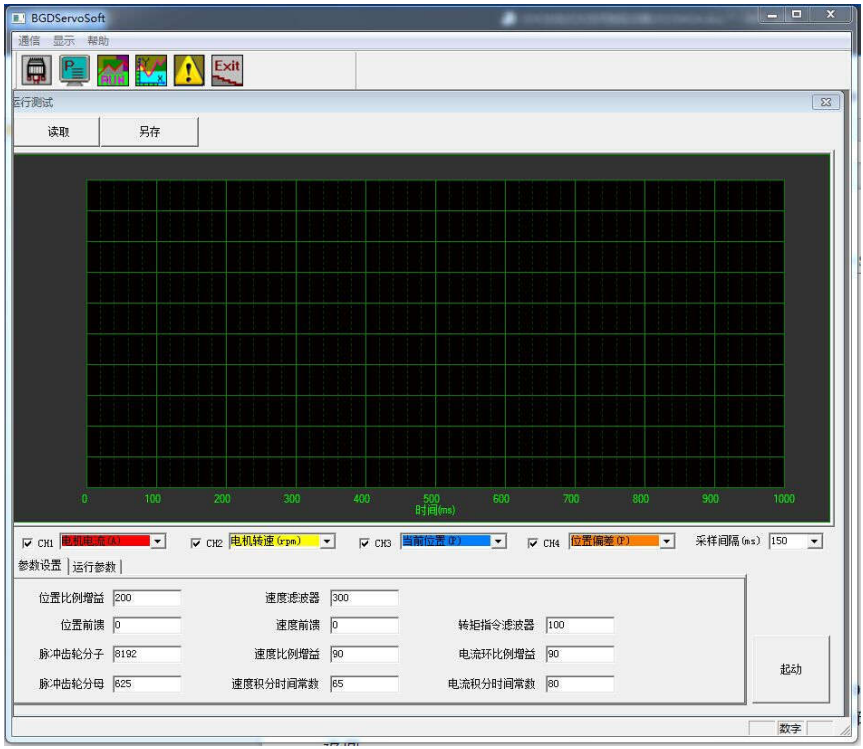
Save: Store the parameter table in the current computer software to another file for download.

Upload: Upload the parameters in the drive to the computer software.

Release: Download the parameters in the computer software to the drive. Parameter batch processing

One by one: download the parameters in the computer software to the drive. Single parameter processing

Save: Save the parameters modified in the current computer software directly to the EEPROM of the drive.



Running test interface

4. Run the test icon to perform four-way acquisition of motor speed, position, command position, torque and current to facilitate debugging of the drive. Please refer to the instructions in the debugging software for instructions on how to use it. This manual not discusses.

6.5 Communication command example

RTU command： 03 Read single or multiple registers
06 Write a single register
10 Write multiple registers

6.5.1 Application example

Read multiple registers (for example, read PB4 PB5 electronic gear ratio)

01	03	00 09	00 02	14 09
Station No	Read command	Address 9	2 data	Check Digit

Return

01 03 04 00 01 00 01 6A 33

Return result: 4 bytes The two parameter data are 01 01 respectively. PB4 PB5=1

Write multiple registers (for example, write PB4 PB5 electronic gear ratio)

01	10	00 09	00 02	04	00 05	00 04	22 07
Station No	Write command	Address 9	2data	4 bytes	Data 5 and 4		Check code

Return

01 10 00 09 00 02 91 CA

Return result: Two bytes have been written to view the drive, PB4=5 PB5=4

Read a single register（For example,read the magnitude of the current output by the servo, that is, the UN-I address is 148.）

01 03 00 94 00 01 C5 E6

Return：01 03 02 00 03 F8 45 Indicates that the data read is 03 for 0.3A.

For example: read the current motor position UN-2 UN-3

01 03 00 8D 00 02 54 20

Return：01 03 01 F5 B1 00 03 D9 D9

F5B1=62897 0003=03

So the current position is 0362897

Read the current motor absolute position

01 03 00 9A 00 02 E4 24

Return：01 03 04 C4 C8 00 03 06 FC

C4C8=50376 actually needs X2, so it is 100753

So the current absolute position is：03 100753

If you are reading a negative number of turns, the actual number of pulses should be: the number of pulses read - 65536 or the number of pulses read - 256.

Communication control I/O

01 06 00 80 00 01 49 E2：Control motor enable signal with communication

01 06 00 04 00 02 49 CA：Modify PA4=2 with communication

Note：

①. Read the address of the monitoring menu, mainly through the 485 communication, let the host computer read, used to transfer the servo status to the host computer.

②. Monitoring menu address: 140 ~ 160, the sequence is the same as the original drive, only the number of motor turns is inserted behind 154, the absolute position does not display the lowest bit (display digits are not enough).

③. Write the address of input port IO48-IO54 for controlling the input point through communication.

The input port address is 128～134, and the output port address is 135/136/137.

④. The communication port standard is debugged by S series servo software, and can also be debugged by computer serial port. Use a computer to debug the converter that needs to be connected to the USB to RS485.

6.5.2 Servo system communication address list

Communication project	Communication address	Read/write status
Servo parameter	0-00FFH	Readable and writable
Input port status	0080H-0086H	only write
Output port status	0087H-0089H	Only read
Monitor menu content	008CH-00A1H	Only read

Note:

1) Only 16-bit information is displayed in the absolute position of the motor 009BH. It is necessary to *2 to be the correct position information after reading.

Chapter 7 Alarm and Processing

If the servo drive fails during use, the display will show: Al-xx, please follow the instructions in this section; remove the corresponding fault before you can use it again.

7.1 Alarm list

Alarm code	Alarm name	Alarm reason
AL-0	normal	
AL-1	Speeding	Servo motor speed exceeds the set value
AL-2	Main circuit overvoltage	Main circuit voltage is too high
AL-3	Main circuit undervoltage	Main circuit voltage is too low
AL-4	Location out of tolerance	Motor following deviation exceeds parameter PB8 setting
AL-6	Speed amplifier saturation	Speed regulator is saturated for a long time
AL-9	Encoder exception	The encoder has a wire break or short circuit
AL-11	Overcurrent 1	IPM module output current is too large
AL-12	Over current 2	DSP detects excessive current
AL-13	Overload	Servo output torque exceeds the allowable value
AL-14	Brake abnormality	Abnormal brake circuit
AL-15	Encoder count is abnormal	Encoder AB count deviation is too large
AL-16	Motor thermal overload	Motor overload for a long time
AL-19	Second code wheel short line	Bad second code wheel line
AL-20	EPROM error	Servo internal EEPROM read and write exception
AL-24	FPGA communication is abnormal	FPGA communication is abnormal
AL-32	Encoder UVW is invalid	Encoder signal error
AL-45	ADC error	ADC error
AL-46	Servo power down signal is abnormal	Servo power down signal is abnormal
AL-47	Second code wheel counter error	Second code wheel line error

7.2 Alarm processing method

Alarm code	Alarm name	Alarm reason	Processing method
AL-1	Speeding	The input command pulse frequency is too high;	Set the input command pulse correctly.
		The input electronic gear ratio is too large;	Set the PB4 and PB5 parameters correctly.
		Encoder zero error;	Please re-adjust the encoder zero.
		The motor U, V, W leads are connected wrong	Confirm the wiring phase sequence.
AL-2	Main circuit overvoltage	Input L1 L2 L3 power supply voltage is higher than AC260V;	Reduce the power supply voltage.
		Brake circuit capacity is not enough (More often occurs when the fast start and stop is frequent and the load inertia is relatively large).	1, extend the control system acceleration and deceleration time; 2. Contact the manufacturer to increase the braking resistor capacity.
AL-3	Main circuit overvoltage	Input L1 L2 L3 power supply voltage is lower than AC170V;	Look for external causes of low voltage.
		Servo drive protection action.	Replace the drive.
AL-4	Location out of tolerance	Execute the motor, the motor does not turn any angle, immediately alarm;	1，Confirm that the phase sequence of the motor UVW line is correct; 2，Check if the input pulse frequency is too high; 3，The pulse electronic gear ratio setting is too large, and set the PB4 and PB5 parameters correctly .
		Rotating alarm (input pulse abnormal);	Confirm the input pulse frequency and width.
		Alarm in rotation (the detection range of the tolerance is too small);	Set parameter PB8 to be larger.
		Alarm in rotation (position proportional gain is too small);	Increase the position gain PB0 setting value
		Alarm in rotation (insufficient torque);	Change to larger power motor
AL-6	Speed amplifier saturation	The motor is mechanically stuck;	Check the load mechanical part.
		The load is too large.	1, reduce the load; 2, replace the drive and motor of higher power
AL-9	Encoder exception	The encoder is wired incorrectly or disconnected;	Check or replace the code wheel line。
		Caused by on-site interference;	Set P n58 to 1.
		The encoder cable is too long, causing the encoder supply voltage to be low.	Shorten the cable.

AL-11	Over current 1	Poor grounding;	Correct grounding;
		Motor insulation damage;	Replace the motor；
		The motor winding has a short circuit;	Replace the motor
		The servo matching motor parameters do not match;	Correctly set the motor ID number PA1;
		Acceleration and deceleration time is too short;	Increase the acceleration and deceleration time of the upper computer;
		Current surge	1, reduce the parameter PG0 PB0; 2, increase the parameter PG2 value;
		Servo drives protection action.	Replace the drive.
AL-12	Over current 2	1，Motor insulation damage;	Replace the motor;
		2, poor grounding;	Correct grounding;
		Servo drives protection action.	Replace the drive.
AL-13	Overload	The servo output torque is outside the allowable value.	1, the machine is stuck or resistant; 2, motor selection is not reasonable, replace the larger power drive and motor.
AL-14	Brake abnormality	Servo drive protection action;	Add external brake unit
		The brake circuit capacity is not enough;	1, increase the acceleration / deceleration time constant; 2. Replace the servo and motor with higher power;
		The main circuit power supply is too high.	Check the AC input power.
AL-15	Encoder count is abnormal	Encoder wiring error;	Check or replace the motor code wheel line;
		Poor grounding;	Correct grounding;
		Defective servo motor.	Replace the servo motor.
AL-16	Motor thermal overload	Motor overload for a long time	Replace the drive.
AL-19	Motor thermal overload	The second encoder is wired incorrectly or disconnected; Caused by on-site interference;	Replace the encoder cable. The motor is grounded.
AL-20	EPROM error	Servo internal EPROM read and write exception	Replace the drive.
AL-24	FPGA error	FPGA communication is abnormal	Replace the drive.
AL-32	Encoder UVW is invalid	Encoder line or encoder is bad	Replace the drive.

AL-45	ADC error	ADC error	Replace the drive.
AL-46	Servo power down signal is abnormal	Power failure detection abnormal	Replace the drive.
AL-47	Second code wheel counter error	The second encoder is wired incorrectly or short-circuited; The encoder line is too long to cause insufficient power supply;	Replace the encoder cable; Shorten the cable length;

Special note: If the drive displays an alarm, but the alarm is cleared after the power is turned back on. It is generally considered to be caused by problems with components other than the driver or improper adjustment of parameters. Please check the servo peripheral components. Such as: power supply voltage, controller, mechanical load, motor, etc. Check the peripheral components no problem, please consult the manufacturer to adjust the parameters.

If the power-on alarm cannot be eliminated, replace the drive and observe.

7.3 Common problems or exception handling in use

1、The no-load running motor vibrates or screams strongly, and the load is noisy or misaligned.

Remedy: Confirm that the drive ID (PA1 parameter) matches the connected motor, set the correct ID parameter according to the table in Appendix A, and then perform the factory reset operation (SN-DEF).

For example: the current motor is AMZ-**200AH055AAA**

1）Obtain the motor ID=24 by looking up Appendix A of the table;

2）To operate the driver, first set PA0 to 0;

3）Set PA1 to the motor ID number, ie PA1=24;

4）Operate the driver to enter the SN-DEF interface, press and hold the ENTER button on the display panel for two seconds, when the display shows DONE, it means success;

5) Shut down and power on again.

2、Motor running positioning accuracy and demand accuracy deviation greatly, and regular

Processing method: Set the position pulse electronic gear ratio correctly.

This servo system defaults to 10,000 pulse motors for one revolution. If the upper machine control requirement is 3000 pulses that the motor needs to rotate one turn, and then the gear ratio needs to be set to meet the requirements. It can be calculated by the following formula:

3000 *（PA9 / PA10）=10000

Can be found that PA9=10 PA10=3

3、Driver input and output signal levels are opposite

1）Set parameters PD2, PD3, PD4 to set the appropriate high or low level of input/output to accommodate the input/output level requirements of different controllers.

4、The host computer sends a pulse but the motor does not run.

Please confirm the UN-12 monitoring value after PA4=0. If there is a digital display indicating that the driver has received the pulse, it can be explained that there is no problem with the control signal connection line. Then please refer to Method 1 to troubleshoot. If the display is F 0 means the drive does not receive a pulse. Please refer to Method 2 for troubleshooting. The unit displayed by UN-12 is KHZ. For example, F 150 indicating that the current drive receives a pulse frequency of 150KHZ.

Method 1:

Set the following two parameters: PA6=1 PA4=3 Perform the jog function in F2 mode. If the motor can rotate, it means that the motor, motor power line and encoder line are connected correctly.

Mainly check whether the T4 signal has an INH signal or the CLE signal is ON. Can be found by observing UN-16.

If the motor cannot be turned, do the following checks:

1）Detect if the drive has an enable motor can turn the motor shaft by hand. If it does not move, the motor is enabling locked. If the motor can be turned on, it means that it is not enabled. Please check if the T3 input enable signal is connected correctly. If the enable signal does not require host computer control. Moreover, the T3 input enable signal is not connected, set PA6=1,then the drive power-on motor is automatically enabled to lock.

2）Check if the power cable between the drive and the motor is connected and the plug is loose. Whether the output of the driver U V W PE corresponds to the motor U V W PE . The U V W PE of the power cable must be connected properly, and the order of the V V PE must not be changed at will;

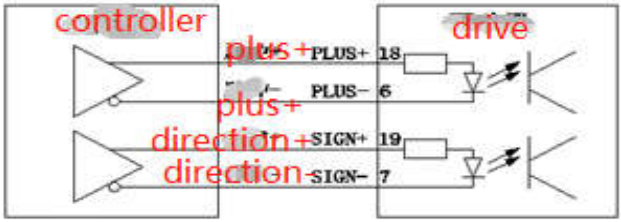
3）Please contact the factory technician.

Method 2:

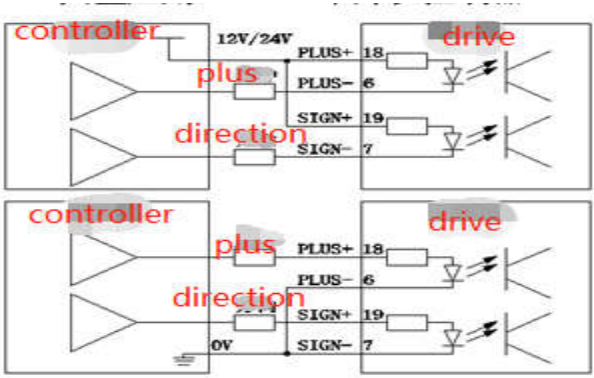
1）Check the pulse amplitude input to the drive, the standard is 5V. If the pulse amplitude is 12V, the 1K resistor must be connected in series. If the pulse amplitude is 24V, the 2K resistor must be connected in series. Failure to follow the string resistance will burn the driver input circuit. Causing the servo can't receive pulses;

2) Confirm that the pulse wiring mode is correct, and the wiring mode: differential wiring mode and single-ended wiring mode. See the picture below for details:

Typical applications: CNC systems, motion controllers



Typical application: PLC; microcontroller controller



5、The motor can only be turned in one direction

1) Confirm the pulse type input to the driver, pulse plus direction setting PB3=0; CW/CCW setting PB3=1; A/B quadrature pulse setting PB3=2, and confirm the driver model;

2) Observe the UN-12 display status. F xx should be displayed when the host computer sends a forward signal. F – xx should be displayed when the signal is inverted. If the host computer sends a forward or reverse signal, both are F xx or F – xx. Please check the direction signal SIGN of the host computer to the drive;

3) Please contact the factory technician.

6、Drive shows AL-3 when stopped at high speed or when moving from top to bottom for negative work

1）Modify the deceleration time of the upper computer;

2）Reduce the speed of the motor;

3）The low power driver is connected to an external braking resistor;

4）Please contact the factory technician. for medium and high power drivers.

7、No display after power on

1）Confirm the power cable and input power;

2）Please contact the factory technician.

8、Powered on drive displays ″.....″ or ″888888″

1）Input power phase loss, check each phase power line;

2）The servo motor has been short-circuited and damaged, causing damage to the drive. The damage of the motor can be judged by rotating the motor shaft under no-load conditions. If the shaft is rotated for one turn, the shaft is not smooth, and there is a stuck phenomenon to determine that the motor is broken.

9、Motor positioning is not accurate

1) Irregular, check the mechanical connection of the motor;

2) Regular, monitoring UN-02 UN-03 UN-04 UN-05 analysis can produce results;

3) Check the on-site interference, use the shielded wire and ground for the signal line, and install the magnetic ring. Use a shielded cable for the motor cable. The electric control system is re-wired, and the strong and weak electricity are separated. Add filters and so on.

The role of servo monitoring menu in analysis and debugging

1）UN-01 Motor speed Observe the actual running speed of the motor;

2）UN-02 UN-03 The current position of the motor: used to observe the current position of the motor, expressed in the form of the number of pulses, such as controlling the fixed trajectory, then repeating each time. When going to the same position, the displayed value should be the same, indicating that each time accurate positioning;

3）UN-04 UN-05 Pulse command count is used to monitor whether the pulse from the host computer is accurate.

For example, if you control a fixed trajectory, you will repeat it each time. When going to the same position, the displayed value should be the same, indicating that the pulse sent by the host computer is accurate;

4）UN-08 The current torque of the motor is used to observe the actual running force of the motor. If the value exceeds 90 for a long time, it means that the motor selection is too small;

5）UN-12 Input pulse frequency, used to observe the pulse frequency and stability of the host computer;

6）UN-17 The state of the input signal is used to judge whether the input signal is normal; the first digit of the decimal point is an alarm signal;

7）UN-18 The output signal status is used to judge whether the output signal is normal.

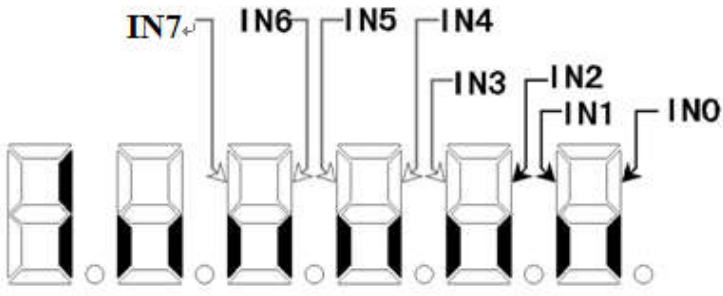
8) UN-23 The analog input voltage AD value is used to indicate the input voltage level. 2048 when there is no input.

9) UN-24 Analog input current AD value is used to indicate the input voltage level. 0 when there is no input.

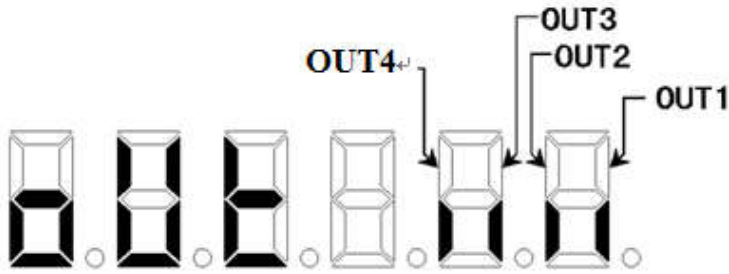
10）UN-25 Displays the current DC bus voltage.

11）UN-26 The current speed of the second dial is displayed.

12）UN-27 The second code wheel absolute position is displayed for detecting the second code wheel positioning position.



Input terminal display (stroke light is On, OFF is OFF)



Input terminal display (stroke light is On, OFF is OFF)

Chapter 8 Motor Specifications and Selection

8.1 Induction asynchronous motor storage and installation

Storage:（1）The storage place of the motor shall be kept dry, air circulated, and free from corrosive gases;

（2）The ambient temperature of the motor storage should be between -20 ° C ~ +50 ° C;

（3）The ambient humidity of the motor storage place should be 20-80%;

Installation:（1）First check whether the motor nameplate data is the motor to be used and whether it meets the requirements for use;

（2）Check the fasteners for looseness and damage to the accessories;

（3）If the motor is left for too long, measure the insulation resistance in a suitable range with a megohmmeter.

（4）Ensure that the motor shaft line is parallel to the input shaft line of the load mechanism during installation;

（5）Ensure that the motor is well ventilated;

（6）Ensure that the grounding terminal in the motor terminal box is properly grounded;

（7）Motors with fans pay attention to the fan power supply separately;

8.2 Motor use

（1）The U, V, W terminals of the motor must be in one-to-one correspondence with the U, V, and W terminals of the driver;

（2）The cable plug of the encoder must be plugged in firmly;

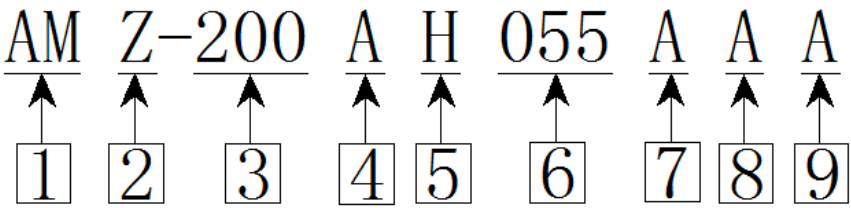
（3）When the fan is wired, the wind direction must be correct;

（4）The motor must be running smoothly without abnormal noise;

（5）The surface temperature of the motor is high during operation, avoiding the touch by hand to prevent burns;

8.3 Motor model description

Take model AMZ-200AH055AAA as example：



Code	Name	Description
1	Motor type	Asynchronous AC servo motor;
2	Motor manufacturer	Factory code
3	Motor flange	200：200 flange；
4	Installation method	A：Horizontal installation B：Vertical installation
5	Voltage level	L：220V； H：380V；
6	Motor Power	5.5KW；
7	Encoder type	A: 2500 line incremental encoder; B: 1024 line incremental encoder; C: absolute encoder; D: rotary encoder; E: magnetic encoder;
8	Shaft structure	A: With key; B: optical axis; C: flat axis; D: tapered axis;
9	Motor rated / maximum speed	A：1500rpm/6000rpm； B：1500rpm/8000rpm；

8.4 Socket cable definition

1、Motor end:

AMM motor：

Pin	5	10	4	9	3	8	2	7	6	1
signal	PV1	G1	A+	A-	B+	B-	Z+	Z-	T1	shield

AMZ Motor：

See motor identification.

2、Drive end：

See the standard control mode wiring diagram.

Appendix A: Parameter setting table for S series driver and asynchronous AC motor

Matching of S series servo and asynchronous AC motor and setting of PA1 parameter (motor ID)

Motor Model	Torque N.m	Max. speed rpm	power KW	Current A	Bergerda asynchronous spindle servo motor ID (PA1 parameter)	
					S1-H5P5AA	S1-H15P0AA
AMZ-180AH022AAA	14.0	6000	2.2	4.8	20	
AMZ-180AH022AAB	10.5	8000	2.2	4.6	21	
AMZ-180AH040AAA	25.5	6000	4.0	8.2	22	
AMZ-180AH040AAB	19.0	8000	4.0	8.0	23	
AMZ-200AH055AAA	35.0	6000	5.5	11.4	24	
AMZ-200AH055AAB	26.0	8000	5.5	11.1	25	
AMZ-200AH075AAA	48.0	6000	7.5	15.3	26	26
AMZ-200AH075AAB	36.0	8000	7.5	15.0	27	27
AMZ-200AH110AAA	70.0	6000	11.0	22.2		28
AMZ-200AH110AAB	52.5	8000	11.0	22.0		29
AMZ-264AH150AAA	96.0	6000	15.0	28.8		30
AMZ-264AH185AAA	118.0	6000	18.5	36.8		31

In order to achieve the best control effect, the drive and the motor must be paired (the PA1 motor ID is assigned to the corresponding model). Otherwise, vibration, screaming, and inaccurate positioning may occur.

Pairing method： 1）First change PA0 to 0;

2）Set PA1 to the ID number of the desired motor;

3）After entering the SN-DEF menu, press and hold the Enter key for about 2 seconds until DONE appears;

4） Power off, you can work normally when you re-power on.

Appendix B: Product After-sales Service Instructions

According to the correct method of use, this product can have a long service life. If the method of use is not appropriate, or the environmental damage is beyond the allowable range. This product will malfunction. This product has a standard warranty period of 18 months. Repairs will be charged due to improper use or failure over 18 months. Please pay attention to the following matters regarding repair service:：

1） The product label is an important document for maintenance. Do not tear or damage it at will. Otherwise no warranty is given;

2） Warranty period within 18 months from the date of purchase, If the proof of purchase cannot be provided, it shall be counted within 19 months from the date of manufacture on the product label;

3）During product maintenance and transportation, please pack it to prevent secondary damage.

The following conditions are not covered by the warranty:

*Because of the wrong use, such as the wrong power supply, self-disassembly, transformation, water, oil and other human factors caused by damage;

* Damage caused by natural disasters, such as lightning, earthquakes, etc.

Hangzhou Bergerda Automation Technology Co., Ltd.

Address: Building 8, Sitai Science and Technology Park, No. 493 Linping Avenue, Yuhang Economic Development Zone, Hangzhou

Hot tell：0571-88326782/ 0086-15906666401(Whatsapp)

Service：0571-89719501

Web：www.bergerda.com

Second Edition 2018-V2.0