DZ-B2 SERIES AC SERVO DRIVER

USER MANUAL

Content

1 Regulations for Use The Device Safely and Accurately

1.1 Caution for the Harm of Electric Shock

⚠ CAUTION
⚠ In avoid of electric shock, please don't open the shell of the drive when it is power on.
⚠ In avoid of electric shock by touching the high-voltage part when the shell opened, please don't supply power to the drive.
⚠ Please wait no less than 5 minutes after power-off before doing maintenance for the drive and check the two ends of the high-voltage capacitor with voltmeter to make sure it is at the safe voltage.
⚠ Please install the drive stable and fixed before supply the power.
⚠ Wiring to the ground is a must for the drive and the motor.
⚠ In avoid of electric shock, please don't touch the drive with wet hand.
⚠ Explosion or operation accident will be caused by wrong voltage supply or power polarities.
⚠ In avoid of electric shock, please make sure the insulation of the wire and avoiding to squeeze the wire.

1.2 Caution for the damage to the device

⚠ CAUTION

⚠ Please don't wiring the dynamic electricity to the output U,V,W ends of the drive, or it will harm the drive.

⚠ Connect the servo motor and servo drive directly, please don't wiring any capacitive parts (the noise suppression filter, pulse interference limiter, etc) to U,V,W output ends of the drive, or the drive cannot operate normally.

⚠ Please wiring as required the power up to the standard to the input end of the drive.

⚠ Please make sure the cable connected accurately and reliably before power it on.

⚠ Please select and use the motor as required, or it will cause the damage to the motor and the drive.

⚠ The rated torque of the servo motor should be higher than the effective continuous loading torque.

⚠ The ratio between load inertia and inertia of the servo motor should be lower than the recommended.

1.3 CAUTION of Fire

⚠ CAUTION

⚠ Please don't install the drive at the surface of combustible material and be far from it, or it is easy to cause a fire.

⚠ Please don't use the drive in the environment with wet, corrosive and combustible gas, or it is easy to cause a fire.

⚠ Please shut off the power immediately and check when there is abnormal condition occur during the operation of the drive. It may cause damage and fire if the drive works over load for a long time.

1.4 Environment Requirement

⚠ CAUTION

PARAMETER	Condition
HUMIDITY	≤90% (No Condensation)
OPERATING TEMPERATURE	0 ～ +40℃ (No Dew)
STORING TEMPERATURE	-40 ～ +55° C
OPERATING HEIGHT	Altitude below 1000m
VIBRATION	Less than 0.5G (4.9m/s^2) 10-60HZ (discontinuous)
AIR ENVIRONMENT	No corrosive, combustible air, No oil mist

2 Product Examination & Explanation of Model Code

2.1 Product Examination

Please check the items listed below carefully in case of the negligence during the purchasing and transportation process.

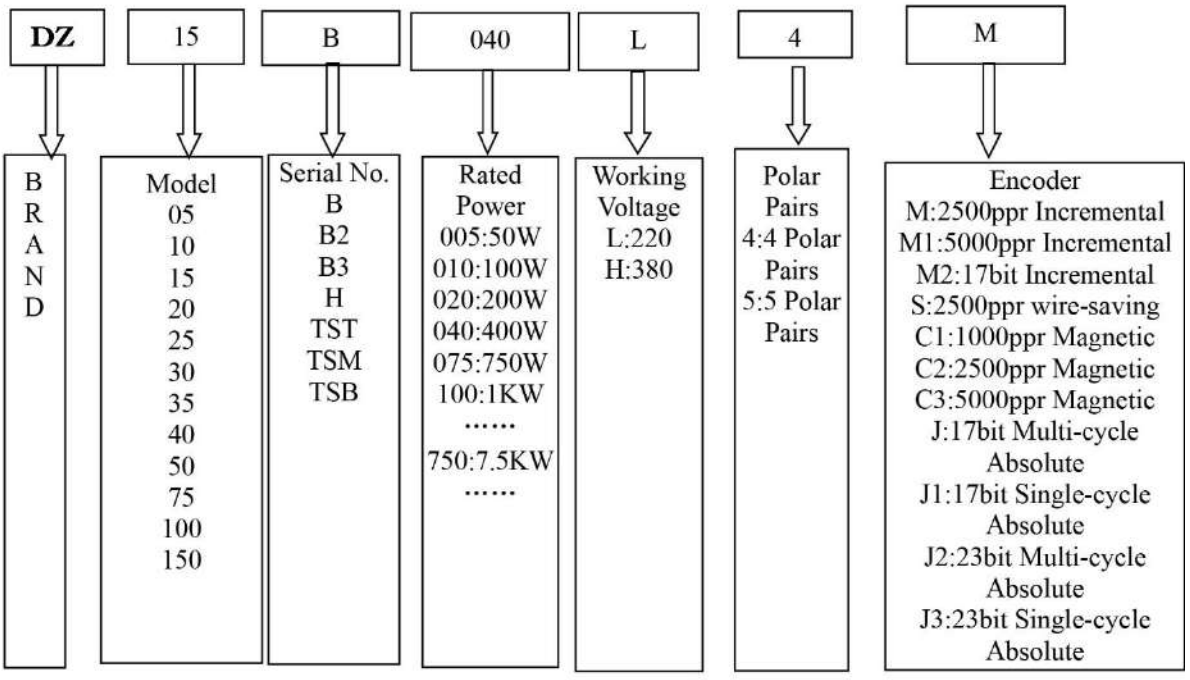
a. Please check model no. Of the motor and the drive to know if they are what you want.

b. Whether the motor shaft can move smoothly: to rotate the motor shaft in CW and CCW directions by your hand, if it move smoothly, it means the motor shaft is normal.

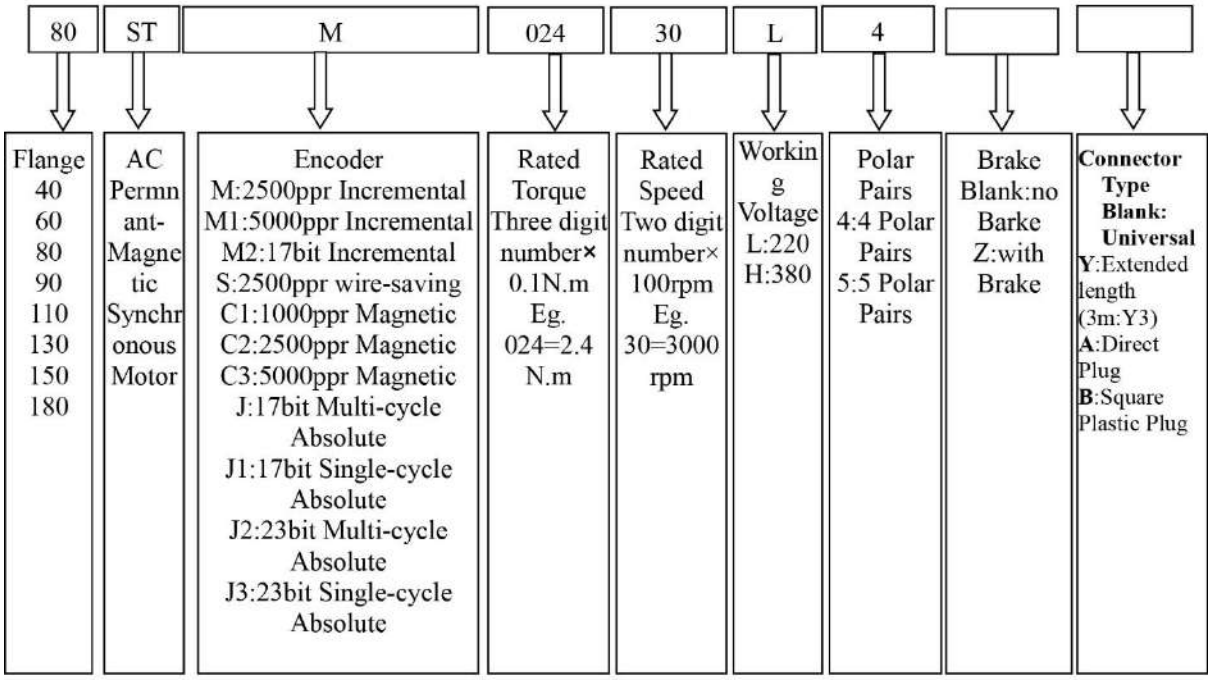
c. Whether there is damage of the appearance:to see the appearance whether there is any damage or loose of the screws.

d. To check whether there is any parts missing.

2.2 Explanation the Model Code of Servo Drive



2.3 2.3 Explanation of the Model Code of Servo Motor



3 Installation

3.1 Precautions

- In avoid of vibration, the drive must be fastened by the fixed screws.
- Don' t make the wire between the drive and the motor too tighten and never wire the power cable and encode cable parallel.
- Please prevent dust or scarp irons going into the drive when installing.
- Please make sure the motor shaft has little deviation with the hole of equipment applied to.
- Please fixed the motor reliably.
- Don' t make the drive, the motor and brake resistor so close to the combustible material, or else it will cause a fire.
- Don' t pile other things on the drive and the motor to prevent damage and fall because of the pressure.
- The drive and the motor is not allowed to bear outer impact.
- The storing and installation of the drive and the motor must meet the demand of the environment.

3.2 Environment Conditions

Item	The Drive	The Motor
Temperature/Humidity of the Working Environment	-10℃~55℃, Humidity: less than 80%	0℃~40℃, Humidity: less than 80%
Temperature/Humidity of the Storing Environment	-25℃~70℃, Humidity: less than 80%	-40℃~50℃, Humidity: less than 80%
Vibration	Less than 0.5G	
Other Working Environment	In the control cabinet, no dust, dry, no corrosive gas, no combustible	Indoor, no corrosive gas, no corrosive gas, no combustible

	material, less moisture, good ventilation, avoiding direct sunlight	material, avoiding direct sunlight

3.3 Installation of Servo Drive

3.3.1 DZ-B2 Series Installation Dimension

Front figure of DZ-15B2 series installation dimension, as shown in fig. 3-1.

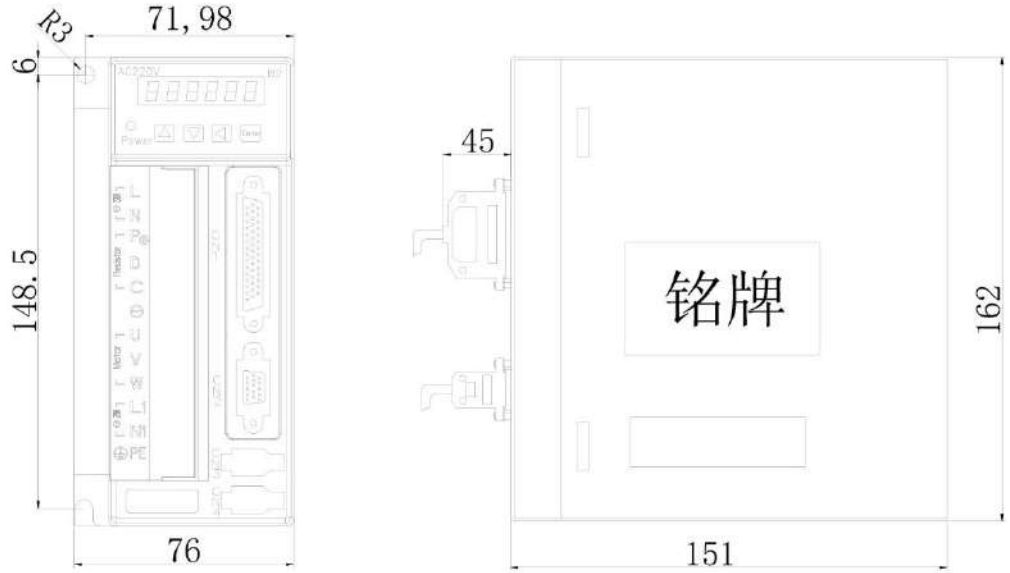


Fig. 3-1 Front figure of DZ-15B2 series installation dimension

Side figure of DZ-20B2, DZ-30B2 series installation dimension, as shown in fig. 3-2.

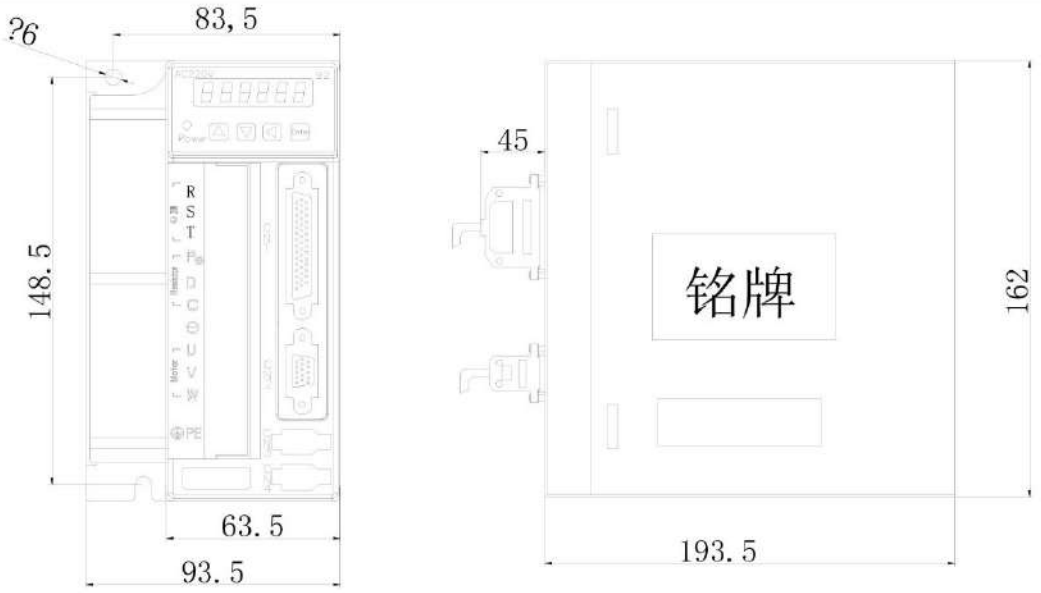


Fig.3-2 Side figure of DZ-20B2, DZ-30B2 series installation dimension

Side figure of DZ-50B2-J, DZ-75B2-J series installation dimension, as shown fig3-3:

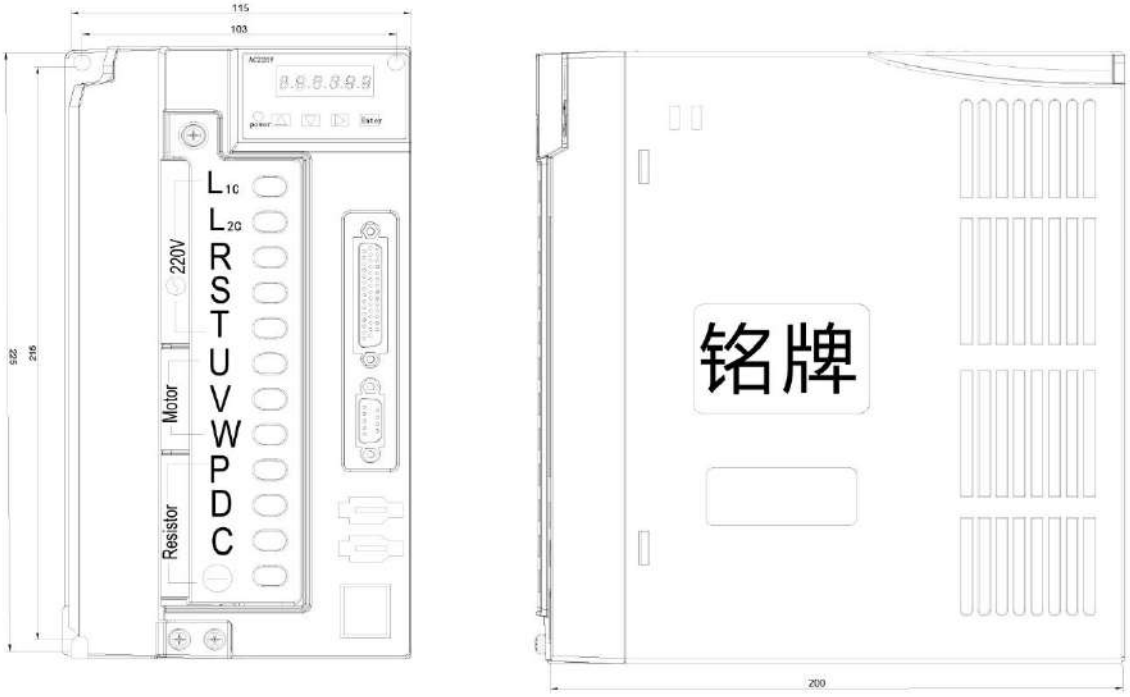


Fig3-3 DZ-50B2-J, DZ-75B2-J series side installation dimension

3.3.2 Fixation

Please tighten the four screws at the back of the drive when installation.

3.3.3 Spacing

It is necessary to have certain spacing between the drive and other electrical devices. The minimum spacing is as shown in fig.3-4.

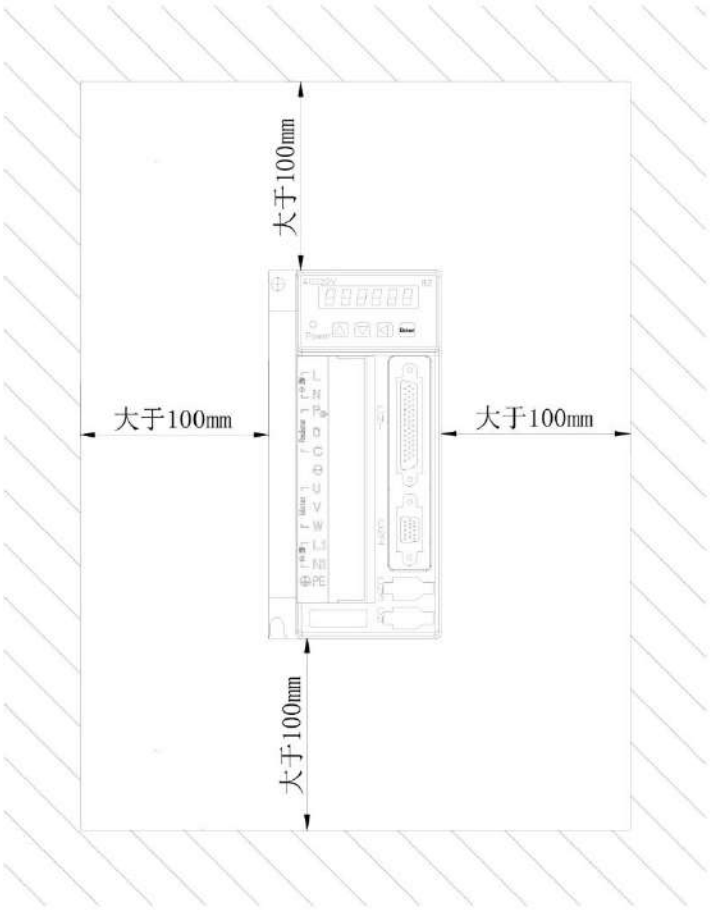


Fig.3-4 the minimum installation spacing

“大于” means “More than”.

3.3.4 Ventilation and Heat Dissipation

In consideration of the heat dissipation of every drive, it is advised to install

cooling fans when installation several drives to make sure there is vertical wind to the cooling pins of the drives. The minimum installation spacing for several drives is as shown in fig. 3-5.

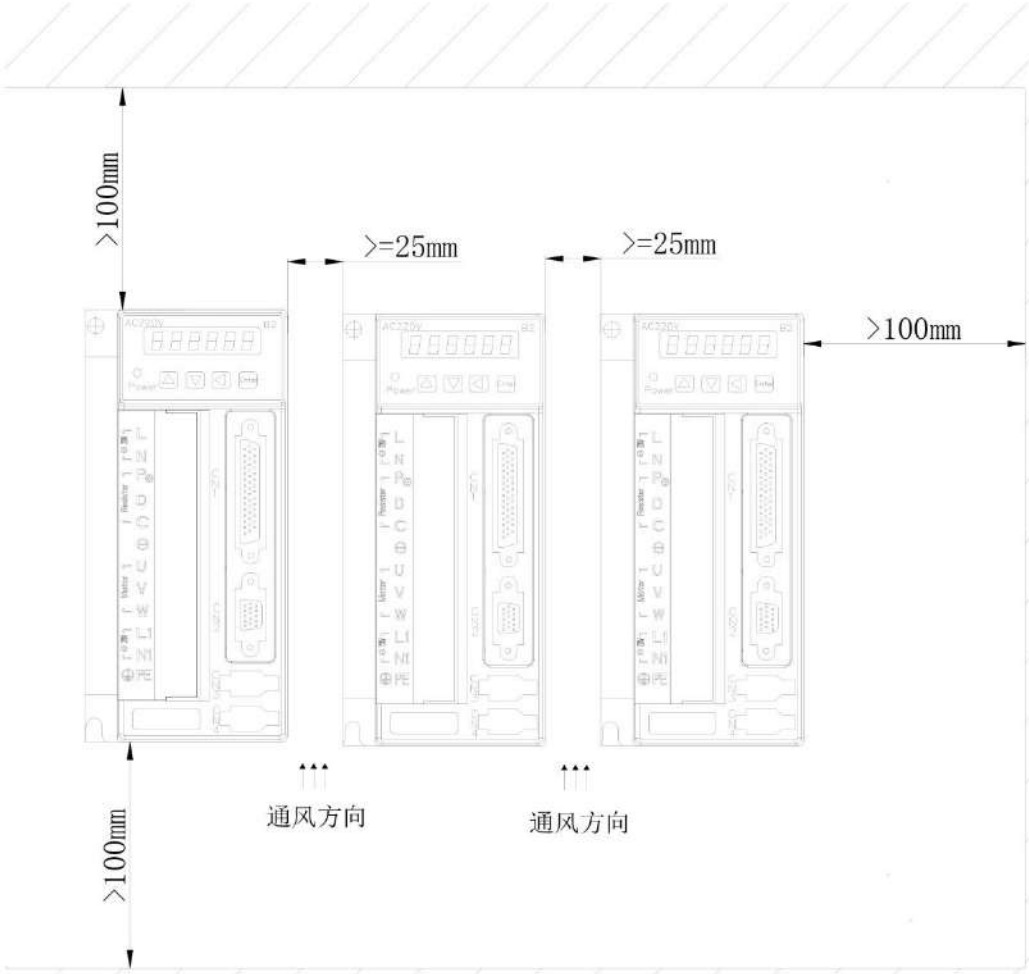


Fig. 3-4 the minimum installation spacing and heat dissipation for several drives

“通风方向” means “cooling direction”.

3.4 Installation of Servo Motor

3.4.1 Installation Method

Horizontal Installation: to avoid water, oil and other liquid flow into the motor and the servo, the output of the cable is in the downward.

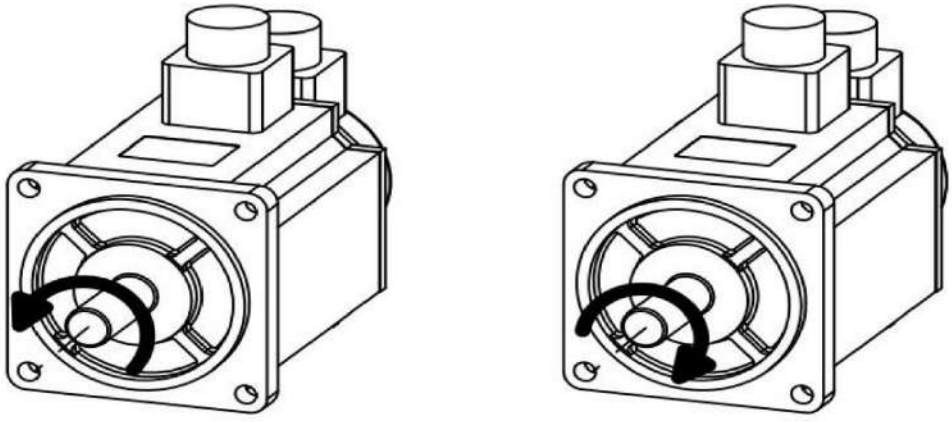
Vertical Installation: to avoid the oil stain from the gearbox infiltrating into the motor via the motor shaft, if the motor shaft is installed upward and with gearbox.

3.4.2 Installation Precautions

- Please don't hit the motor or its shaft with the hammer to avoid the damage to the bearing of the motor and the encoder when installing and disassemble the belt wheel. Please apply screw-type tools to install and disassemble.
- Please make sure the stretch-out part of the motor shaft sufficient, or else it will make the motor vibrate easily when moving.
- Please use the lock washer to fasten the motor to avoid the slip of the motor.
- It is advised to have elastic coupling to connect the motor shaft with the devices, because the motor cannot stand the heavy electrical devices in axial and radial directions.

3.5 Definition of the rotating direction

The rotating direction the manual described as follow: facing the stretch-out part, the forward direction means the rotating shaft rotating counter clockwise; the backward direction means the rotating shaft rotating clockwise, as shown in fig. 3-6.



Forward Backward

Counter Clock-wise (CCW) Clock-wise (CW)

Fig. 3-5 rotating direction of the motor

4 Ports and Wiring

4.1 Precautions

● Please ask the technician to do the wiring.

● Please shut off the power before wiring and repairing. Waitting for 10 minutes, to do the wiring and repairing after the extinguished of the power indicator light.

● Please make sure the servo drive and servo motor wiring the ground properly.

● Please make sure there is no any damage of the wiring cable and don' t hang any heavy article on the wiring cable.

4.2 Brief introduction of the wiring terminals

As shown in fig. 4-2, power indicator light is the sign of enabling the servo. When the servo enabled (means the motor with power on), the indicator light is flicking. The keypads and the nixie tube are the parting to setting the data and display them. Please check the other terminals on the face-plate of the drive and their function and precautions on Table .

Table 4.1 Brief introduction of the terminals on the face-plate of the drive

Termina l name	Function	Using Precautions
UVW	Wiring terminals for motor power wires	Must be wiring with the U\V\W ends of the motor respectively
L/N (R/S/T)	Main power wiring terminals	The input terminals of major loop, Single phase or three phases' AC220V 50HZ, don' t wiring them with the output U/V/W ends of

		the motor.
L1/N1	Control power wiring terminals	The input terminals of control loop, single phase :AC220V 50HZ
PE	Grounding Terminal	Wiring the motor and the drive to the ground properly during operation.
CN1	Upper computer control terminal	Note the definition of every port of the terminal
CN2	Motor encoder wiring terminal	Note the definition of every port of the terminal
CN3	RS485 communication terminal	Under RS485 network connection, could connect to another drive with RS485 network
CN4	RS485、RS232 communication terminal	Note the definition of every port of the terminal

4.2.1 Drive wiring terminals of DZ-B2 Series

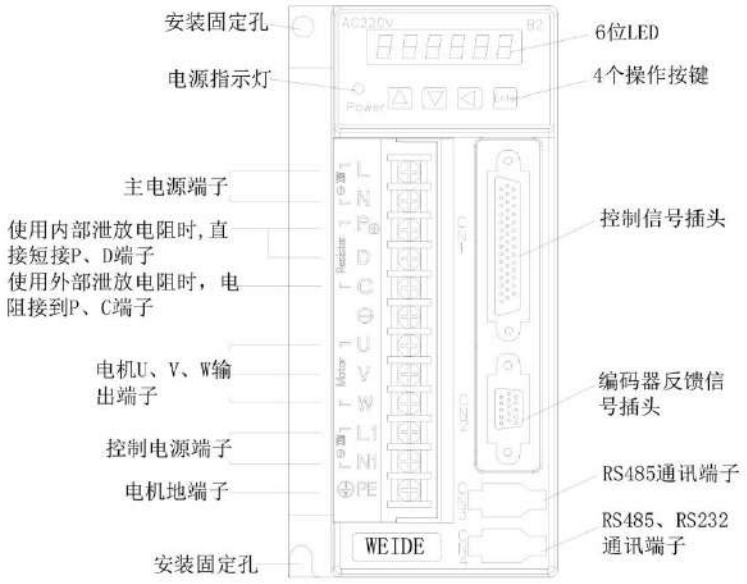


Fig.4-2a Drive wiring terminals of **DZ**-10/15B2、**DZ**-10/15B2-J

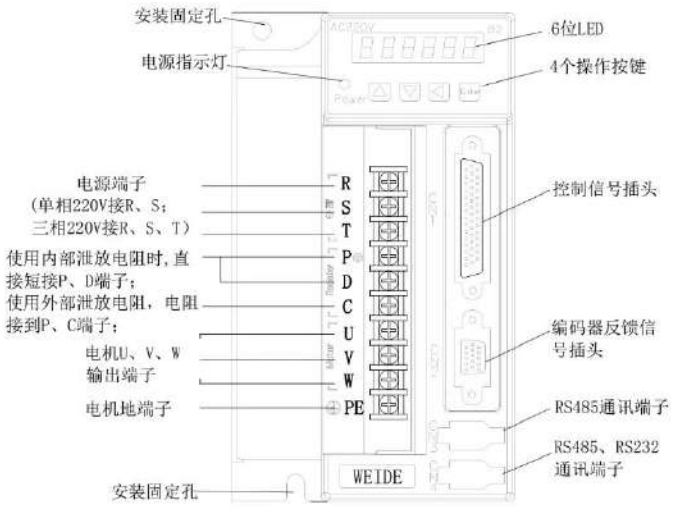


fig.4-2b Drive wiring terminals of **DZ**-20/30B2、**DZ**-20/30B2-J

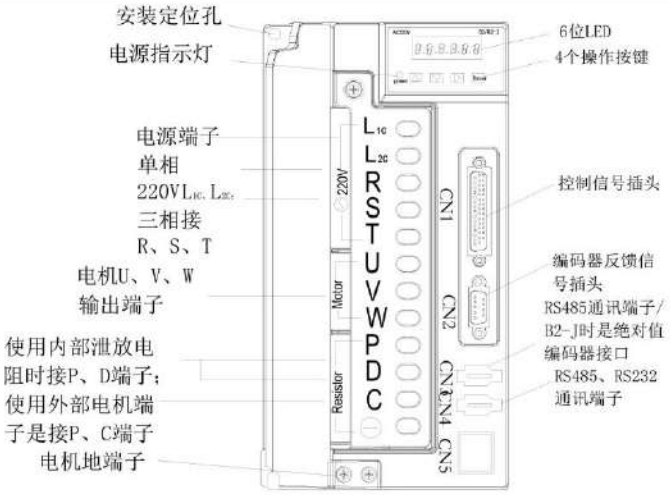
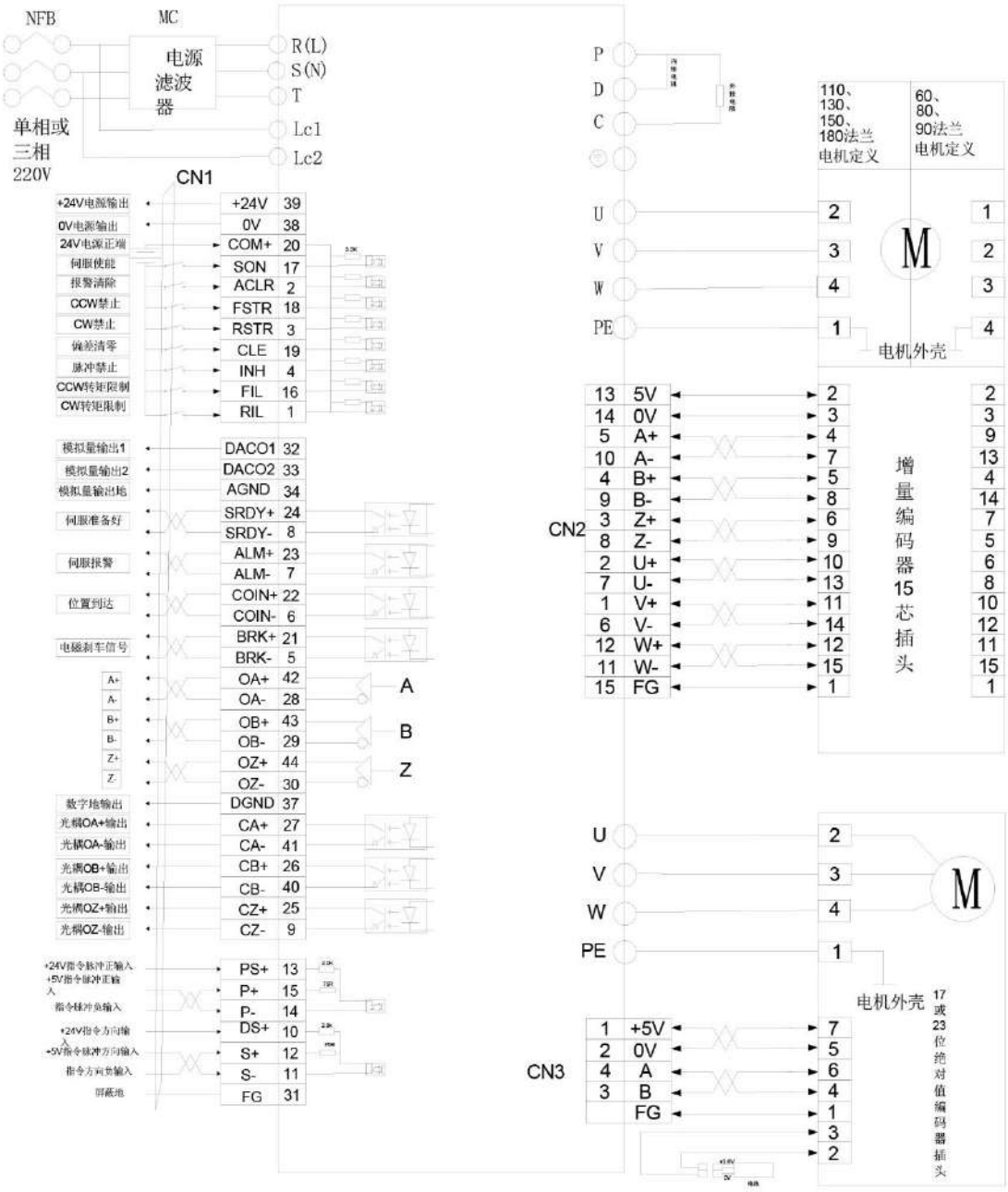


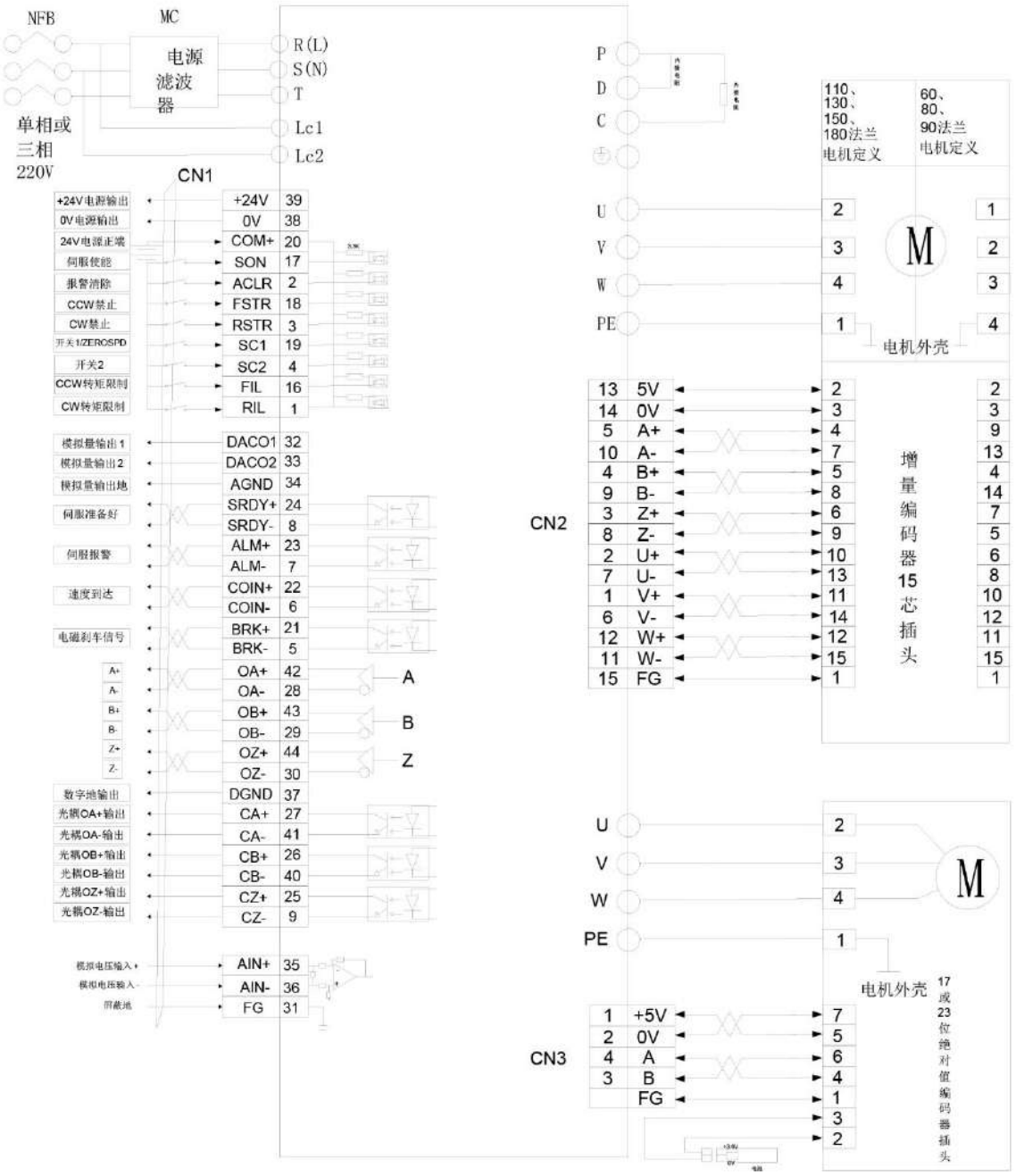
fig.4-2b Drive wiring terminals of DZ-50/75B2、DZ-50/75B2-J

4.3 Standard Wiring

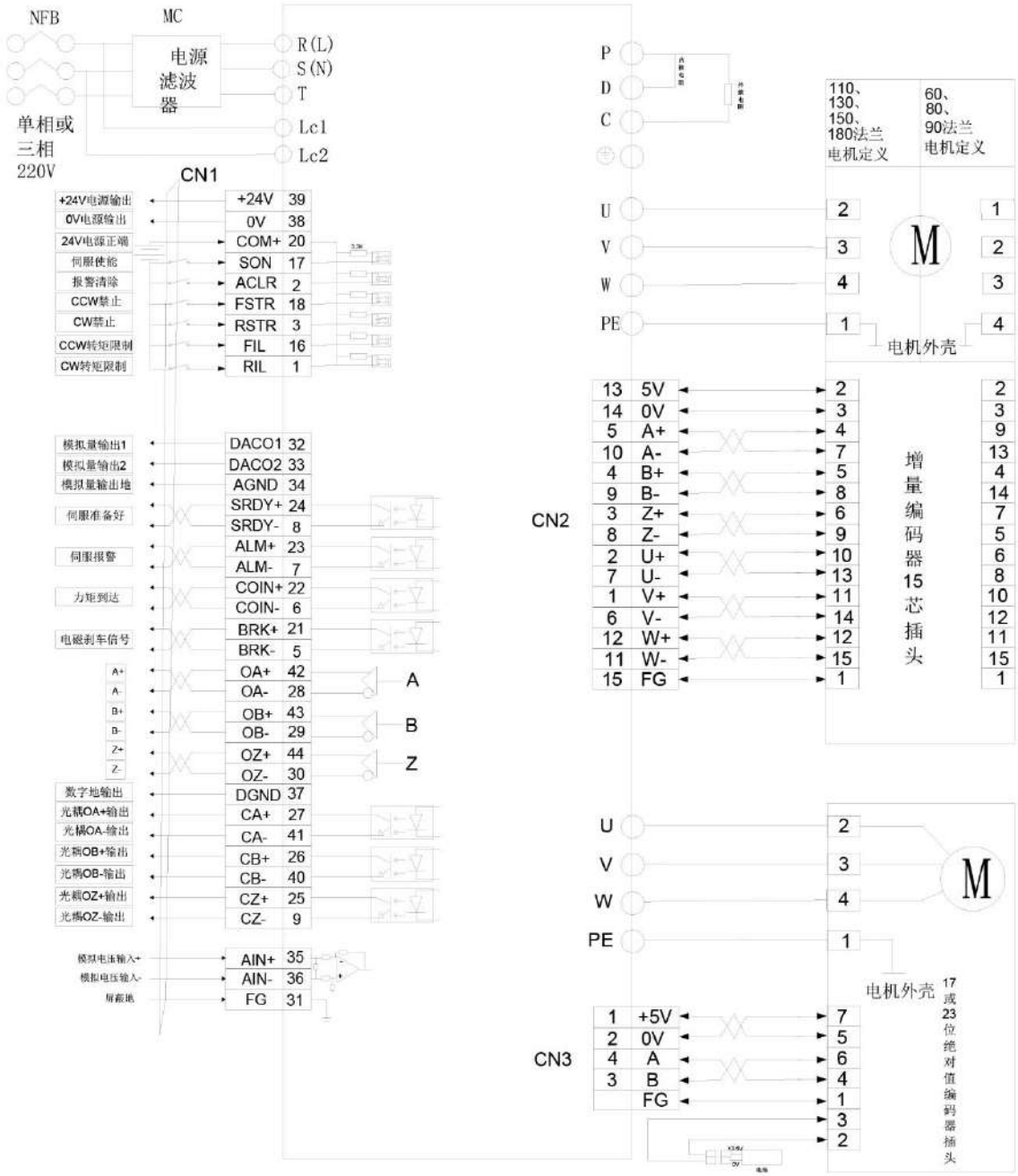
4.3.1 Position Control



4.3.2 Speed Control



4. 3. 3Torque Control



4.4 Upper Computer Communication Wiring Terminal of DZ-B2 Series (CN1)

4.4.1 Terminal Configuration of DZ-B2 Series (CN1)

Fig.4-4 is the deployment diagram for the communication wiring terminal(CN1) of upper computer. CN1 is 44 core socket and DB44 hole standard.

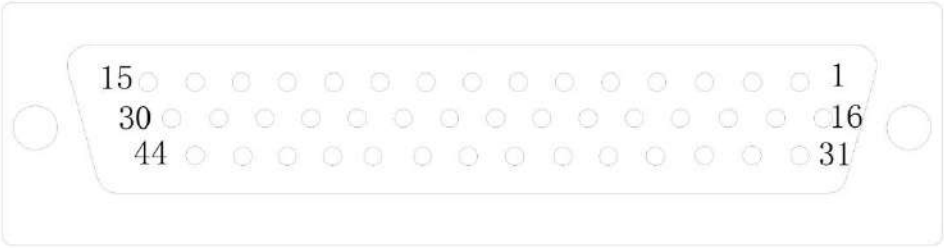


Fig.4-4 (Check at the side of the soldering terminal)Communication wiring terminal of upper computer for DZ-B2 Series

4.4.2 Function description of DZ-B2 Series(CN1)

Abbreviation for control Mode: P for Position Control Mode
S for Speed Control Mode
T for Torque Control Mode

Table 4.2 Function description of the communication wiring terminal(CN1) for the upper computer

Terminal no.	Signal name	Mark	I/O	Control Mode	Function Description
20	Positive Pole of the power	COM+	Type1	P、S、T	Positive Pole of the power of the input terminal; ■Photoelectric coupler to

	of the input terminal				drive the input terminal; ■ DC12～24V, Current≥100mA;
17	Servo with power	SON	Type1	P、S、T	Input terminal of servo with power; ■ SON ON:Wiring a short circuit with COM-, the drive is permitted to operate; ■ SON OFF: Switch off with COM-, the drive shut down and stop operation. The motor is under free state; ■Note 1:Make sure the Motor is at static condition before switch the SON ON; ■Note 2:Wait no less than 50ms before input any commands, when the SON was ON;
2	ALARM CLEAR	ACLR	Type1	P、S、T	Input terminal of Alarm clear ■ ACLR ON: When the system is under alarm state, wiring a short circuit with COM-, Clear the system Alarm. (Major faults need to Clear with re-power on.); ■ ACLR OFF: Switch off with COM-, keep system Alarm function;
23	Output of Servo Alarm	ALM+	Type2	P、S、T	Output terminal of Servo Alarm; ■ ALM ON:No alarm for servo drive, if the output of servo ALARM is ON. ■ ALM OFF: With alarm for
7		ALM-			

					servo drive, if the output of servo ALARM is OFF.
25	Collector Open-circuit Output for Z phase of Encoder	CZ+	Type2	P、S、T	Signal for Z phase of Encoder ■Collector Open-circuit output, when there is Z phase signal of encoder, output is ON, or else output is OFF; ■Isolated Output; ■Normally the Z phase pulse signal is narrow in upper computer, so please receive it with high-speed photo-electric coupler. To widen the pulse by setting PA-92 parameter is accepted.
9		CZ-			
31	Shielding Ground	FG		P、S、T	Terminal for Shielding Ground
13	Command Pulse Input	IN_PS	Type3 Single-ended	P	Input terminal of outer command pulse
15		IN_P+	Type3 Differential	P	
14		IN_P-			
10	Direction Input of Command Pulse	IN_DS	Type3 Single-ended	P	
12		IN_D+	Type3 Differential		
11		IN_D-			

19	Deviation Counter Clear	CLE /SC1 /ZEROSPD	Type1	P	■Under Position Control Mode(Parameter PA4=0), Input terminal of position deviation counter Clear. CLE ON : Under position Control , Clear position control counter. ■Under speed mode:SC1 and SC2 consist of the selection of inner speed.
24	Signal of Servo Ready	SRDY+	Type2	P、S、T	Output terminal of servo ready ■SRDY ON:When the power of controller and main drive is normal with no alarm of the drive, the SRDY ON. ■SRDY OFF:The main power is not on or having alarm of the drive, the SRDY OFF.
8		SRDY-			
16	CCW Torque Limitation	FIL	Type1	P、S、T	Input terminal of CCW torque limitation.
1	CW Torque Limitation	RIL	Type1	P、S、T	Input terminal of CW torque limitation.
42	A Phase Signal of Encoder	A+	Type5	P、S、T	■Differential drive output of the A/B/Z signal of the encoder (26LS31 output is equal as RS422) ■Non-isolated output(Non-isolated), pin37 is the reference ground
28		A-			
43	B Phase Signal of Encoder	B+	Type5	P、S、T	
29		B-			
44	Z Phase	Z+	Type5	P、S、T	

30	Signal of Encoder	Z-			
37	Digital Ground	DGND			Output Signal Ground of the encoder ■connect with internal control panel(Non-isolated)
22	Positioning Complete Output	COIN+	Type2	P	Output terminal of Positioning Complete ■COIN ON:COIN ON when the value of the position deviation counter in the range of setting.
6		COIN-			
4	Prohibited of Command Pulse	INH/SC2	Type1	P	■Under Position Control Mode(Parameter PA4=0),Input terminal of prohibited of Position Command Pulse. INH ON : Prohibit input of command pulse; INH OFF: Allow input of command pulse. ■Under speed mode:SC1 and SC2 consist of the selection of inner speed.
18	Prohibit of CCW Drive	FSTP	Type1	P、S、T	Input terminal of Prohibit of CCW Drive. ■FSTP ON :Permit the movement of CCW drive,the motor can rotate in CCW direction; ■FSTP OFF: Prohibit the movement of CCW drive,the motor is prohibited to rotate in CCW direction; ■Note: Apply to machine

					overrun, the torque in CCW direction is 0 when the switch is OFF.
3	Prohibit of CW Drive	RSTP	Type1	P、S、T	Input terminal of Prohibit of CW Drive. ■FSTP ON :Permit the movement of CW drive, the motor can rotate in CW direction; ■FSTP OFF: Prohibit the movement of CW drive, the motor is prohibited to rotate in CW direction; ■Note: Apply to machine overrun, the torque in CW direction is 0 when the switch is OFF.
21	Release of Mechanical Brake	BRK+	Type2	P、S、T	This terminal can be applied when the motor have mechanical brake. ■BRK ON:The brake is power on. The braking is invalid and the motor is workable. ■BRK OFF:The brake is cut-off. The braking is valid and the motor is unworkable. ■Note:The function of the BRK is with internal control of the drive.
5		BRK-	Type2		

35	Input of Analog Speed, Torque Command	AS+	Type4	S	Input terminal of external analog speed, torque command, Differential Mode, Input Resistance 10kΩ, Input Range －10V～＋10V.
36		AS-			
32	Input 1 of Analog Volume DA	DAC01		P、S、T	Output of analog volume, it can indicate the information of speed, torque and current.
33	Input 2 of Analog Volume DA	DAC02		P、S、T	Output of analog volume, it can indicate the information of speed, torque and current.
34	Analog Ground	AGND			Analog the ground of Input and Output; ■Wiring with the ground of internal control board(Non-isolated)

4.5 Motor Encoder Wiring Terminal(CN2) of DZ-B2 Series

4.5.1 Configuration of Terminals (CN2) of DZ-B2 Series

Fig.4-4 is the deployment diagram of Motor Encoder Wiring Terminals(CN2).CN2 is 15 core socket with DB15 hole standard.

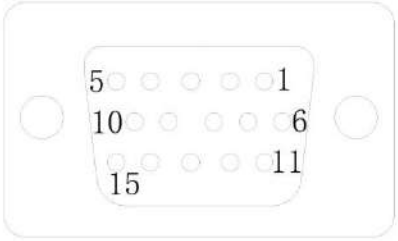


Fig.4-4 (Check at the side of the soldering terminal)Wiring terminal of Motor Encoder for DZ-B2 Series

4.5.2 Function Description of CN2 DZ-B2 Series

Table 4.5 Function Description of Motor Encoder Wiring Terminals CN2

Terminal No.	Signal Name	Mark	IO Port Type	Function Description
13	Power Output	+5V		Photoelectric encoder of the servo motor is the power +5V; if the cable is longer, it is advised to do parallel connection with several core wires.
14	Power Ground	GND		
5	Input of Encoder A+	A+	Type7	Wiring with photoelectric encoder A+ of the servo motor
10	Input of Encoder A-	A-		Wiring with photoelectric encoder A- of the servo motor
4	Input of Encoder B+	B+	Type7	Wiring with photoelectric encoder B+ of the servo motor
9	Input of Encoder B-	B-		Wiring with photoelectric encoder B- of the servo motor
3	Input of Encoder Z+	Z+	Type7	Wiring with photoelectric encoder Z+ of the servo motor
8	Input of Encoder Z-	Z-		Wiring with photoelectric encoder Z- of the servo motor
2	Input of Encoder U+	U+	Type7	Wiring with photoelectric encoder U+ of the servo motor
7	Input of Encoder U-	U-		Wiring with photoelectric encoder U- of the servo motor
1	Input of Encoder V+	V+	Type7	Wiring with photoelectric encoder V+ of the servo motor
6	Input of Encoder V-	V-		Wiring with photoelectric encoder V- of the servo motor
12	Input of Encoder W+	W+	Type7	Wiring with photoelectric encoder W+ of the servo motor
11	Input of Encoder W-	W-		Wiring with photoelectric encoder W- of the servo motor
15	Shielding Ground	FG		Terminal of shielding ground wire

4.6 Input/Output Port Types

4.6.1 Type1 Switching value Input Port

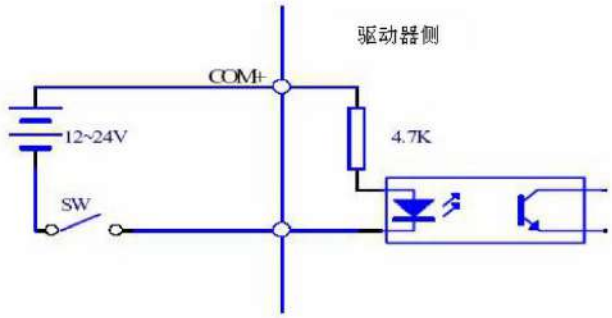


fig.4- 6-1:Type1 Switching Value Input Port

- The power is supplied by the user via COM+ terminal, input DC12～24V, current≥100mA;
- Note, the servo drive cannot work if wiring the current polar wrong.

4.6.2 Type2 Switching value Output Port

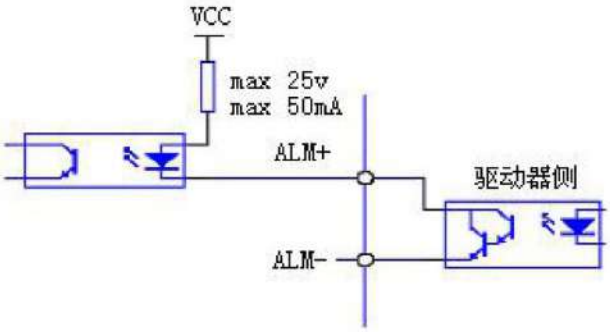


Fig. 4- 6-2a:Type2 Switching Value Output Port(Optocoupler)

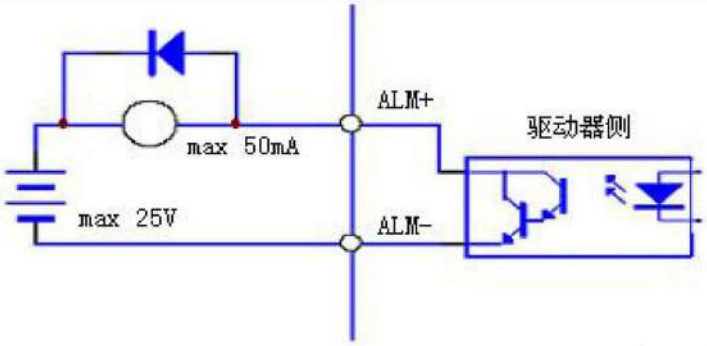


Fig. 4- 6-2b:Type2 Switching Value Output Port(Relay)

- Output is Darlington transistor, wiring with Optocoupler(fig.4- 6-2a) or Relay(fig.4- 6-2b);
- The outer power supplied by the user. Please note the servo drive will be damaged if wiring the polar of the power wrong;
- Output is collector open-circuit mode, the maximum current is 50mA, the maximum voltage of external power is 25V. The load of the Switching output signal must meet the limitation of current and voltage. If it exceed the limitation or output wiring with the power directly, it will damage the servo drive;
- If the load is transistor or other inductive types, it is a must to reverse parallel at the two ends of the load with a FWD. If wiring the FWD wrong, the servo drive will be damaged;
- Output transistor is Darlington transistor. The voltage drop between collector and emitter is around 1V if the transistor conducted. It cannot meet the requirement of the low level of TTL, so it cannot wiring direct with TTL integrated circuit.

4.6.3 Type3 Pulse value Input Port

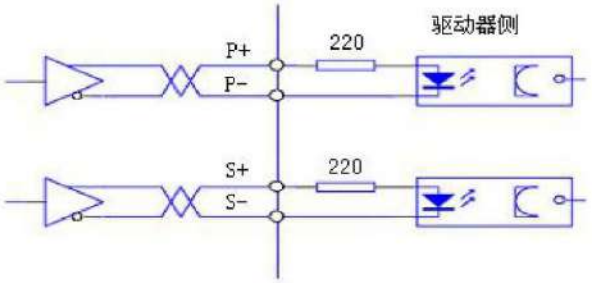


Fig. 4- 6-3a:Type3 Differential Drive Mode of Pulse Value Input Port

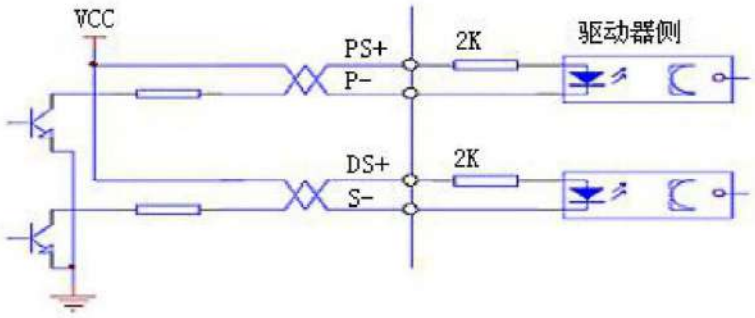


Fig. 4- 6-3b: Type3 Single-ended Drive Mode of Pulse Value Input Port

- It is advised to apply differential drive mode(fig.4-6-3a)to transmit the data of pulse value correctly and enhance the anti-interference ability of the system;
- Under differential drive mode, AM26LS31, MC3487 or similar to RS422 drive is applied.
- The movement frequency will be lower by applying single-ended drive mode. According to the input circuit of pulse value, the current of the drive is 10~15mA, the maximum voltage of external power for the VCC restriction is 25V.
- When applying single-ended drive mode, the external power is supplied by the user. If wiring the polar of the power wrong, it will damage the servo drive;
- Check table 4.6 to know the pulse input mode, the arrows stands for the number of the pulses .Table 4.5 is the time sequence and parameter when the pulse input. When input with 2 phase, the 4 times pulse frequency is ≦500kH.

Table 4.6:Pulse input mode

脉冲指令形式	CCW	CW	参数设定值
脉冲列符号 符号	PULS SIGN		0 指令脉冲＋符号
CCW脉冲列 CW脉冲列	PULS SIGN		1 CCW脉冲/CW脉冲

Table 4.5:The time sequence and parameter of Pulse input

参数	差分驱动输入	单端驱动输入
t_{ck}	>2μS	>5μS
t_h	>1μS	>2.5μS
t_l	>1μS	>2.5μS
t_{rh}	<0.2μS	<0.3μS
t_{rl}	<0.2μS	<0.3μS
t_s	>1μS	>2.5μS
t_{qck}	>8μS	>10μS
t_{qh}	>4μS	>5μS
t_{ql}	>4μS	>5μS
t_{qrh}	<0.2μS	<0.3μS
t_{qrl}	<0.2μS	<0.3μS
t_{qs}	>1μS	>2.5μS

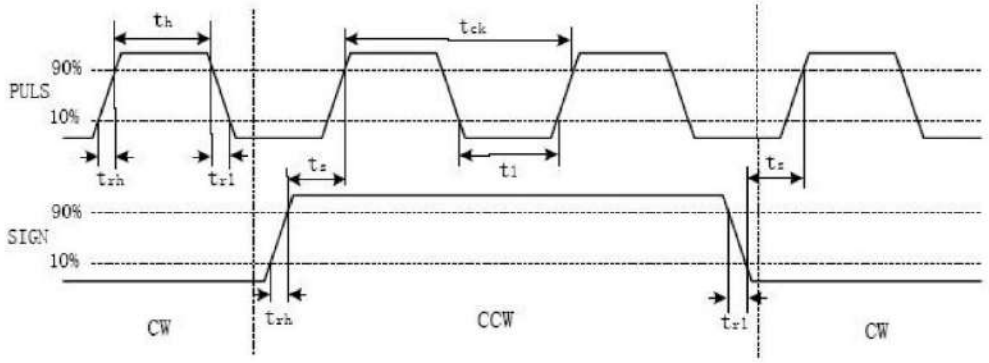


Fig.4- 6-3c:Sequence Chart of Pulse+Symbol input port(maximum pulse frequency:500kHz)

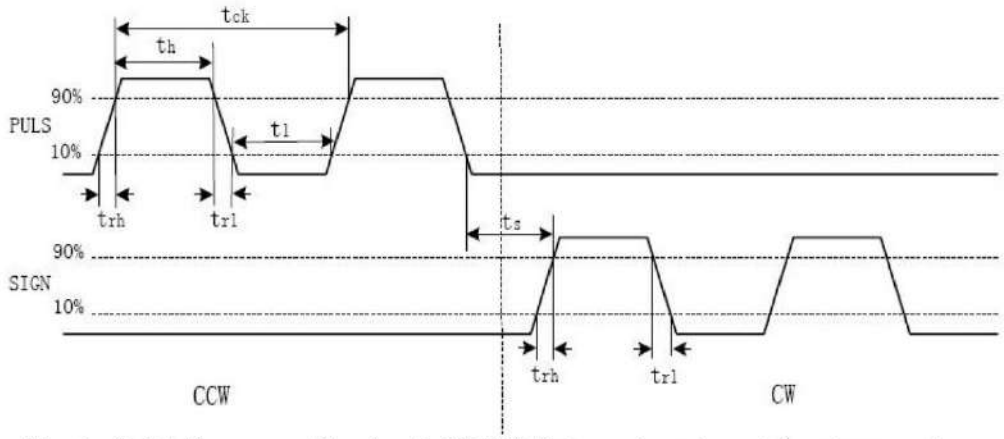


Fig.4- 6-3d:Sequence Chart of CCW+CW Pulses input port(maximum pulse frequency:500kHz)

4.6.4 Type4 Analog Input Port

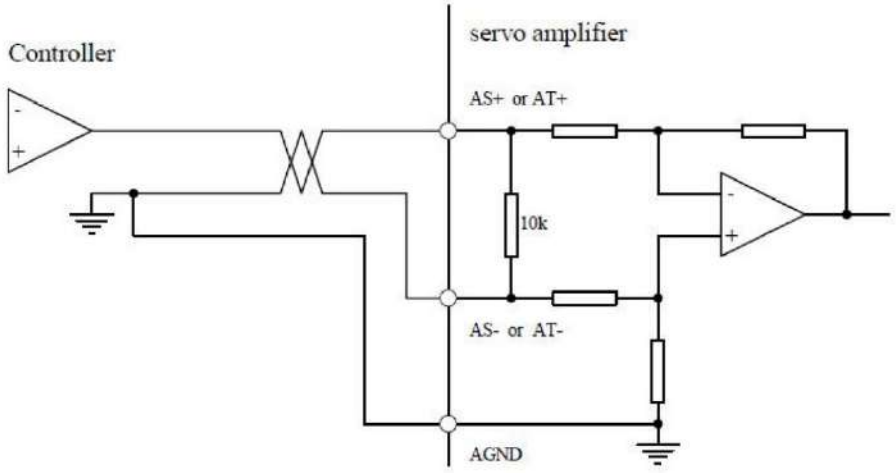


Fig.4-6-4a Type4 Analog Differential Input Port

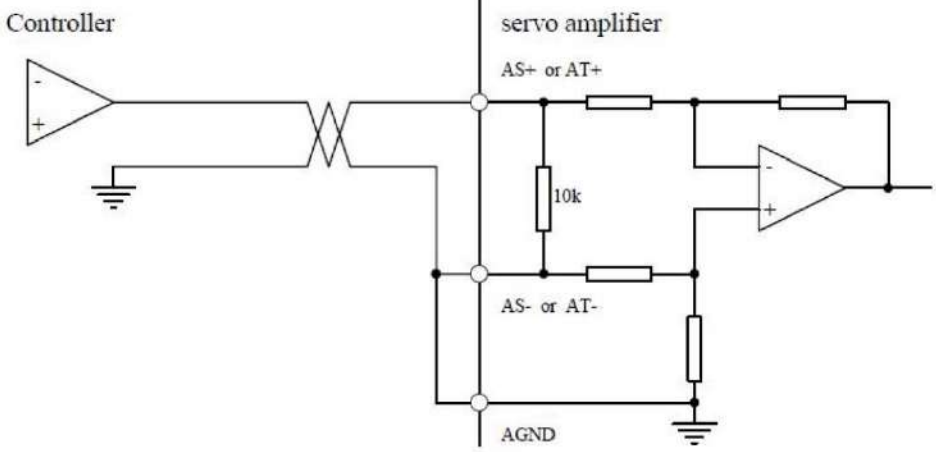


Fig.4-6-4b Type4 Analog Single-ended Input Port

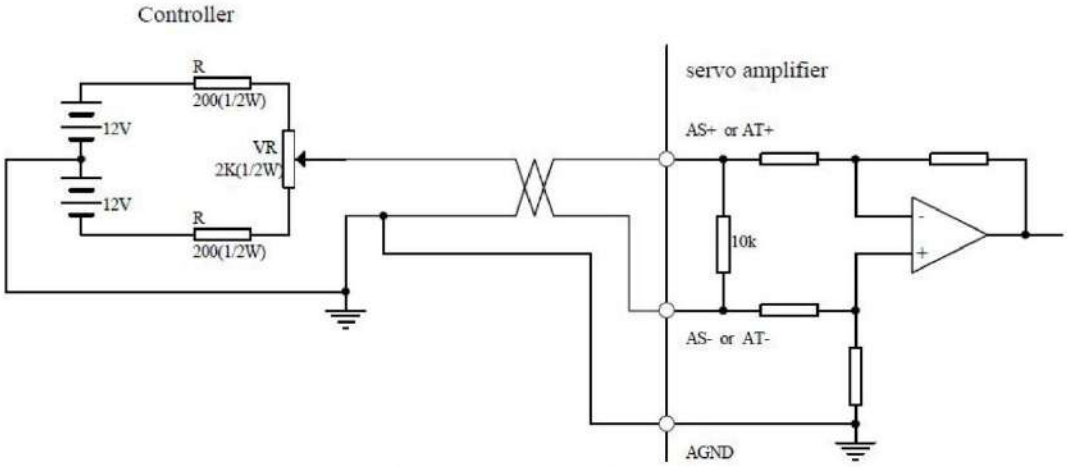


Fig. 4-6-4c Type4 Analog Differential Potentiometer Input Port

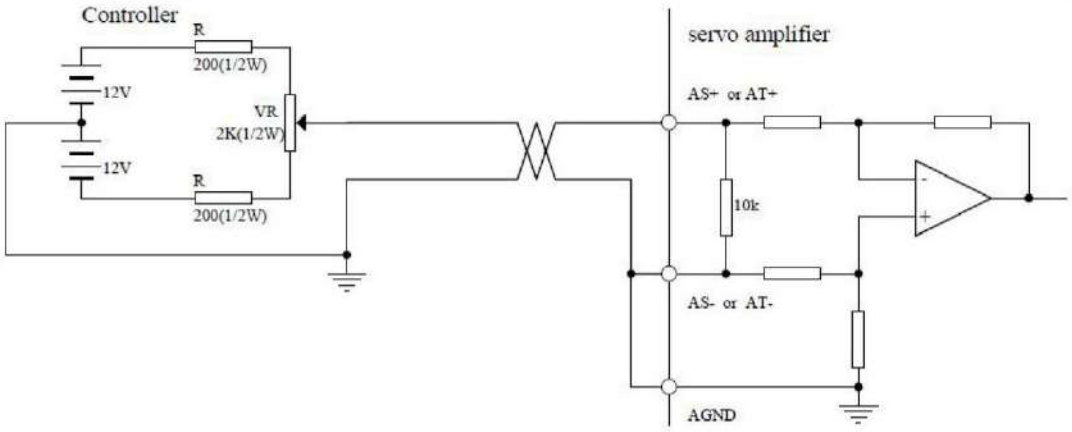


Fig. 4-6-4d Analog Single-ended Potentiometer Input Port

- The analog input port is differential mode. According to different wiring, it can be differential and single-ended modes. The input resistance is 10kΩ, and input voltage range is －10V～＋10V;
- Under differential wiring, analog ground wire and input negative terminal should be wiring at the controller side. It needs three wires to connect controller and driver;
- Under single-ended wiring, analog ground wire and input negative terminal should be wiring at the drive side. It needs two wires to connect controller and driver;
- The performance of differential wiring is better than the single-ended. It can reduce common mode interference;
- Input voltage should not surpass the range of －10V～＋10V, otherwise it will damage the drive;
- It is advised to wire with shield cable to reduce the interference of the noise;
- It is normal to have zero offset at analog input port. It can be adjusted via PA45 to compensate the zero offset;
- Analog port is non isolation(no insulation).

4.6.5 Type5 Encoder Signal Output Port

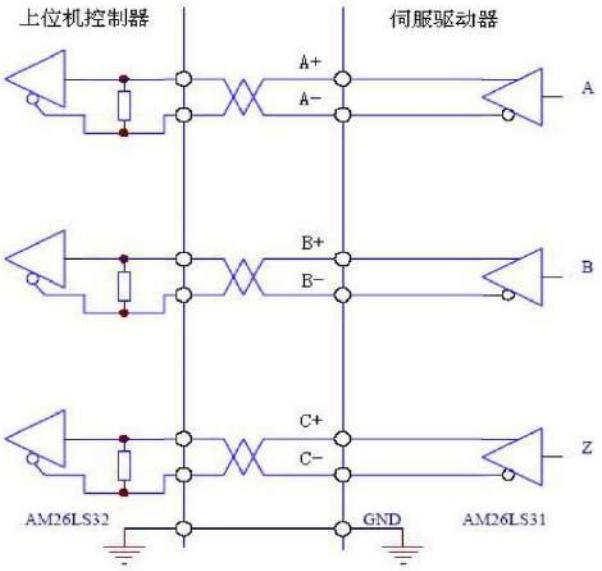


Fig. 4- 6-5a: Type5 Output signal of photoelectric encoder

- The signal of the encoder is output via differential drive(AM26LS31);
- The input end of controller can apply ATM26LS31 receiver. It is a must to wire terminal resistance(around 330Ω);
- The ground wire of the controller and the drive must be wiring with the ground properly;
- No isolation output, as shown in fig.4-6-5a;
- The input end of the controller can be also received by photocoupler(must be high speed photocoupler, e.g.6N137);

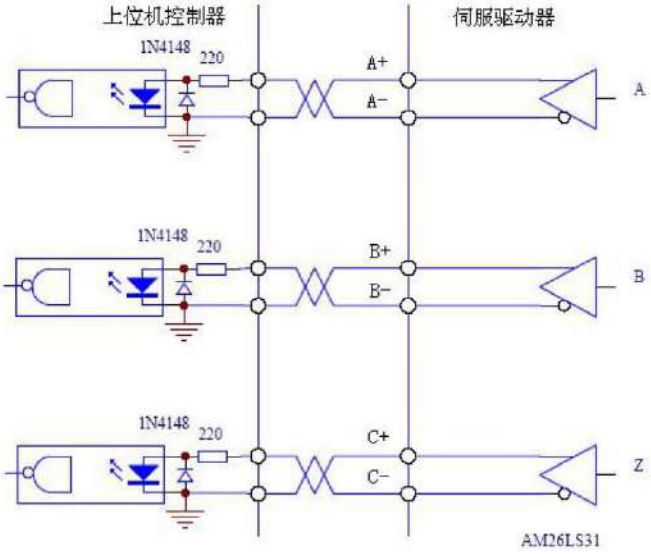


Fig. 4- 6-5b:Type5 Output Signal of Photoelectric Encoder

4.6.6 Type6 Z Phase Signal Collector Open-circuit Output Port of Encoder

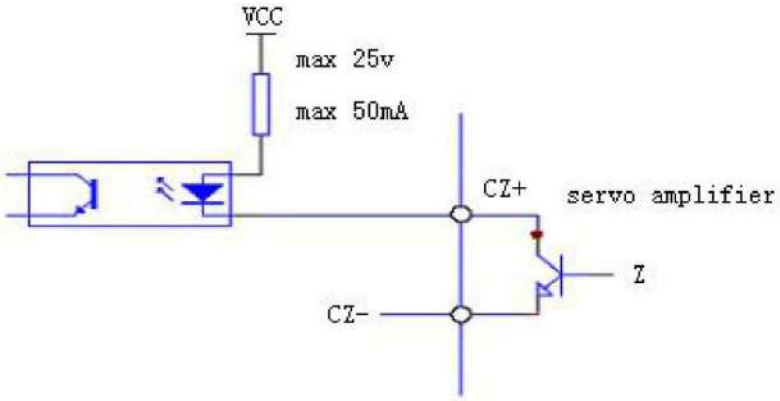


Fig.4- 6-6:Type6 Output Port of Photoelectric Encoder

- The signal of Z phase of encoder is output with collector open-circuit. When there is the signal of Z phase of encoder, the output ON, or else the output OFF;
- Please receive with high speed photocoupling(e.g.6N137) because the Z phase signal pulse is normally narrow from the upper computer;

4.6.7 Type7 Photoelectric Encoder Input Port of Servo Motor

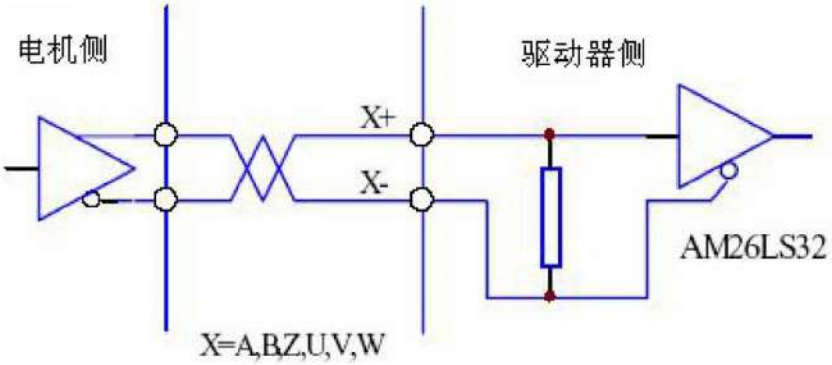
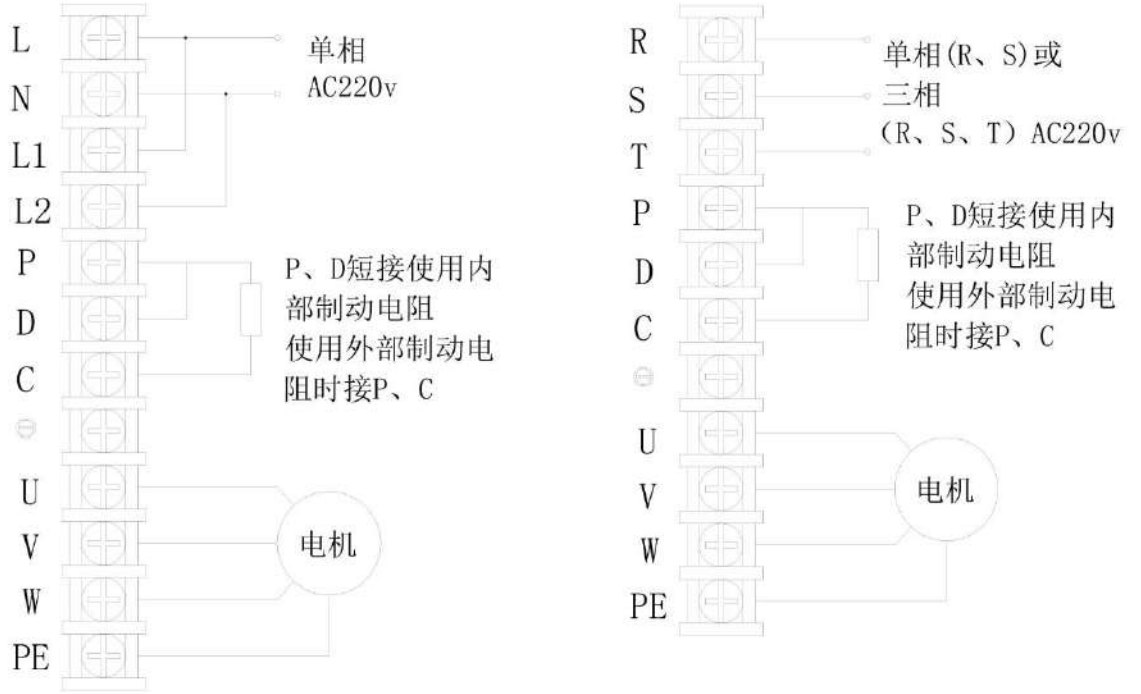


Fig. 4- 6-7：Type 7 Photoelectric Encoder Input Port of Servo Motor

4.6.8 Type8 Analog Value Output Port

Output with amplifier, no isolation. Output current is no more than 10mA.

4.7 Terminal Wiring of Drive Power



Terminals of Drive Power for 10/15B2/-J

Terminals of Drive Power for 20B2/30B2/-J

Fig. 4-7 Wiring of Drive Power

“单相” means “Single Phase”; “三相” means “Three Phase”; “P, D 短接使用内部制动电阻，使用外部制动电阻时接 P, C, ” means “Connecting P and D together when using inner braking resistor; Connecting P and C together when using outer braking resistor”; “电机” means “Motor”

4.8 Wiring Regulation

1. To avoid electric shock to hurt people, it is advised to supply the power with three phases’ isolation transformer;

2. To enhance the anti-interference ability, it is advised to let the power via noise filter;
3. Please install non-fusing short-circuit to cut off the external power when there is fault of the drive;
4. The ground wiring should be ≧2.5mm² and as strong as possible. Wiring to the ground with single point, the ground terminals (PE)of the servo motor and the servo drive should be connected together;
5. To avoid false operation because of interference, it is advised to install noise filter and kindly note:
   - To install the noise filter as close as possible with servo drive and upper controller;
   - It is a must to install surge suppressors to the coils of the relay, AC contactor and brake;
   - Don't bind the cables of power current circuit and the signal together;
6. Connecting with the shield layer of the cable correctly.

5 Display and Operation

5.1 Keyboard Operation

There are 6 LED Nixie tube displays and four keypads(↑, ↓, ← and Enter) on the panel of the drive. They are used to show the status of the system and set the parameter.

Functions of the keypads is as below:

↑ :Add the serial number and the value, or forward the option.
↓ :Subtract the serial number and the value, or recede the option.
← : Return to the upper operation menu, or cancel operation.
Enter :Enter into next step or confirm.

There are different layers. Press "←" or "Enter" mean to return to previous layer or go into the next layer. Press "↑" or "↓" mean to add or subtract the serial number and the value. Press and hold "↑" or "↓" mean to repeat the step mentioned above, the time for holding longer, the repeating speed faster.

The 6 LED Nixie tubes is used to display all the status and data of the system.

5.2 The first layer

There are multi-layer manipulation menus. The first is main menu with three operation mode, the second is functional menu for different operation modes. Fig5-1 is operation diagram of main menu.

Fig.5-1:Mode select operation diagram

“监视方式”means“Monitor Mode”;“参数设置”means“Parameter Setting”;“参数管理”means“Parameter Management”;“第一层”means“the first layer”;“第二层”means“the second layer”.

5.3 The second layer

5.3.1 Monitor Mode

Select“dp-” in the first layer and press “Enter”to enter into the monitor mode. There are 21 statuses in total. The user can press“↑”,“↓”to select the status wanted and press “Enter”to enter into the specific status.

dP-spd	电机速度（r/min）
dP-pos	当前位置低5位（脉冲）
dP-pos.	当前位置高5位（x10000脉冲）
dP-cpo	位置指令低5位（脉冲）（电子齿轮之后）
dP-cpo.	位置指令高5位（x10000脉冲）（电子齿轮之后）
dP-Epo	位置偏差低5位（脉冲）
dP-Epo.	位置偏差高5位（x10000脉冲）
dP-trq	电机转矩（%）
dP-I	电机电流（I）
dP-Udc	母线电压（m/min）
dP-Cnt	当前控制方式
dP-Frq	位置指令脉冲频率（MHz）
dP-CS	速度指令（r/min）
dP-Ct	转矩指令（%）
dP-APO	一转中转子绝对位置（脉冲）
dP-In	控制端子输入监视
dP-OUT	控制端子输出监视
dP-COD	码盘信号
dP-Rn	运行状态
dP-Err	报警代码
dP-PLD	版本号
dP-PT1	脉冲计数器值，来自APM的TLM1
dP-PCD	脉冲计数器值，来自CPLD
dP-CFB	Z信号捕获的编码器值
dP-ARN	ARM版本
dP-RE	控制板温度值
dP-AC0	U相电流采样AD值
dP-AC1	W相电流采样AD值
dP-AU0	母线电压采样AD值
dP-AS0	速度指令AS采样AD值
dP-AT0	温度采样AD值
dP-ICQ	峰值电流指令
dP-BUC	泻放电压监视数值
dP-CP	位置指令低5位（脉冲）（电子齿轮之前）
dP-CP.	位置指令高5位（x10000脉冲）（电子齿轮之前）
dP-RES	备用

Fig.5- 2：Monitor Mode Operation Diagram

Specific description listed below：

Serial No.	MODBUS Address	Mark	Description
1	0x1000	SPD	Current Speed
2	0x1001	POS	Current position lower 5 bits
3	0x1002	POS.	Current position higher 5 bits

4	0x1003	CPO	Command of Pulse lower 5 bits(after amplification of electronic gear)
5	0x1004	CPO.	Command of Pulse higher 5 bits(after amplification of electronic gear)
6	0x1005	EPO	Deviation of Position lower 5 bits
7	0x1006	EPO.	Deviation of Position higher 5 bits
8	0x1007	TRQ	Real Torque of Motor (A)
9	0x1008	I	Real Current of Motor (A)
10	0x1009	UDC	Busbar Voltage (V)
11	0x100A	CNT	Current Control Mode
12	0x100B	FRQ	Pulse Frequency (Hz)
13	0x100C	CS	Command of Speed
14	0x100D	CT	Command of Torque
15	0x100E	APO	the position of the rotor in a power cycle, 0-2500 electrical angle
16	0x100F	IN	Input port, start from the third Nixie tube, check "Note 7"
17	0x1010	OUT	Output port, check "Note 7"
18	0x1011	COD	Coded Disc Signal, check "Note 7"
19	0x1012	RN	Running Status, check "Note 8"
20	0x1013	ERR	Alarm No.
21	0x1014	PLD	CPLD Edition
22	0x1015	PT1	Pulse counter value 1
23	0x1016	PCD	Pulse counter value 2
24	0x1017	CFB	Encoder value captured by Z signal
25	0x1018	ARN	ARM Edition
26	0x1019	RE	Temperature value of Control Panel
27	0x101A	AC0	Sampling AD value of U phase current;the value is equal to 2048, when the current is 0.
28	0x101B	AC1	Sampling AD value of W phase current;the value is equal to 2048, when the current is 0.
29	0x101C	AU0	Sampling AD Value of Busbar Voltage
30	0x101D	AS0	Sampling AD value of Command of Speed AS ;the value is equal to 2048, when the command is 0.
31	0x101E	AT0	Sampling AD value of temperature
32	0x101F	ICQ	Command of Peak Current:refresh cycle 2s
33	0x1020	BUC	Monitoring Value of Discharge Voltage
34	0x1021	CP	Command of Pulse lower 5 bits (before

			amplification of electronic gear)
35	0x1022	CP.	Command of Pulse higher 5 bits (before amplification of electronic gear)
36	0x1023	APO	One-loop Position of Encoder, 0-65535
37	0x1024	HPO	Multi-loops Position of Encoder, 0-65535
38	0x1025	RES	Reservation

[Note 1] The value of position pulse and command pulse are that after amplification of input electronic gear.

[Note 2] The unit of pulse value is that of system inner pulse. In the system 10000pulse/cycle. The pulse value counts with high 4 bits+low 4 bits. Calculation formula as follow:

Pulse value=value of high 4bits×10000+low 4bits

[Note 3] Control Mode:0-Postion Control;1-Pulse and speed control;

[Note 4] Under pulse speed mode, the pulse frequency of Position Command means pulse speed, the unit is rpm. Forward direction shows the positive number, backward direction the negative number.

[Note 5] Calculation formula of Motor current I

$$I = \sqrt{\frac{2}{3}(I_U^2 + I_V^2 + I_W^2)}$$

[Note 6] The absolute position of the rotor in a circle means the position the rotor comparative position with the stator. A turn is a circle, range of 0～9999.

[Note 7] Check fig. 5-3 for the display value of input terminal, fig. 5-4 for output terminal, fig5-5 for encoder signal.

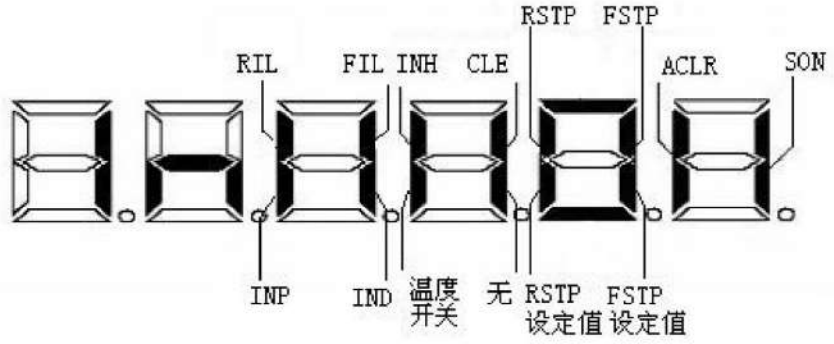


fig. 5- 3:Display of input terminal (Lighting up a stroke means ON, lighting off a stroke means OFF)

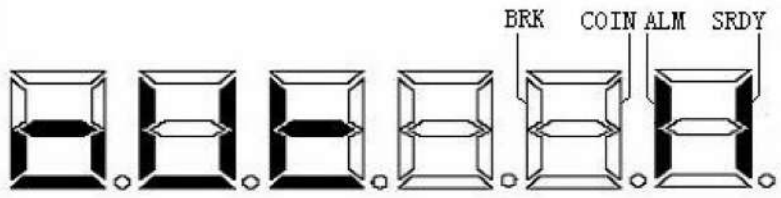


fig. 5- 4:Display of input terminal (Lighting up a stroke means ON, lighting off a stroke means OFF)

Communication Output:Permutation with binary system,SRDY=1,ALM=2,COIN=4,BRK=8

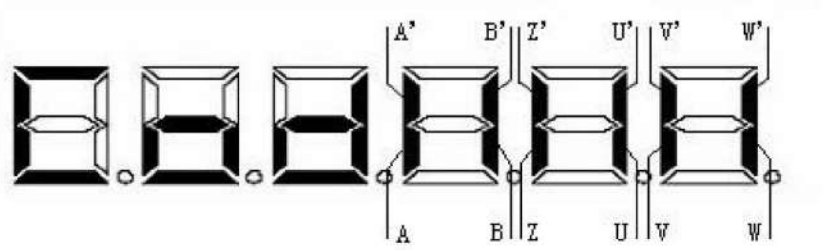


fig. 5- 5:Display of Encoder Signal

(A' B' Z' U' V' W' is XOR. Doing disconnection test, all lighting up means normal, extincting disconnection.)

(ABZUVW is signal level, lighting up means high level, extincting low level.)

(Z Signal: Having a Z pulse, there is a conversion of lighting up or extincting.)

[Note 8] Operation status:

"cn- oFF" :the main circuit has no power, servo system is not operating;

"cn- CH" :the main circuit has power, servo system is not operating; (Servo motor has no power or has alarms)

"cn- on" :the main circuit has power, servo system is operating.

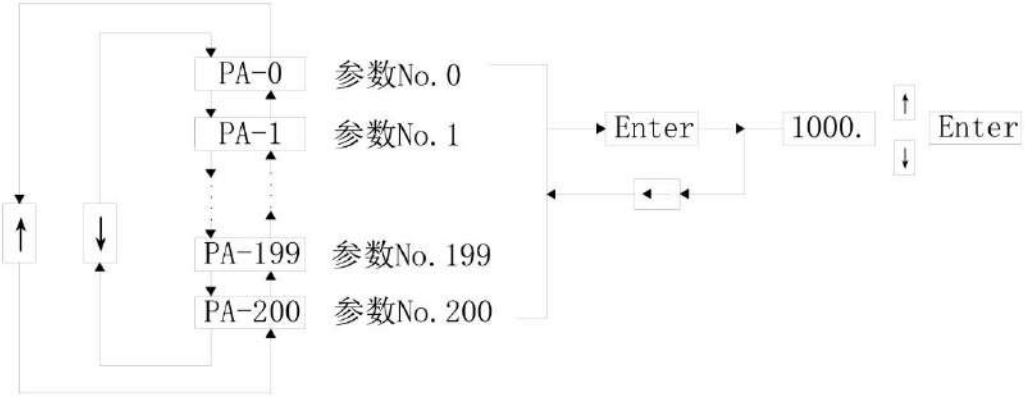
[Note 9] Alarm display "Err --" means normal, no alarm.

5.3.2 Parameter Setting

Select "PA-" in the first layer and press "Enter" to enter into parameter setting. Press "↑", "↓" to select parameter serial no., press "Enter" to show

the value of the parameter, and Press "↑", "↓" to change the value. Press one time of "↑" or "↓" means to add or subtract 1, press and hold "↑" or "↓", the parameter can add or subtract continuously. If the parameter value changed but not confirmed, the decimal point at the rightmost of the LED Nixie tube lighted up, to press "Enter" to confirm the changed value and the decimal point at the rightmost of the LED Nixie tube extincted. The changed value will feedback to the control system. The user can press "↑", "↓" to change continuously. Finished the value change, press "←" to return to parameter selection. If the value changed is not that wanted, please don't press "Enter" but press "←" to make parameter recover to the original and return to parameter selection.

It is worth noting that some important parameter needed to have parameter writing process, which needed to be valid by power-off and re-power on.



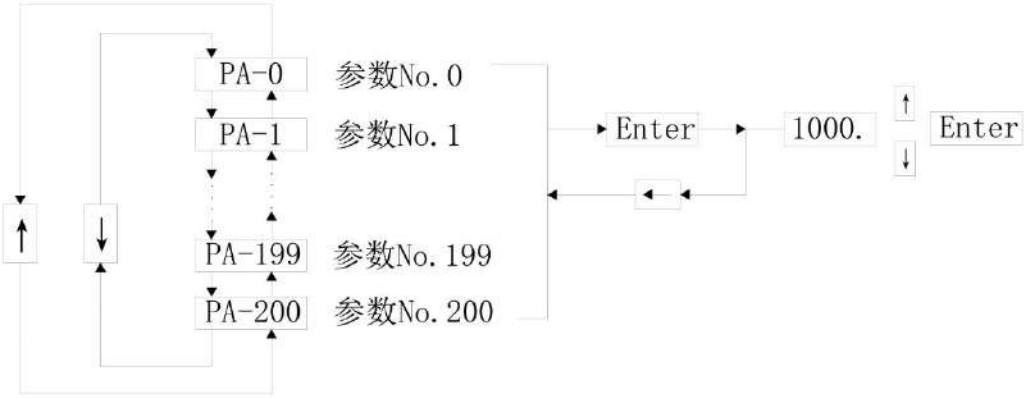


fig.5- 1:Parameter Setting Operating Diagram

Note:“参数”means “Parameter”.

5.3.3 Parameter Management

Parameter manager is the operation to deal with the internal storage and EEPROM. Select “EE-” in the first layer and press “Enter” to enter into parameter management. The first is to select operation mode. There are 5 modes, which can be selected by pressing “↑”, “↓”. To take “recover to default value” as an example, select “EE-DEF” and press “Enter” and hold for over 3s, if the writing operation succeed, the display shows “Finish”; if failure, the display shows “error”. The user can press “←” to return the operation mode selection.

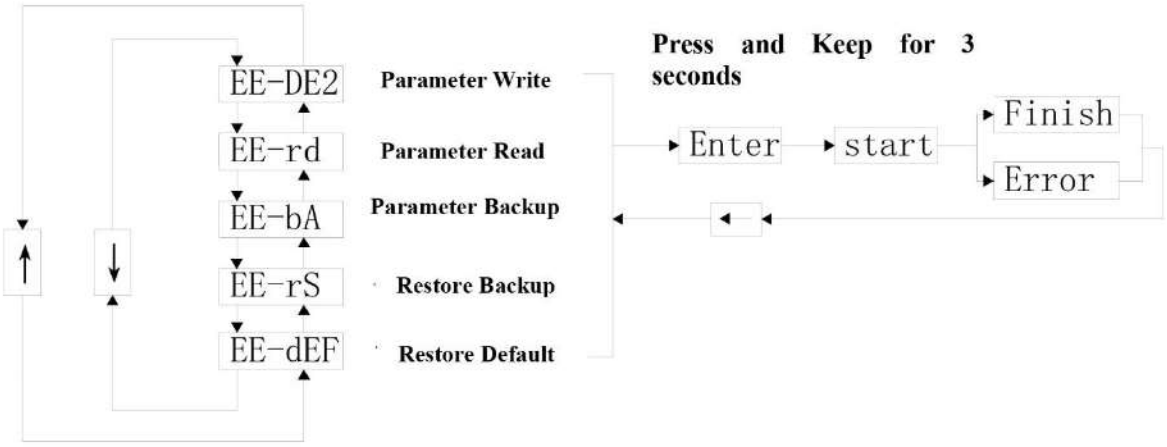


fig.5- 2:Parameter Management Operation Diagram

	系统上电:	EEPROM参数区	⇨	EEPROM参数区
EE-DE2	参数写入:	内存	⇨	内存
EE-rd	参数读取:	EEPROM参数区	⇨	EEPROM参数区
EE-bA	参数备份:	内存	⇨	内存
EE-rS	恢复备份:	EEPROM备份区	⇨	内存
EE-dEF	恢复缺省值:	参数缺省值	⇨	内存、EEPROM参数区

fig.5- 3:Diagram for the Meaning of Parameter Management

- EE-DE2: Load the relevant parameter of the motor. To change the parameter of the motor and store to EEPROM parameter area. Before executed this step, please change

the motor model PA1 first.

- EE—rd:Read the parameter, means read the data of EEPROM parameter area to the internal storage. This process will do a time when the power on. At the beginning, the value of internal storage parameter is same with that EEPROM parameter area. If the user changes the parameter, the parameter value in the internal storage will change. If the user is not satisfied with the changed parameter or the parameter in disorder, do reading the parameter can read the data of EEPROM parameter area to the internal storage and recover the value as that of power on.
- EE—bA:Parameter backup. It means write the parameter into the backup area of EEPROM. EEPROM consists of parameter area and backup area. It can store two sets of parameter. The parameter area is for the usage of system with power on, writing parameter, and reading parameter, while the backup area is for parameter backup and recover backup. During setting the parameter, if the user is satisfied with a set of parameter but want to do some change, he can do the parameter backup to store the parameter to the backup area of EEPROM and then change the parameter. If the effect is not wanted , the user can restore the backup and read the parameter stored in the backup area of EEPROM last time to the internal storage, and then change the parameter or finish setting. In addition, after setting up the parameter, the user can write in and backup the parameter to make sure the parameter the same in the two areas. In case of there is a change of the parameter, the user can parameter in the internal storage to the parameter area of EEPROM.
- EE—rS:Restore backup. It means read the parameter in the parameter area of EEPROM to the internal storage. Please note this process has no writing the parameter. The parameter next power on is also the parameter in the parameter area of EEPROM. If the user wants to use the parameter in the backup area of EEPROM, he needs to do a parameter writing operation.
- EE—dEF:Restore default value. It means reading the factory default value to the internal storage and writing into the parameter area of EEPROM. The default value will be applied with next power on. When the parameter is in disorder that can not work, it is advised to do this to restore all the parameter into default value. It is because different drives have different default value, please make sure the accuracy of parameter(PA-1) of the drive before restoring.

Note:

①After changed the PA parameter and press “Enter”, it will store into the

parameter area of EEPROM instantly. Therefore, it is not need to have a SET operation independent.

②After change the motor type PA1 and confirm, the relevant parameter in the parameter table will also change instantly but not store in EEPROM. The parameter of the motor in the parameter table will restore the original after power on. If it needs to store, the user needs to do EE-TOR.

③The difference of EE-DE2 and EE-DEF: EE-DEF will make all the parameter restore to the initial value while EE-DE2 is only changed the relevant parameter of the motor.

6 Parameter

6.1 Parameter List

The factory default in the below table takes DZ-15B2 with 80ST-M02420 motor as an example.

Note:With mark of "#" means valid instantly, "！" means valid after switch off and re-power on, "M" means the parameter of the motor.

Modbus Address of the parameter(Decimal system):offset 0+serial number.

Serial No.	Name	Mark	Parameter Range	Factory Default	Unit
0	Password	#	PA1:385 Others:315	315	
1	Model	M		14	
2	Inner Torque Command Register	#		260	
3	Initial Display Status	!	0~35	0	
4	Control Mode	#	0~10	0	
5	Speed Gain	# M	0~20000	400	
6	Speed Integral	# M	1~10000	1000	
7	Torque Command,feedback filter	#	1~400	20	Hz

8	Speed Given,Detection(Feedback) Filter	#	1~2000	200	Hz
9	Position Gain	# M	1~10000	200	
10	Position Feed-forward Gain	#	0~100	0	
11	Position Feed-forward Filter Cut-off Frequency	#	1~1200	1	
12	Numerator of Position Command Pulse Frequency	#	1~32767	1	
13	Denominator of Position Command Pulse Frequency	#	1~32767	1	
14	Input Mode of Position Command Pulse	!	0~3	0	
15	Negation of Position Command Pulse Direction	!	0~1	0	
16	Complete Range of Position	#	1~30000	20	
17	Detention Range of Position Deviation	#	1~30000	400	
18	Invalid of Position Out-of-tolerance Error		0~1	0	
20	Invalid of Drive Inhibit Input	!	0~1	1	
21	JOG Operation Speed	#	-3000~3000	120	
22	Selection of Inner and Outer Speed Command	!	0~2	0	
23	Maximum Speed Restriction and	M	0~4000	3600	

	Over-speed Alarm Valve Value				
24	Inner Speed 1	#	-3000~3000	100	
25	Inner Speed 2	#	-3000~3000	500	
26	Inner Speed 3	#	-3000~3000	-500	
27	Inner Speed 4	#	-3000~3000	-100	
28	Arrival Speed	#	0~3000	5	
29	Input Gain of Analog Torque Command	#	10~100	30	%
30	Alarm of User Torque Overload	#	1~300	300	%
31	Alarm Detention Time of User Torque Overload	#	0~32767	10	ms
33	Direction Negation of Analog Torque Command	!	0~1	0	
34	Inner CCW Torque Limitation	# M	0~300	300	%
35	Inner CW Torque Limitation	# M	-300~0	-300	%
36	Outer CCW Torque Limitation	#	0~300	150	%
37	Outer CW Torque Limitation	#	-300~0	-150,	%
38	Torque Limitation of Speed Trail Operation and JOG Operation	#	0~300	100	%
39	Zero Offset Compensation of Analog Torque Command	#	-2000~200	0	
40	Accelerating Time Constant	#	1~10000	10	ms
41	Decelerating Time	#	1~10000	10	ms

	Constant				
43	Input Gain of Analog Speed Command	#	10~3000	300	
44	Direction Negation of Analog Speed Command	!	0~1	0	
45	Zero Offset Compensation of Analog Speed Command	#	-1500~1500	0	mV
46	Filtering of Analog Speed,Torque	#	1~1000	300	
47	Action Setting of Mechanical Brake When Motor Stopping	#	0~200	0	
48	Action Setting of Mechanical Brake When Motor Rotating	#	0~200	50	
49	Action Speed of Mechanical Brake When Motor Rotating	!	0~3000	100	
50	Speed Limitation of Torque Control	!	0~5000;	3000	
53	Low 4 bits Input Terminal Forced ON Control Word	#	0~15	0	
54	High 4 bits Input Terminal Forced ON Control Word	#	0~15	0	
55	Low 4 bits Input Terminal Negation Control Word	#	0~15	0	
56	High 4 bits Input Terminal Negation Control Word	#	0~15	0	
57	Output Terminal Negation Control Word	#	0~15	0	
59	Source Selection of		0~1	0	

	Analog Torque Command				
60	Current Gain	# M	1~20000	90	
61	Current Integral	# M	1~10000	225	
62	Over Voltage Alarm Time	#	1~10000	500	
63	Software Over Current Alarm Time	#	1~1000	50	ms
64	Heat Overload Alarm Valve Value	#	100~300	150	%
65	Heat Overload Alarm Time	#	0~30000	3600	s
66	Speed PID Saturation Alarm Time		0~1000	10000	ms
67	Braking Alarm Time(the number of discharge time)	#	1~10000	2000	100us
68	Alarm Shielding 1-6	!	0~63	0	
69	Alarm Shielding 7-12	!	0~63	0	
70	Alarm Shielding 13-18	!	0~63	0	
71	Alarm Shielding 19-24	!	0~63	0	
72	Alarm Shielding 25-30	!	0~63	0	
73	Alarm Shielding 31-36	!	0~63	0	
74	RS232 serial port with power(also Baud Rate Selection)	#	0~63	5	
80	Brake Discharge Cycle,100us basic unit	#	2~200	10	个
81	Discharge Duty Rate %,100us Unit	#	0~75	50	%
82	Discharge Close Voltage V	#	0~1000	360	V
83	Discharge Open Voltage V	#	0~1000	380	V

84	Under-voltage Valve Value V	#	0~1000	120	V
85	Over-voltage Valve Value V	#	0~1000	400	V
86	Discharge Voltage Filtering	#	1~20000	10	ms
87	Power Off Protection Time	#	1~10000	1000	ms
88	Coded Disc ABZ Signal Filtering	!	1~255	5	28ns
89	Line Number of Encoder After Frequency Demultiplication	!	1~10000	10000	
90	Feedback Direction of Encoder Frequency Demultiplication	!	0~1	0	
91	Pulse Digital Filtering Factor	!	1~255	36	
92	Setting of Z Pulse Expand Width	!	1~255	10	
95	Pull-in Voltage of Busbar Relay	!	0~1000	250	
96	DI1 Filtering Time-SON	#	0~1000	2	ms
97	DI2 Filtering Time-ALRS	#	0~1000	2	ms
98	DI3 Filtering Time-FSTP	#	0~1000	2	ms
99	DI4 Filtering Time-RSTP	#	0~1000	2	ms
100	DI5 Filtering Time-CLE SC1 ZERO SPD	#	0~1000	2	ms
101	DI6 Filtering Time-INH SC2	#	0~1000	2	ms
102	DI7 Filtering Time-FIL	#	0~1000	2	ms
103	DI8 Filtering Time-RIL	#	0~1000	2	ms

104	Capture Speed Filtering/ Low Speed Detection Filtering Time Constant	#	1~32767	1	
106	485 Baud Rate Selection	#	1~6	2	
107	485 Communication Data Protocol	#	0~8	6	
108	485 Slave Computer ID Address	#	0~247	1	
109	Alarm Shielding 37-42	#	0~63	0	
110	Alarm Shielding 43-48	#	0~63	0	
111	Alarm Shielding 49-54	#	0~63	0	
112	Alarm Shielding 55-60	#	0~63	0	
113	Alarm Shielding 61-66	#	0~63	0	
114	Alarm Shielding 67-72	#	0~63	0	
115	Alarm Shielding 73-78	#	0~63	0	
116	Alarm Shielding 79-84	#	0~63	0	
117	Alarm Shielding 85-90	#	0~63	0	
118	Alarm Shielding 91-96	#	0~63	0	
119	Alarm Shielding 97-102	#	0~63	0	
120	Alarm Shielding 103-108	#	0~63	0	
124	Positive Direction Dead Zone of Analog Speed	#	0~1500	0	mV
125	Negative Direction Dead Zone of Analog Speed	#	-1500~0	0	mV
126	Positive Direction Dead Zone of Analog Torque	#	0~1500	0	mV
127	Negative Direction Dead Zone of Analog Torque	#	-1500~0	0	mV
133	Current Feed forward Ratio		0~100	0	
134	Overall Slope Curve		0~1000	0	

	Fitting Rate of Current Feedforward				
135	Under-voltage Protection time ms	#	1~10000	500	
136	Over Temperature Protection Time ms	#	1~10000	500	
138	D Axis Electric Current Loop Rate	# M	0~20000	90	
139	D Axis Electric Current Loop Integral	# M	1~10000	225	
140	Pulse Low-pass Filtering Time 0-1000	!	0~1000	0	
141	Pulse Smoothing Filtering Time 0-1000	!	0~1000	0	
142	Positive value of Position Loop Output	#	0~3050	1200	
143	Negative value of Position Loop Output	#	-3050~0	-1200	
148	INH Signal Fixed-length Control Speed		-3000~3000	60	RPM
149	INH Signal Fixed-length Control Pulse Number low 4 bits		0~9999	0	PC
150	INH Signal Fixed-length Control Pulse Number High 4 bits		0~9999	10	× 10000 PC
151	INH Signal Fixed-length Control Accelerate		1~200	10	
153	Low Speed Output COIN Signal Valve Value		0~5000	10	rpm
154	Torque Arrival Point (Torque Arrival Output		1~5000	1000	0.01N .m

	Signal) (COIN)				
155	COIN Signal Source		0~2	0	
156	Detection Filtering Time of Torque Arrival Signal		0~10000	100	ms
157	Analog Signal Power-on Auto Zero Offset Compensation Permission Bit	#	0~1	0	
158	CLE Signal Fixed-length Control Speed		-3000~3000	60	RPM
159	CLE Signal Fixed-length Control Pulse Quantity Low 4 bits		0~9999	0	PC
160	CLE Signal Fixed-length Control Pulse Quantity High 4 bits		0~9999	10	× 10000 Pc
161	CLE Signal Fixed-length Control Acceleration and Deceleration		1~200	10	
162	ACLR Signal Fixed-length Control Speed		-3000~3000	60	RPM
163	ACLR Signal Fixed-length Control Pulse Quantity Low 4 bits		0~9999	0	PC
164	ACLR Signal Fixed-length Control Pulse Quantity High 4 bits		0~9999	10	× 10000 PC
165	ACLR Signal Fixed-length Control Acceleration and Deceleration		1~200	10	
166	Internal Speed 5	#	-3000~3000	100	rpm
167	Internal Speed 6	#	-3000~3000	500	rpm

168	Internal Speed 7	#	-3000~3000	-500	rpm
169	Internal Speed 8	#	-3000~3000	-100	rpm
170	Speed Low Signal Filtering Time		1~30000	100	ms
171	MODBUS Action Signal Execution Status		0~1	Read Only	
172	MODBUS Absolute Coordinate Binary System Low 16 bits				
173	MODBUS Absolute Coordinate Binary System High 16 bits				
174	Power-on Self-zeroing Permission Bit		0~1	0	
175	Zeroing Speed		-3000~3000	300	rpm
176	Zeroing Acceleration and Deceleration		1~100	10	
177	Running Speed after Zeroing with Deceleration Switch on		-200~200	20	rpm
178	Zeroing Mode		0~2	1	
179	Deceleration Signal Selection at Zeroing Point		0~2	0	
180	Motor Rated Current	#	1~32000		0.01A
181	Counter Electromotive Force Coefficient				
182	D Axis Inductance				
183	Q Axis Inductance				
184	D/Q Axis Resistance				
185	Rotor Inertia				
186	Motor Rated Torque	#	1~32000		0.01 N.m

187	Torque Current Coefficient	#	1~1000		0.01 N.m/ A
188	Rated Speed	#	1~10000		rpm
189	Pulse Number of Every Rotor for the Encoder				
190	Motor Pole Pairs				
191	Encoder Type	!	0~10	0	
192	Encoder Zero Position	!	100~10000	2350	
193	Driver Model(Basic Current,Basic Voltage)	!	0~30		
194	Absolute Disc Code High 4 Bits		0-9999	13	
195	Absolute Disc Code Low 4 Bits		0-9999	1072	
196	RSTP Constant-speed Operation Speed		1~2000		
197	RSTP Constant-speed Operation Acceleration and Deceleration		1~100		
198	Modbus Motion Command Cache Mark Bit		0~1	0	
199	Communication Storing Status;When changing PA Parameter,can save and control		0~2,9	0	
200	Enable Mode		0~1	0	
201	IO Fixed-length Control Auto Return Delay Time		0~9999	10	0.1s

202	DAC0 Output Signal Selection	#	0~4	0	
203	DAC1 Output Signal Selection	#	0~4	1	
204	DAC0 Output Setting Value	#	0~4096	1024	
205	DAC1 Output Setting Value	#	0~4096	2048	
206	DAC Corresponding Rotor Speed of Output Speed Coordinate Upper Limit 5V		1~6000	3000	rpm
207	DAC Corresponding Rotor Speed of Output Speed Coordinate Lower Limit 0V		-6000~0	-3000	rpm
208	DAC Corresponding Torque of Output Torque Coordinate Upper Limit 5V		1~5000	2000	0.01 Nm
209	DAC Corresponding Torque of Output Torque Coordinate Lower Limit 5V		-5000~0	-2000	0.01 Nm
210	DAC Corresponding Current of Output Current Coordinate Upper Limit 5V		1~8000	2000	0.01A
211	DAC Corresponding Current of Output Current Coordinate Lower Limit 0V		-8000~0	-2000	0.01A

212	Lack Magnetic Compensating Current		0-20	0	0.01A
213					
214	Mode Change Delay Time		0-1000	2	0.1s
215	Mode Change time		2-3000	10	rpm
220	Zero Returning Request Signal Select		0~2	0	
221	ABS zero point position Single-cycle value		16bit no symbolic number	0	
222	ABS zero point position Multi-cycle value		16bit with symbolic number	0	
223	ABS zero point position setting signal selection		0~3	0	
224	ABS zero point position memory		0-1	0	
225	Absolute zero-returning mode		0-1	0	

6.2 Parameter Function

Serial No.	Name	Function	Factory Default	Range Unit
0	Password		315	
1	Model	■ Motor Model; ■ PA180~193 will be different after	14	

		setting the default value of different motors.		
2	Internal Torque Command Register	Source of internal torque mode command. ■ Select by PA59.	260	0.01 N.m
3	Initial Display Status	0~35.Serial number is corresponding to the number of DP-xx.	0	
4	Control Mode	■ 0.Position Control. ■1.Speed Control.(Internal,external) ■ 2.Speed trail Operation. ■ 3.JOG. ■ 4.Torque control Mode. (Internal,external) ■ 5~8.No. ■ 9.IO control fixed-length,fixed-speed control. ■ 10.RS485 MODBUS position mode. ■ 11. ■ 12.Speed Control. Internal 8 number sections.	0	0-18
5	Speed Gain	■ Set the proportional gain of the speed loop adjuster ■ The larger the setting value is, the gain will be higher and the stiffness higher. The value should be set according the model no of the servo drive and its load value.Generally, the greater the load inertia is, the bigger the setting value is.	400	1~1000 Hz

		■ If there is no vibration of the system, please set the value as big as possible.		
6	Speed Integral Time Constant	■ Set the integral time constant of the speed loop adjuster. ■ The smaller the setting value is, the faster the integral speed is and the stronger the system anti-deviation ability is. It meas the higher of the stiffness. If the value is too small, it will lead to overshoot easily.	1000	1~10000ms
7	Torque Command, Feedback Filter	■ Set Torque Command,feedback filter character; ■ To restrain the resonance from the torque; ■ The smaller the value is, the lower the cut-off frequency and the vibration and the noise from the motor will be. If the load inertia is bigger, please lower the setting accordingly. If the value is too small, it will let the response be slowly and may cause the vibration. ■ The greater the value is, the higher the cut-off frequency and the faster the response will be. If the torque response should be high, please increase the setting value accordingly.	20	Hz
8	Speed Given,Detection(Fe	■ Set both the Speed Given and Feedback Detection(the bigger the	200	Hz

	edback)Filter	value is, the heavier the filtering is.) ■ The bigger the value is, the lower the cut-off frequency and the noise from the motor will be. If the load inertia is bigger, please increase the setting value accordingly. If the value is too big, it will let the response be slowly and may cause the vibration. ■ The smaller the value is ,the higher the cut-off frequency and the faster the speed feedback response will be. If it should be high speed response, please lower the setting value accordingly.		
9	Position Gain	■ Set the proportional gain of position loop adjuster. ■ The higher the setting value is, the higher the gain and the stronger of the stiffness will, and the smaller of the position log value under the same frequency signal pulse will be. However, it will cause vibration and overshoot should the value is too big. ■ The value should be set according to the model no. of the servo drive and load.	200	1~2000 /s
10	Position Feed-forward Gain	■ Set the feed-forward gain of the position loop. ■ If the setting value is 100%, it means the position lag value is	0	0~2000 %

		always 0 under any frequency of command pulse. ■ Increase the feed-forward gain of the position loop, the high-speed response character of the control system will rise.However,it will make the position loop unstable and easy to cause vibration. ■ Only if it should be a higher response character, the feed-forward gain of position is normally 0.		
11	Position Feed-forward Filter Cut-off Frequency	■ Set the low-pass filter cut-off frequency of the position loop feed-forward value. ■ The function of the filter is to increase the stability of compound position control.	1	1~1200 Hz
12	Position Command Pulse Fractional Frequency Numerator	■ Set the fractional frequency(electronic gear) of position command pulse ■ Under position control mode, set the value of PA12,PA13, it can match the pulse source conveniently to reach the ideal control resolution(angle/pulse) for the user. P×G=N×C, P : the input command pulse number; G : electronic gear ; G=fractional frequency numerator ÷ fractional	1	1~1000

		frequency denominator N: Rotating laps of the motor; C : The pulse quantity of one rotating cycle of the motor. Eg,2500 wires incremental opto-electronic encoder,eg C=10000 (4 frequency doubling) 〖 eg 〗 If it is required the input command pulse is 6000,the servo motor rotate 1 cycle.Then the PA12 value is 5,and PA13 3. The recommended range of electronic gear ratio is :1/50<G<50 In addition, the absolute value encoder that is over 17 bits,all should count as 16 bits, namely, the pulse quantity of one cycle of the motor is 2^{16} =65536.		
13	Position Command Pulse Fractional Frequency Denominator	Check Parameter PA12	1	1~1000
14	Position Command Pulse Input Mode	■ Set the input mode of position command pulse. (Re power-on is needed!!!) ■ By setting the parameter to set one of the following 3 input modes: 0: Pulse + Symbol; (Count the rising edge) 1: Pulse + Symbol; (Count both the rising and the falling edges) 2: 2 phase orthogonal pulse input;	0	0~3

		3: CCW Pulse/CW Pulse; ■ CCW means counter clock-wise; ■ CW means clock-wise.		
15	Direction Negation of Position Command Pulse	Set the value as: 0: normal; 1 : The Direction of Position command pulse is negation.	0	0~1
16	Positioning Complete Range	■ Set the positioning complete pulse range under position control mode; ■ The drive can do judgment whether the position is completed under the position control mode by consulting the parameter. When the left pulse quantity in the position deviation counter is less than or equal the setting parameter. The drive will define the position is completed. The signal of position complete is COIN ON. or else it is COIN OFF. ■ Under position control mode, the output signal of position complete is COIN. While under other control mode, output speed arrival signal SCMP.	20	0~3000 0 pulse
17	Detection Range of Position Out of Tolerance	■ Set detection range of position out of tolerance. ■ Under position control mode, when the value of the counter of position deviation is overpass the	400	0~5000 × 100 Pulse

		parameter value, the servo drive will do a position deviation alarm.		
18	Error Invalid of Position Out of Tolerance	Set the value as: ■ 0: Valid of Detection of Position Out of Tolerance Alarm; ■ 1: Invalid of Detection of Position out of tolerance Alarm, stop to detect the error of position out of tolerance.	0	0~1
20	Input Invalid of Drive Forbid	Set the value as: ■ 0: CCW, CW input forbid valid. When the CCW drive forbid switch (FSTP) on, CCW drive is allowed;When CCW drive forbid switch (FSTP) off, CCW direction torque keep as 0;CW is also in the same way. If CCW,CW drives are all OFF,there will have Alarm of the drive forbid input error ■ 1: Cancel CCW,CW input forbid. No matter what status the switches of CCW and CW drive forbid is, CCW,CW drive are all allowed. If the drive forbid of CCW, CW are off, there will have no Alarm of drive forbid input error.	1	0~1
21	JOG Operation Speed	Set JOG Operation Speed.	120	-3000 ~3000 RPM
22	Command Selection of Internal and	Set the value as ■ 0: Speed command is from internal speed, the choice of the	0	0~2

	External Speed	speed designed by the SC1 and SC2 of IO; ■ 1:Speed command is from the external analog input; -10V ~ 10V ; ■ 2:Speed command is from external analog input ,uni-polarity 0 ~ 10V,speed direction is control by FIL(CCW torque restriction),RIL(CW torque restriction),FIL means valid CCW rotor,while RIL means valid CW rotor. The speed is zero when they are all invalid or valid. Under this mode, the external torque restriction of PA36,PA37 have no function.		
23	The Maximum Speed Restriction, Over-speed Alarm Valve Value	■ Set the Maximum Speed Restriction of the servo motor. ■ Not relevant with rotor direction. ■ If the set value is over the rated speed PA188, the real highest restricted speed is rated speed.	3000	0~4000 r/min
24	Internal Speed 1	Set the value of internal speed 1 ■ Under speed control mode, when SC1=OFF,SC2=OFF, select internal speed 1 as the speed command.	100	-3000~ 3000 r/min
25	Internal Speed 2	Set the value of internal speed 2 ■ Under speed control mode, when SC1=ON,SC2=OFF, select internal speed 2 as the speed command.	500	-3000~ 3000 r/min
26	Internal Speed 3	Set the value of internal speed 3 ■ Under speed control mode, when SC1=OFF,SC2=ON, select internal	-500	-3000~ 3000 r/min

		speed 3 as the speed command.		
27	Internal Speed 4	Set the value of internal speed 4 ■ Under speed control mode, when SC1=ON,SC2=ON, select internal speed 4 as the speed command.	-100	-3000~3000 r/min
28	Arrival Speed	Set the arrival speed value. ■Under non-position control mode, if the speed of the motor is over the set value,COIN ON;or else,COIN OFF. ■ Under position control mode, the parameter is invalid. ■ Not relevant with the rotor direction. ■ There is a little delay of the signal.	5	0~3000 r/min
29	Input Gain of Analog Torque Command	■ The percentage ratio of the corresponding motor output current Ie(torque Te) of 1V analog command ■ For example, rated current Ie=PA180=4A,PA29=30, then the 1V analog motor output current is 1.2A.	30	10~100 %
30	Overload Alarm of User Torque	■ Set the overload value of user torque, the value is the percentage ratio of rated torque. The torque restriction value has no direction restriction, protect both CW and CCW; ■ When PA31>0 , Motor torque>PA30, lasting time>PA31, the drive has a alarm with signal of	300	1~300 %

		Err-29,the motor will stop. When there is an alarm, it is a must to re-power on to clear the alarm.		
31	Overload Alarm Detection Time of User Torque	■ Detection time of user torque overload, the unit is ms; ■ When the value is 0, forbid the alarm function of user torque overload.	10	0~30000ms
33	Direction Negation of Analog Torque Command	Set the value as 0: Normal; 1: Opposite direction of the analog command direction.	0	0~1
34	Internal CCW Torque Restriction	Set the internal torque restriction value in CCW direction of the servo motor. ■The setting value is the percentage of the rated torque,eg, if the set value is the 2 times of the rated torque, the setting value is 200. ■ The restriction is valid at any time. ■ If the setting value is over the maximum overload capacity permitted by the system, then the torque restriction value is the maximum overload capacity permitted by the system.	300	0~300%
35	Internal CW Torque Restriction	Set the internal torque restriction value in CW direction of the servo motor. ■The setting value is the percentage of the rated torque,eg, if the set	-300	-300~0%

		value is the 2 times of the rated torque, the setting value is -200. ■ The restriction is valid at any time. ■ If the setting value is over the maximum overload capacity permitted by the system, then the torque restriction value is the maximum overload capacity permitted by the system.		
36	External CCW Torque Restriction	Set the external torque restriction value in CCW direction of the servo motor. ■The setting value is the percentage of the rated torque,eg, if the set value is the 1 times of the rated torque, the setting value is 100. ■ The restriction is valid only when The CCW torque restriction input terminal (FIL) is ON。 ■ When the restriction is valid, the actual torque restriction is the smallest value among the maximum overload capacity permitted by the system,internal CCW torque restriction and external CCW torque restriction.	150	0~150 %
37	External CW Torque Restriction	Set the external torque restriction value in CW direction of the servo motor. ■The setting value is the percentage of the rated torque,eg, if the set	-150,	-150~0 %

		value is the 1 times of the rated torque, the setting value is -100. ■ The restriction is valid only when The CW torque restriction input terminal (RIL) is ON。 ■ When the restriction is valid, the actual torque restriction is the smallest value among the maximum overload capacity permitted by the system,internal CW torque restriction and external CW torque restriction.		
38	Speed Trail Operation and JOG Operation Torque Restriction	Set the torque restriction value under speed trail operation and JOG operation. ■ Not relevant to the rotor direction,Both directions are valid. ■ The setting value is the percentage of the rated torque,eg, if the set value is the 1 times of the rated torque, the setting value is 100. ■ It is also valid for internal and external torque restrictions.	100	0~100 %
39	Zero Offset Compensation of Analog Torque Command	-2000~200;It will collect the voltage of VSP as the 0 point when the power is on.	0	
40	Acceleration Time Constant	The setting value means the acceleration time of the motor from 0 to 1000r/min.	10	0~10000ms

		■ The acceleration and deceleration character is linear type. ■Apply only to speed control mode, it is invalid to position control mode. ■ The parameter should set as 0, if the drive is applied combining with the external position loop.		
41	Deceleration Time Constant	The setting value means the deceleration time of the motor from 1000rpm to 0. ■ The acceleration and deceleration character is linear type. ■Apply only to speed control mode, it is invalid to position control mode. ■ The parameter should set as 0, if the drive is applied combining with the external position loop.	10	0~10000ms
42				
43	Input Gain of Analog Speed Command	Set the proportional relation between the analog speed input voltage and motor real rotor speed. Namely, the corresponding rpm speed of 1V command.	300	10~3000 RPM/V
44	Direction Negation of Analog Speed Command	0~1; Polarity Reverse of Analog Speed Input. ■ Set the value as 0,when the analog speed command is positive,the speed direction is CCW; ■ Set the value as 1,when the analog speed command is positive,	0	0~1

		the speed direction is CW.		
45	Zero Offset Compensation of Analog Speed Command	Zero offset compensation value of analog speed input.The Unit is mV。Adjusting speed rpm=(PA45÷1000) ×PA43	0	-1500~1500
46	Analog Speed,Torque Command Filter	Low-pass filter of analog command input. ■ The smaller the value is, the faster the response speed to speed input analog and the stronger the influence of signal noise; ■ The bigger the value is, the slower the response speed and the weaker the influence of signal noise.	300	1~1000 Hz
47	Action Setting of Mechanical Brake When Motor Stopped	Define the delay time when the motor stopping rotates from the mechanical brake action to switch off of the current(Output terminal BRK from ON to OFF); ■ The parameter should not be less than the delay time of mechanical brake(Tb),in case of the small displacement or artifacts fall; ■ See fig.9-5 of the corresponding sequence	0	0~200 ×10ms
48	Action Setting of Mechanical Brake When Motor Rotating	Define the delay time when the motor rotating form the switch off the current of motor and mechanical brake action(Output terminal BRK from ON to OFF) ; ■ This parameter setting is to avoid the damage to the brake by	50	0~200 ×10ms

		making the motor reduce to low speed from a high rotating speed and let the mechanic brake action ; ■ The real action time is PA48 or the time the motor decelerating to the value of PA49, to choose the smaller one between the two values; ■ See fig.9-6 of check the corresponding sequence		
49	Action Speed of Mechanical Brake When Motor Rotating	Define the speed value when the motor rotating form the switch off the current of motor and mechanical brake action(Output terminal BRK from ON to OFF) ; ■ This parameter setting is to avoid the damage to the brake by making the motor reduce to low speed from a high rotating speed and let the mechanic brake action ; ■ The real action time is PA48 or the time the motor decelerating to the value of PA49, to choose the smaller one between the two values; ■ See fig.9-6 of check the corresponding sequence	100	0~3000 r/min
50	Speed Restriction of Torque Control	The maximum speed restriction of the torque control	3000	0~5000 rpm
53	Low 4 Bits Input Terminal Forcing ON Control Word	■ The binary edit ■ Set the input terminal internal forcible ON valid.It needs to have a outer wiring to control ON/OFF for the terminal without forcible ON. It	0000	0000~ 1111

<table>
<tr><td></td><td></td><td>is no need to have outer wiring for the terminal with forcible ON. The drive will be auto-ON internally.
■ To apply 4bit binary numbers to indicate, 0 means the input terminal without forcible ON,1 means the input terminal with forcible ON. The input terminal of the binary number is as the follow:

<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>RSTP</td><td>FSTP</td><td>ALRS</td><td>SON</td></tr></table>SON: Servo is ON;
ALRS: Alarm clear;
FSTP: CCW drive forbids;
RSTP: CW drive forbids;</td><td></td><td></td></tr>
<tr><td>54</td><td>High 4 Bits Input Terminal Forcing ON Control Word</td><td>■ The binary edit
■ Set the input terminal internal forcible ON valid.It needs to have a outer wiring to control ON/OFF for the terminal without forcible ON. It is no need to have outer wiring for the terminal with forcible ON. The drive will be auto-ON internally.
■ To apply 4bit binary numbers to indicate, 0 means the input terminal without forcible ON,1 means the input terminal with forcible ON. The input terminal of the binary number is as the follow:
<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr></table></td><td>0000</td><td>0000~ 1111</td></tr>
</table>

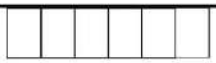
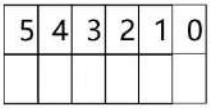
		<table><tr><td>RIL</td><td>FIL</td><td>INH /SC2</td><td>CLE/SC1 /ZERO SPD</td></tr></table> CLE/SC1/ZEROSPD : Deviation Counter Clear/Speed Selection 1/Zero Speed Clamping; INH/SC2: Command Pulse forbid / Speed Selection 2; FIL: CCW Torque Restriction; RIL: CW Torque Restriction.		
55	Low 4 Bits Input Terminal Negation Control Word	■ The binary edit ■ Set the input terminal negation. The terminal without negation, it is valid when the switch is On, invalid when the switch is Off.The terminal with negation ,it is invalid when the switch is On, and valid when the switch is Off. ■ To apply 4bit binary numbers to indicate, 0 means the input terminal without negation,1 means the input terminal with negation. The input terminal of the binary number is as the follow: <table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>RSTP</td><td>FSTP</td><td>ALRS</td><td>SON</td></tr></table> SON: Servo is ON; ALRS: Alarm clear; FSTP: CCW drive forbids;	0000	0000~ 1111

<table>
<tr><td></td><td></td><td>RSTP: CW drive forbids;</td><td></td><td></td></tr>
<tr><td>56</td><td>High 4 Bits Input Terminal Negation Control Word</td><td>■ The binary edit
■ Set the input terminal negation. The terminal without negation, it is valid when the switch is On, invalid when the switch is Off.The terminal with negation ,it is invalid when the switch is On, and valid when the switch is Off.
■ To apply 4bit binary numbers to indicate, 0 means the input terminal without negation,1 means the input terminal with negation. The input terminal of the binary number is as the follow:
<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>RIL</td><td>FIL</td><td>INH/SC 2</td><td>CLE/SC1/ZER SPD</td></tr></table>CLE/SC1/ZEROSPD : Deviation Counter Clear/Speed Selection 1/Zero Speed Clamping;
INH/SC2: Command Pulse forbid / Speed Selection 2;
FIL: CCW Torque Restriction;
RIL: CW Torque Restriction.</td><td>0000</td><td>0000~ 1111</td></tr>
<tr><td>57</td><td>Output Terminal Negation Control Word</td><td>■ The binary edit
■ BRK+COIN+ALM+SRDY (bit0)
Set the output terminal negation. The definition of breakover and cutoff for the negation terminal is</td><td>0000</td><td>0000~ 1111</td></tr>
</table>

<table>
<tr><td></td><td></td><td>exactly the opposite with the standard one;
■ To apply 4bit binary numbers to indicate, 0 means the input terminal without negation,1 means the input terminal with negation. The input terminal of the binary number is as the follow:
<table><tr><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td>BRK</td><td>COIN</td><td>ALM</td><td>SRDY</td></tr></table>SRDY: Servo is On;
ALM: Servo Alarm;
COIN : location complete/speed arrival;
BRK:mechanical braking release.</td><td></td><td></td></tr>
<tr><td>59</td><td>Analog Torque Command Source Selection</td><td>■ 0=Analog Voltage Mode ; PA33 Negation of the setting direction , PA50 Torque Restriction
■ 1=Internal Command Register Mode (PA2)</td><td>0</td><td>0~1</td></tr>
<tr><td>60</td><td>Current Gain</td><td>Set the proportional gain of current loop adjuster.
■ The bigger the setting value is, the bigger the gain is ,the higher the stiffness is,the smaller position lag under the same frequency command pulse is.
But it will cause vibration and overshoot if the value is too big.
■The parameter value is relevant to the motor. Users cannot modify.</td><td>90</td><td>1~2000
0</td></tr>
</table>

61	Current Integral	Set the integral time constant of the current loop adjuster. ■ The smaller the setting value is, the faster the integral speed is, the stronger the anti-deviation of the system is. It means the stronger the stiffness is. If the stiffness is not strong, it can cause overshoot easily. ■The parameter value is relevant to the motor. Users cannot modify.	225	1~10000
62	Over Voltage Alarm Time	Detection Alarm time of the over-voltage of the busbar voltage	500	1~10000ms
63	Software Over-current Alarm Time	Software Over-current Detection Alarm Time ■ If there is over-current of any phase, the valve value is 0.95 times of the maximum range of hardware current detection.	50	1~1000 ms
64	Thermal Overload Alarm Starting Detection Point	Set the starting detection point of motor overload current ■ The set value is the current value. The unit is the percentage of the rated current. ■ When the current of the motor is low to the starting point, the electronic overload counter in the system will not work,it means not detection the motor overload;When the current of the motor is high to the starting point, the electronic	150	100~300%

		overload counter in the system will work;When the value of the counter is over the valve value(PA64*PA65),there is motor overload alarm. The higher the times of the motor overload is, the shorter the time is to have an alarm. Valve value=PA64*PA65 ■ Generally,PA180<PA64<PA30,Otherwise, there is no condition to have overheat load or overload detection. ■ It is factory default setting,user cannot edit.		
65	Thermal Overload Alarm Time	Set Heat overload Alarm Valve Time ■ Heat Overload Alarm Valve Value= PA64×PA65。	3600	0~30000s
66	Speed PID Saturation Alarm Time	Speed PID Saturation Alarm Time ■ 0=No Alarm	10000	0~10000ms
67	Braking Alarm Time(Discharging Cycles)	Alarm Detection Time of Continuous Discharging	2000	1~10000*100us
68	Alarm Shielding 1-6	■ The binary edit ■ 1=Alarm Shielding ■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following. 5 4 3 2 1 0	000000	000000 ~ 111111

		 0=motor over-speed ERR-1 1=Over voltage ERR-2 2=Under voltage ERR-3 3=Error of Position Out-of-tolerance ERR-4 4=Motor overheat ERR-5 5=Error of Speed loop integral Saturation ERR-6		
69	Alarm Shielding 7-12	■ The binary edit ■ 1=Alarm Shielding ■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following.  0=Error of Drive Forbid ERR-7 1=Over a certain range of the feedback counter value for the position loop ERR-8 2=Logic Error of the encoder,all high or all low ERR-9 3= Controlling Power Error ERR-10 4=no definition 5=The current of every phase exceeds the set time of the maximum current, there is a alarm for over-current. ERR-12	000000	000000 ~ 111111
70	Alarm Shielding 13-18	■ The binary edit ■ 1=Alarm Shielding	000000	000000 ~

		■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following. 5 4 3 2 1 0 0=Overload ERR-13 1=Braking Error, ERR-14 2=Pulse loss of Count Error of Coded Disc ERR-15 3=Continuous braking of the brake circuit ERR-17		111111
71	Alarm Shielding 19-24	■ The binary edit ■ 1=Alarm Shielding ■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following. 5 4 3 2 1 0 0=Over temperature ERR-19 1=EEPROM Error ERR-20 4=Zero point Error of AD current ERR-23	000000	000000 ~ 111111
72	Alarm Shielding 25-30	■ The binary edit ■ 1=Alarm Shielding ■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following.	000000	000000 ~ 111111

		<table><tr><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> 2=Error of power wire disconnection ERR-27 3=buff overflow of Parameter Storage ERR-28 4=the setting torque exceed the overload and setting time set by the user ERR-29 5=Error of the loss of Z pulse ERR-30		
73	Alarm Shielding 31-36	■ The binary edit ■ 1=Alarm Shielding ■ To indicate by 6bit binary numbers, 0 is no shielding,1 shielding. The input terminals of the binary number is in the following. <table><tr><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	000000	000000 ~ 111111
74	RS232 Serial Port Enabled is also Baud Rate Selection	Serial Port Enabled is also Baud Rate selection. ■ 0=Close the serial port ■ 1= 115200; ■ 2= 57600; ■ 3= 38400; ■ 4= 19200; ■ 5= 9600; ■ 6= 4800; ■ 7= 2400; ■ 8= 1200;	5	0~10

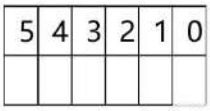
		■ 9= 600; ■ 10= 300; ■ Others= 230400;		
80	Braking Discharging Cycle	The Discharging Cycle Quantity Every Time, 100us basic Unit	10	2~200 pcs
81	Discharging Duty Cycle	Discharging Duty Cycle, the cycle is 100us	50	0~75 %
82	Discharging Off Voltage	Voltage of Discharging Off.When it is under the voltage, the discharging is off.	360	0~1000 V
83	Discharging On Voltage	Voltage of Discharging On.When it is over the voltage, the discharging is on.	380	0~1000 V
84	Under-voltage Valve Value	Under-voltage valve value, if it is lower than the voltage. There is a over-voltage alarm.	120	0~1000 V
85	Over-voltage Valve Value	Over-voltage valve value, if it exceeds the voltage. There is a over-voltage alarm.	400	0~1000 V
86	Discharging Voltage Filter	Time of Discharging Detection filter	10	1~20000ms
88	Coded Signal Digital Filtering	Hardware Digital filter of output IO port ■The bigger the value is, the heavier the digital filter is. If the value is too big, it will filter the real signal. Therefore the filter time cannot exceed the actual pulse. ■ The smaller the value is,the filter effect is less obvious.	5	1~255 ×28ns
89	Wire Numbers after Encoder	Set the any fractional frequency of the coded disc response.	10000	1~10000

	Fractional Frequency			
90	Feedback Direction of Encoder Fractional Frequency	■ 0=normal direction ■ 1=Negation of the feedback direction	0	0~1
91	Pulse Digital Filtering Factor	Digital filter of pulse and direction port. Unit:28us ■The bigger the value is, the heavier the digital filter is. If the value is too big, it will filter the real signal. Therefore the filter time cannot exceed the actual pulse. ■ The smaller the value is,the filter effect is less obvious. ■ If the interference is bigger, please increase the value accordingly.	23	1~255 ×28us
92	Normal Disc:Extend Width Setting of Z Pulse; Absolute Disc:Multi-cycle value(Read Only)	Width expansion of encoder Z signal, Unit:0.1us	110	1~255 ×3.6us
95	Pull-in Voltage of Busbar Relay	The voltage of the busbar is over the value, then the Busbar relay will be pull-in.	250	0~1000 V
96	DI1 Filter Time-SON	Software digital filter	2	0~1000 ×500us
97	DI2 Filter Time-ALRS	Software digital filter	2	0~1000 ×500us
98	DI3 Filter Time-FSTP	Software digital filter	2	0~1000 ×500us

99	DI4 Filter Time-RSTP	Software digital filter	2	0~1000 ×500us
100	DI5 Filter Time-CLE/SC1/ZERO_SPD	Software digital filter	2	0~1000 ×500us
101	DI6 Filter Time-INH/SC2	Software digital filter	2	0~1000 ×500us
102	DI7 Filter Time-FIL	Software digital filter	2	0~1000 ×500us
103	DI8 Filter Time-RIL	Software digital filter	2	0~1000 ×500us
106	RS485 Baud Rate Selection	RS485 communication Baud Rate Selection (bps) 1=4800 2=9600 3=19200 4=38400 5=57600 6=115200 Others=9600	2	1~6
107	RS485 MODBUS Communication Data Protocol	RS485 MODBUS Communication Data Protocol 0=ASCII，8 data,2 stop，no verify 1=ASCII，8 data,1 stop，no verify 2=ASCII，8 data,1 stop，even verify 3=ASCII，8 data,1 stop，odd verify 4=ASCII，8 data,2 stop，even verify 5=ASCII，8 data,2 stop，odd verify 6=RTU，8 data,1 stop，no verify 7=RTU，8 data,1 stop，even verify 8=RTU，8 data,1 stop，odd verify 9=RTU,8 data,2 stop，odd verify	6	0~8
108	RS485 Slave	RS485 slave computer ID address;	1	0~247

	Computer ID Address	0=Broadcasting address.		
109	Alarm Shielding 37-42		0	0~63
110	Alarm Shielding 43-48		0	0~63
111	Alarm Shielding 49-54		0	0~63
112	Alarm Shielding 55-60		0	0~63
113	Alarm Shielding 61-66		0	0~63
114	Alarm Shielding 67-72		0	0~63
115	Alarm Shielding 73-78	■ The binary edit ■ 1=Alarm Shielding ■ To describe with 6 bit binary numbers,when the bit is 0, it is means no shielding,1 shielding.The input terminal of the binary number is as the follow. 5 4 3 2 1 0 0=when ARM and CPLD communication, there is a error to set output IO port,it is ERR-73 1=when ARM and CPLD communication, there is a error to set pulse encoder filter,it is ERR-74 2=Error of setting CPLD fractional frequency, it is ERR-75 3=Error of setting the expand width	0	0~63

		of Z pulse, it is ERR-76 4=Error of reading UVW signal, it is ERR-77 5=Error of reading the set verification value of the CPLD and ARM communication,it is ERR-78		
116	Alarm Shielding 79-84	■ The binary edit ■ 1=Alarm Shielding ■ To describe with 6 bit binary numbers,when the bit is 0, it is means no shielding,1 shielding.The input terminal of the binary number is as the follow. 5 4 3 2 1 0 0=Error of reading the IO port of communication, it is ERR-79 1=Error of reading the measuring speed value of CPLD,it is ERR-80 2=Error of read other fault level of CPLD, it is ERR-81	0	0~63
118	Alarm Shielding 91-96	■ The binary edit ■ 1=Alarm Shielding ■ To describe with 6 bit binary numbers,when the bit is 0, it is means no shielding,1 shielding.The input terminal of the binary number is as the follow. 5 4 3 2 1 0 0= 1=	0	0~63

		2=Absolute Encoder Battery Alarm ERR-96		
119	Alarm Shielding 97-102	■ The binary edit ■ 1=Alarm Shielding ■ To describe with 6 bit binary numbers,when the bit is 0, it is means no shielding,1 shielding.The input terminal of the binary number is as the follow.  0=Absolute Encoder Batter Voltage Low ERR-97 1=Absolute Encoder Overheat ERR-98 2=Absolute Encoder Communication Error ERR-99	0	0~63
120	Alarm Shielding 103-108			
124	Positive Direction Dead Zone of Analog Speed	In the range of positive direction zero speed to dead zone, the rotor speed is 0; Rotor speed of dead zone point: rpm=PA124÷1000×PA43	0	mV
125	Negative Direction Dead Zone of Analog Speed	In the range of negative direction zero speed to dead zone, the rotor speed is 0; Rotor speed of dead zone point:	0	mV

		rpm= PA125÷1000×PA43		
126	Positive Direction Dead Zone of Analog Torque	In the range of positive direction torque to dead zone, the Torque is 0;	0	mV
127	Negative Direction Dead Zone of Analog Torque	In the range of negative direction torque to dead zone, the Torque is 0;	0	mV
135	Under Voltage Protection Time		500	1~10000ms
136	Over Temperature Protection Time		500	1~10000ms
138	d axis electric current loop ratio	Same as PA60	90	0~20000
139	d axis electric current loop integral	Same as PA61	225	1~10000
140	Pulse Low-pass Filtering Time	Position command smoothing filer, the lower the value is, the faster the response speed is.0=no filter.	0	0~1000
141	Pulse Smoothing Filtering Time	Position command smoothing filer, the lower the value is, the faster the response speed is.0=no filter.	0	0~1000
142	Position Loop Output Positive Amplitude		1200	0~3050
143	Position Loop Output Negative Amplitude		-1200	-3050~0

144	Absolute Disc Single-Cycle low 16bit	Read Only. Low 16bit		0-65535
145	Absolute Disc Single-Cycle high bit	Read Only. 17bit Disc, high 1bit 23bit Disc, high7bit		
146	Absolute Disc Multi-Cycle	Read Only		0-65535
147				
148	INH Signal Fixed-length Control Speed	INH signal edge valid		rpm
149	INH Signal Fixed-length Control Number Low 4 Bits	Total displacement pulse numbers=PA150×10000+PA149	0	Pulse numbers
150	INH Signal Fixed-length Control Number High 4 Bits		10	10000 Pulses
151	INH Signal Fixed-length Control Acceleration and Deceleration		10	2000rpm/s
152				
153	Low Speed Output COIN Signal Valve Value	With current command, but the speed is lower than PA153, there is output COIN signal.	10	rpm
154	Torque Arrival Point of Torque	Torque arrival point. The Unit is the percentage of rated torque. When	1000	1~5000 ×

	Arrival Output Signal COIN	the output current of the motor arrived PA154, the COIN is valid.		0.01N.m
155	COIN Signal Source	■ 0=Position arrival or Speed arrival;At this time, If PA4=0 (Position mode) ,COIN means the position arrival; If PA4=1 (Speed mode) , COIN means the speed arrival; ■ 1=torque arrival 1. PA4=whatever position mode,speed mode or torque mode,COIN can means torque arrival;the real output torque is over or equal to the value of Pa154,COIN signal output is valid. ■ 2=low speed abnormal.There is SON signal and the command is not zero,but the speed is less than PA153 , and the lasting time as PA170,COIN signal output is valid. ■ 3=The torque output of the motor reached the max value set by Pa34/Pa35. ■ 4=torque arrival 2. PA4=whatever position mode,speed mode or torque mode,COIN can means torque arrival;The difference of the real output torque and torque command is less than Pa154 value,COIN signal is valid.	0	0~3
156	Torque Arrival	Output COIN signal detection	100	1~3000

	Signal Detection Filtering Time	filtering time after the torque is arrived.		0ms
157	Auto Zero Off-set Compensation Permission Bit of Analog Command Power On	0=permit.1=not permitted. When it is permitted power-on auto compensation, it will read AD value as the zero point value and change PA39 and PA45.	0	
158	CLE Signal Fixed-length Control Speed	CLE signal edge valid	60	rpm
159	CLE Signal Fixed-length Control Pulse Number Low 4 Bits	Total Displacement pulse numbers=PA160×10000+PA159	0	Pulse numbers
160	CLE Signal Fixed-length Control Pulse Number High 4 Bits		10	10000 pulses
161	CLE Signal Fixed-length Control Acceleration and Deceleration		10	2000rpm/s
162	ACLR Signal Fixed-length Control Speed		60	rpm
163	ACLR Signal Fixed-length Control Pulse Number Low 4 Bits	Total Displacement pulse numbers=PA164×10000+PA163	0	Pulse numbers
164	ACLR Signal Fixed-length		10	10000 Pulses

	Control Pulse Number High 4 Bits			
165	ACLR Signal Fixed-length Control Acceleration and Deceleration		10	2000rpm/s
166	Internal Speed 5	Set the internal speed 5,It is workable when PA4=12 ■ Under speed control mode,when ACLR=ON,SC1=OFF , SC2=OFF,select the Internal Speed 5 as the speed command.	100	-3000~3000 r/min
167	Internal Speed 6	Set the internal speed 6,It is workable when PA4=12 ■ Under speed control mode,when ACLR=ON,SC1=ON, SC2=OFF,select the Internal Speed 6 as the speed command.	500	-3000~3000 r/min
168	Internal Speed 7	Set the internal speed 7,It is workable when PA4=12 ■ Under speed control mode,when ACLR=ON,SC1=OFF , SC2=ON,select the Internal Speed 7 as the speed command.	-500	-3000~3000 r/min
169	Internal Speed 8	Set the internal speed 8,It is workable when PA4=12 ■ Under speed control mode,when ACLR=ON,SC1=ON, SC2=ON,select the Internal Speed 8 as the speed command.	-100	-3000~3000 r/min
170	Low-speed Alarm	When PA155=2 , the current	100	ms

	Filtering Time	command is over 0, but the speed is less than PA153,lasting time overPA170, there is output of COIN signal.		
171	MODBUS Action Command Operation Status	0=Command execution complete, 1=Command is under execution.		Read Only
172	MODBUS Absolute Coordinator Binary System Low 16 Bits	MODBUS absolute coordinates.There is symbol binary number.Actual value=PA173m move 16 bit to the left+ PA172.		
173	MODBUS Absolute Coordinator Binary System High 16 Bits			
174	Power on Auto Zeroing Permission Bit	0= Auto zeroing is not permitted. 1=Auto zeroing is permitted.	0	
175	Zeroing Speed		300	-3000~3000 rpm
176	Zeroing Acceleration and Deceleration		10	2000rpm/s
177	Operation Speed when Zeroing with deceleration switch off		20	-200~200
178	Zeroing Mode	0=when there is a deceleration switch,stop instantly; 1=when there is a deceleration switch and decelerated to PA177, stop instantly; 2=When there is a deceleration	1	

		switch and decelerated to PA177 and the motor has a Z signal, stop instantly.		
179	Acceleration Signal Selection at return-to-zero point	0=no this function. 1=RSTP signal 2=FSTP signal. 3=INH signal. The selected signal cannot work as the original function of the servo . Therefore, it is advised to apply the signal not used by the system as the signal for zeroing acceleration switch. It need to set PA20 to 0,when select RSTP/FSTP.	0	
180	Motor Rated Current			A
181	Counter Electromotive Force Coefficient			
182	D Axis Inductance			
183	Q Axis Inductance			
184	D/Q Axis Resistance			
185	Rotor Inertia			
186	Motor Rated Torque			N.m
187	Torque Current Coefficient			
188	Rated Speed			
189	Number of Pulses Per Cycle of the Encoder			
190	Number of			

	Pole-pairs of the Motor			
191	Encoder Type	0=normal coded disc; 1=Tamagawa wire-saving coded disc;2=Tamagawa motor(Huada wire-saving motor);10=Tamagawa 17 bit absolute coded disc;11=Tamagawa 23 bit absolute coded disc		
192	Zero Position of the Encoder			
193	Driver Model(Basic Current,Basic Voltage)	220VAC: (Below 0.9 Edition) 0=15B2 (20.63A , 20A Module 0.01R) ; 1=30B2 (41.26A , 30A Module ,0.005R) ; 2=10B2 (10.32A , 15A Module,0.02R) ; 3=50B2 (68.75A , 50A Module,0.003R) ; 4=75B2 (103.15A,75A Module,0.002R) ; 6=05B2 (5.16A , 10A Module , 0.04R) ; 7=02B2 (2.58A , 10A Module , 0.08R) ; 220VAC: (Up 0.9 Edition) 0=02B2 (2.58A , 10A Module , 0.08R) ; 1=05B2 (5.16A , 10A Module , 0.04R) ; 2=10B2 (10.32A , 15A	0	0~4

		Module,0.02R) ; 3=15B2 (20.63A , 20A Module 0.01R) ; 4=20B2 (20.63A , 20AModule 0.01R) ; 5=30B2 (41.26A, 30A Module,0.005R); 6=50B2 (68.75A, 50A Module,0.003R); 7=75B2 (103.15A,75A Module,0.002R) ; 8=100B2(206.3A,75A Module ,0.001R) ; 380VAC: 10=3_10B2 () ; 11=3_15B2 () ; 12=3_20B2 () ; 13=3_35B2 () ; 14=3_50B2 () ; 15=3_75B2 () ; 16=3_100B2 () ;		
194	Absolute Value Coded Disc One Loop High 4 Bits(Decimal System)	Resolution ratio of absolute encoder=PA194×1000+PA195 ; eg 17bit coded disc , one loop value=131072,then the high 4 bits is 13,the low 4 bits is 1072	13	
195	Absolute Value Coded Disc One Loop Low 4 Bits(Decimal System)		1072	
196	RSTP Fixed Speed Operated Speed	IO Fixed Speed Control Speed	1000	1~2000
197	RSTP Fixed Speed	IO Fixed Speed Control Acceleration	10	1~100

	Operated Acceleration and Deceleration	and Deceleration		
198	Modbus Motion Command Cache Mark Bit	0=Command Cache no command,can receive motion command. 1=Cache have command.don' t accept new command.	0	0~1
199	Communication Storing Status;When changing PA Parameter,can save and control	0~2: storing status when excuting storing command; 0: after parameter changed,the parameter in the system will restore,all changed parameter will be valid at once,but not save to EEPROM; 8:After changed parameter,the parameter in the system will not restore," !" type parameter is invalid," #" type parameter is valid at once,but not save to EEPROM; 9:After changed parameter,all the parameter in the system will restore and is valid at once,they will be saved to EEPROM; 10:After change the parameter,save to EEPROM, the parameter in the system will not restore." !" type parameter is valid after re-power on," #" type parameter is valid at once	0	0~2 8,9,10
200	Enable Mode	0=low level valid	0	0~1
201	IO Fixed-length	IO fixed-length mode ,before	10	0-9999

	Control Auto-return Delay Time	auto-return, the Stationary Delay time		×0.1s
202	DAC0 Output Signal Selection	DAC01 output physical quantity selection, transmission delay:67ms。 ■ 0=Speed (filtering) ■ 1=Torque (filtering) ■ 2=Current (filtering) ■ 3=Peak Torque (renew every 1s) ■ 4=electrical angle ■ 5=Output PA204 setting value 0~5V ■ 6=speed command ■ 7 ■ 8 ■ 20=Speed (filtering) ,negation output ■ 21=Torque (filtering) ,negation output ■ 22=current (filtering) ,negation output	0	0~5
203	DAC1 Output Signal Selection	DAC02 output physical quantity selection, transmission delay:67ms。 ■ 0=Speed (filtering) ■ 1=Torque (filtering) ■ 2=Current (filtering) ■ 3=Peak Torque (renew every 1s) ■ 4=electrical angle ■ 5=Output PA205 setting value 0~5V ■ 6=speed command ■ 7	0	0~5

		■ 8 ■ 20=Speed (filtering) ,negation output ■ 21=Torque (filtering) ,negation output ■ 22=current (filtering) ,negation output		
204	DAC0 Output Setting Value	Output setting 0~4096 is 0~5V Output voltage=PA204 × 5V ÷ 4096(V)	1024	0~4095
205	DAC1 Output Setting Value	Output setting 0-4096 is 0-5V Output voltage=PA205 × 5V ÷ 4096(V)	2048	0~4095
206	DAC Corresponding Rotating Speed of Output Speed with Coordinator Upper Limit 5V	Set the coordinator Upper limit	3000	1~6000 rpm
207	DAC Corresponding Rotating Speed of Output Speed with Coordinator Lower Limit 0V	Set the coordinator lower limit	-3000	-6000~0 rpm
208	DAC Corresponding Torque of Output Torque with Coordinator Upper Limit 5V	Set the coordinator upper limit	5000	1~5000 ×0.01N.m
209	DAC	Set the coordinator lower limit	-5000	-5000~

	Corresponding Torque of Output Torque with Coordinator Lower Limit 0V			0×0.01 N.m
210	DAC Corresponding Current of Output Current with Coordinator Upper Limit 5V	Set the coordinator upper limit	8000	1~8000 ×0.01A
211	DAC Corresponding Current of Output Current with Coordinator Lower Limit 0V	Set the coordinator lower limit	-8000	-8000~ 0×0.01 A
212	Lack Magnetic Compensation Current	If the value is not zero, then it is lack magnetic control	0	0-20 0.01A
214	Mode Switch Delay Time	Speed/Torque mode,Position/torque mode,Position/speed mode,in IO switch mode, it will delay the time the parameter set, and then go into another mode.	2	0-1000 ×0.1s
215	Mode Switch Switch speed	Speed/Torque mode,Position/torque mode,Position/speed mode,in IO switch mode, when the speed lowered to the value the parameter set, and then go into another mode.	10	2~3000 rpm

220	Zero-returning Request Signal Selection	0=no zero-returning request function; 1=FIL terminal; 2=RIL terminal; 3=INH; 5=RSTP terminal; 6=FSTP terminal; The selected signal cannot work as the original function of the servo . Therefore, it is advised to apply the signal not used by the system as the signal for zero-returning point request.;		
221	ABS zero point position single-cycle value	16bit no symbol data		0~65535
222	ABS zero point position multi-cycle value	16bit with symbol data		-32767~+32767
223	ABS Zero Point Position Set signal Selection	0=no this function 1=RSTP signal. 2=FSTP signal. 3=INH signal. The selected signal cannot work as the original function of the servo . Therefore, it is advised to apply the signal not used by the system as the signal for zeroing deceleration switch. It need to set PA20 to 0,when select RSTP/FSTP. This parameter cannot be conflict with PA179.	0	0~3

224	ABS Zero-point Position Memory	In the process of this parameter changing from 0 to 1,it save the encoder position as zero point to PA221 and PA222	0	0~1
225	Absolute zero-returning mode	0=multi-cycle zero-returning , 1=single-cycle zero-returning	0	0-1

7 Protection Function

7.1 Alarm List

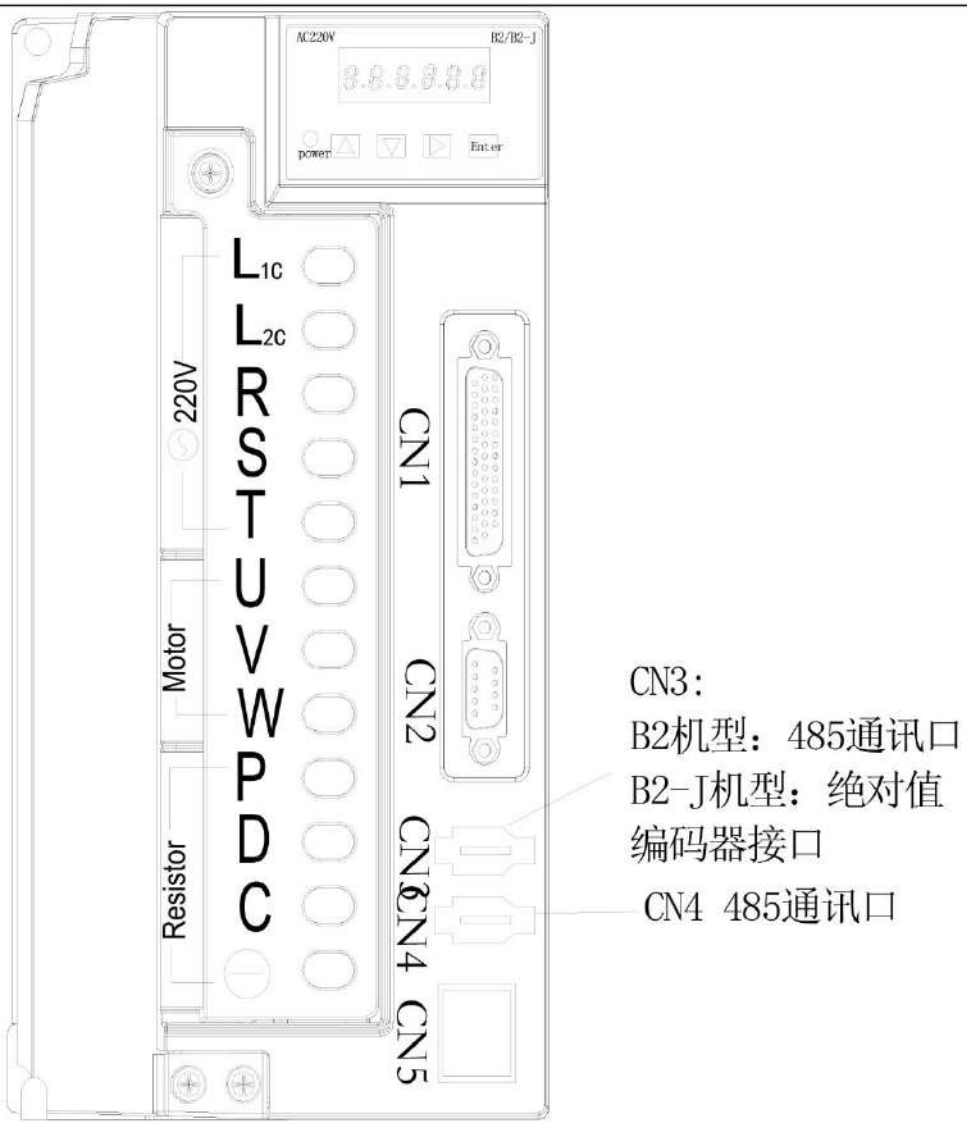
Alarm Code	Alarm Name	Alarm Content
--	Normal	
1	Over-speed	The speed of the servo motor is over the setting value
2	Main Circuit Over-voltage	Main Power Circuit Over-voltage
3	Under-voltage of Main Circuit	The voltage of main circuit power is too low.
4	Position out-of-tolerance	The value of position error counter is over the value set
5	Motor Heating Load	Motor operates over the rated current for over 15mins.
6	Speed amplifier Saturation	Speed amplifier Saturation and fault
7	Drive Prohibition Abnormal	
8	Position Error Counter Overflow	The absolute value of the value on the position error counter is over 2^{30}.
9	Encoder Malfunction	Coded Disc Wire "XOR" Error
10	Control Power Error	
11	IPM Module Fault	IPM Intelligent Module Fault
12	Over-current	

13	Over-load	Servo Drive and Motor Overload(Instant Heat)
14	Discharging brake Fault	Braking Circuit Fault
15	Coded Disc Counter Error	
17	Brake Power Overload	
19	Overheat	Temperature reached the test value of temperature switch
20	EEPROM fault	EEPROM Keyword write and read detection and verification error
23	AD Current zero sampling fault	
29	User Torque Overload Alarm	
30	Encoder Z pulse loss	Encoder Z pulse loss
31	Encoder UVW signal error	
32	Encoder UVW signal Illegal Codes	
34	Wire-saving Coded Disc Read UVW Error	
73-84	Internal Chip Communication Error	
90	EEPROM Error	EEPROM Read/Write No Feedback
91	EEPROM Error	EEPROM Data Verification Wrong
96	Low Voltage of the battery of Absolute Encoder	Battery low voltage or invalid, please change a battery
97	Battery Alarm of Absolute Encoder	Battery low voltage or invalid, please change a battery
98	Overheat of Absolute Encoder	Motor Overheat
99	Communication Error of Read Absolute Encoder	Driver read the encoder error

8 Communication

8.1 Communication Port

The drive is integrated with two communication terminals, CN3 and CN4, the hardware is 1394 standard terminal, as the following fig shown,



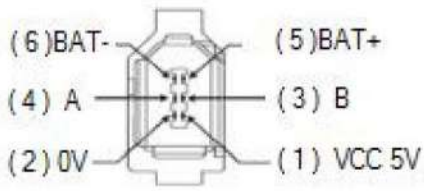
The definition of CN3 and CN4 will be different for different driver models.

1. B2-J Absolute Model:

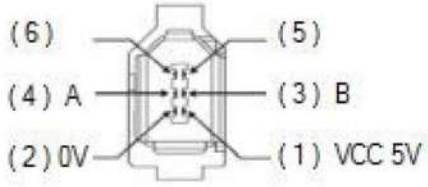
Terminal CN3 is ONLY used for absolute encoder.

Terminal CN4 is for 485 Modbus communication, it is used to connect the main 485 device.

The definition of the pins in the following.

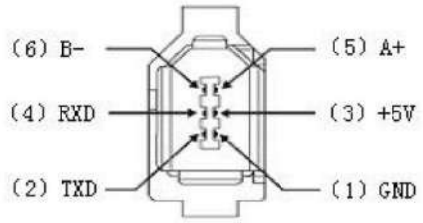


CN3信号定义



CN4信号定义

2. B2 incremental encoder model:
   CN3 and CN4 are all Modbus 485 communication port, the definition of the pins in the following.



CN4信号定义

8.2 RS485 MODBUS Communication

The drive can apply with standard MODBUS communication protocol, can execute 0x03, 0x06, 0x10 commands. Setting the parameter of 485 hardware communication protocol with the following PA- numbers.

Parameter No.	Definition	Numerical Range	Default Value
106	485 Baud Rate Selection	1=4800， 2=9600， 3=19200， 4=38400， 5=57600, 6=115200, Other=9600	2
107	485 Communication Data Protocol	0=ASCII, 8 Data, 2 stop, no check; 1=ASCII, 8 Data, 1 stop, no check; 2=ASCII, 8 Data, 1 stop, even check; 3=ASCII, 8 Data, 1 stop, odd check; 4=ASCII, 8 Data, 2 stop, even check; 5=ASCII, 8 Data, 2 stop, odd check; 6=RTU, 8 Data, 1 stop, no check;(common use)	6

		7=RTU, 8 Data, 1 stop, even check; 8=RTU, 8 Data, 1 stop, odd check; 9=RTU, 8 Data, 2 stop, odd check;	
108	485 Slave Computer ID Address	IP address	1

MODBUS command Description as follow:(Note:1. " 0x " before the number means hexadecimal,otherwise means decimal)

0x03: Read register, can read PA parameter and DP status data of the servo driver.

Modbus address:

PA series:offset 0x0000, the largest Parameter numbers=200;

DP series:offset 0x1000, the largest Parameter numbers=36;

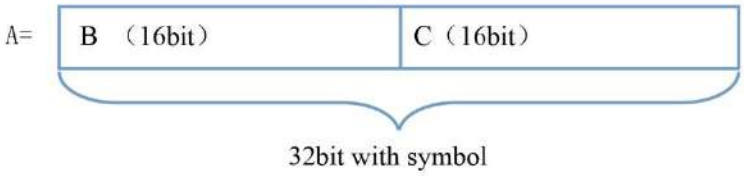
Note:

The upper computer will deal "current position", "command pulse", "position offset" in the following way:

Define a variate "A" with 32 bit symbol,read the high 16 bit is "B" and low 16bit is "C", then the operation likes the following:

The data read valued directly to the variate with symbol unit, and operate in the following formula:

A= (B move left with 16bit) with bit or C;



0x06: write one register.

① write one PA parameter. Address< (PA offset+the maximum value of parameter numbers)and ≠ 0 (password) ,write one PA parameter and not save to EEPROM.

Of which:PA parameter offset address=0x0000,the maximum value of the number of the parameter=200.

The parameter will not save to EEPROM with this operation. If the user needs to save EEPROM real-time ,please set PA-199 as 9 first.

PA199 Value	0x06 write one command	0x10 write more parameter command	Note
9	Parameters save to EEPROM	Parameters save to EEPROM	
Other Value	Parameters not save to EEPROM	Parameters not save to EEPROM	Power on (Default value)

②PA will have 230 parameters save to EEPROM at one time. To Address 0x3300, write data 0x3300.

PA199 is zone bit. PA199=0 means idle, PA199=1 means storing, PA199=2 means writing completed and correct, PA199=3 means writing completed and wrong.

Read PA199 before sending the storing command,if the value is =1, can not send storing command again. If the value is not equal to 1, can write PA199 as 0 and send storing command, then it can read PA199. If the value is equal to 3, then it is wrong. If the value is equal to 2, then it is right and can send writing command again.

PA199 Value	Storing Command	Note
0	Idle,can send storing command.	
1	Busy,it is storing,cannot receive storing command.	Wait for storing completed
2	Storing write EEPROM right and completed	Change PA199 as 0,and resend storing command.
3	Storing write EEPROM failure	

Note, it needs to wait 4 seconds after executing storing EEPROM command and then power off!

0x10: Write more registers, write PA parameters or motion command.

① Write PA parameter. Address< (PA offset+the MAX parameter numbers) , and≠ 0 (password) , write several PAs at a time and not storing to EEPROM.

Of which :PA offset=0x0000,the MAX of the number of the parameter=230.

The parameter will not save to EEPROM with this operation. If the user needs to save EEPROM real-time ,please set PA-199 as 9 first.

PA199 Value	0x06 write one command	0x10write more parameter command	Note
9	Parameters save to EEPROM	Parameters save to EEPROM	
Other value	Parameters not save to EEPROM	Parameters not save to EEPROM	Power on (Default value)

② Save EEPROM。Write a data to Address=0x3300, data=0x3300:Save 230 PA Parameter list to EEPROM。

Frame format (hexadecimal) : IP+10+3300+0001+02+3300

PA199 is zone bit. PA199=0 means idle, PA199=1 means storing, PA199=2 means writing completed and correct, PA199=3 means writing completed and wrong.

Read PA199 before sending the storing command,if the value is =1, can not send storing command again. If the value is not equal to 1, can write PA199 as 0 and send storing command, then it can read PA199. If the value is equal to 3, then it is wrong. If the value is equal to 2, then it is right and can send writing command again.

PA199 Value	Storing Command	Note
0	Idle,can send storing command.	
1	Busy,it is storing,cannot receive storing command.	Wait for storing completed
2	Storing write EEPROM right and completed	Change PA199 as 0,and resend storing command.
3	Storing write EEPROM failure	

Note:The standard MODBUS protocol data format is as follow:

通讯协议的数据格式：

ASCII 模式：

STX	起始字符 ':' =>(3AH)
ADR	通讯地址=>1-byte 包含了 2 个 ASCII 码
CMD	指令码=>1-byte 包含了 2 个 ASCII 码
DATA(n-1)	数据内容=>n-word=2n-byte 包含了 4n 个 ASCII 码，n 不大于 12
.....	
DATA(0)	
LRC	校验码=>1-byte 包含了 2 个 ASCII 码
End 1	结束码 1=>（0DH）(CR)
End 0	结束码 0=>（0AH）(LF)

RTU 模式：

STX	在当前传输速率下超过 4 个字节的传输时间的静止时段
ADR	通讯地址=>1-byte
CMD	指令码=>1-byte
DATA(n-1)	数据内容=>n-word=2n-byte，n 不大于 12
.....	
DATA(0)	
CRC	CRC 校验码=>1-byte
End 1	在当前传输速率下超过 4 个字节的传输时间的静止时段

LRC（ASCII 模式）和 CRC（RTU 模式）侦误值的计算：

ASCII 模式的 LRC 计算：

ASCII 模式采用 LRC（Longitudinal Redunancy Check）侦误值。LRC 侦误值是从 ADR 至最后一笔资料内容之和，得到之结果以 256 为单位，去除超出的部分（例如加总后得到的结果为十六进制的 128H，则只取 28H），然后计算其补数，最后得到的结果即为 LRC 侦误值。

例如：从局号 01H 伺服驱动器的 0201 地址读取 1 个字（word）。

STX	':'
ADR	'0'
	'1'
CMD	'0'
	'3'
起始资料地址	'0'
	'2'
	'0'
	'1'
资料个数 (以word计算)	'0'
	'0'
	'0'
	'1'
LRC 校验	'F'
	'8'
End 1	(0DH)(CR)
End 0	(0AH)(LF)

从 ADR 的数据加至最后一笔数据：
01H+03H+02H+01H+00H01H=08H
对 08H 取 2 的补数为 F8H，所以 LRC 为 'F'，'8'。

8.3 RS485 MODBUS Motion Control

When set the driver PA4=18, enter into Modbus motion Control mode. It can have extra enable or inner enable mode. When set PA53=0001, it is inner enable mode.

Communication data address is 0x7200-0x7206. With different command, the data structure and length needed will be different, please check the following table 1.

Of Which:

(1) Address 0x7200 save executing command order. Write 0x11 to this address, it will execute one command. After executed the command, it will auto zero clearing.

(2) Address 0x7201 save the command type. The address after 0x7202 save the parameters the command needed.

(a) Incremental pulse number, the max 32bit positive integer.

(b) Speed, it is required to less than the max speed of the motor, the higher bit in the front.

(c) Accelerate/Decelerate, range1-20. Range is 2400rpm/s, means the rotate speed raised to 2400rpm in 1 second.

(d) Direction, 00=CCW , 0x11=CW.

Communication is standard Modbus Protocol.

Support Modbus Command 0x06 and 0x10. It can write single register, also can write several registers. If the user want to have 0x06 command(write single register), please set the data after 0x7201 first, and then write 0x11 to address 0x7200 and execute the command.

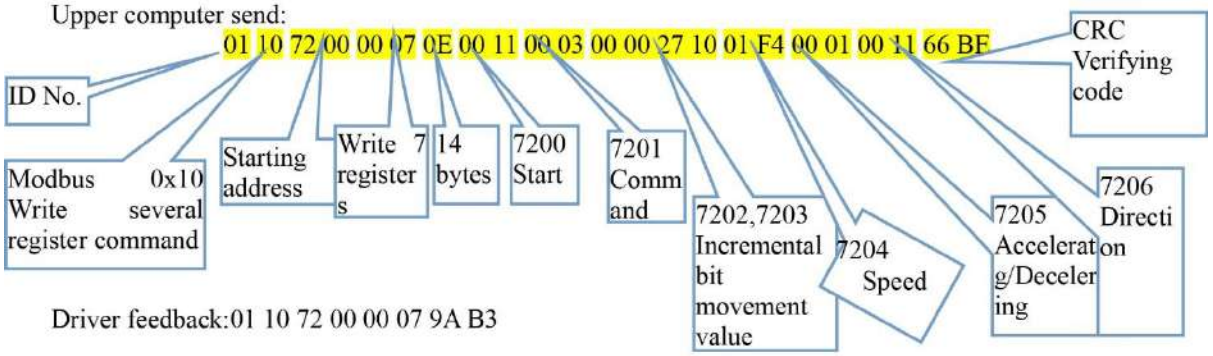
The data after 0x7201 is always valid before power off.

Table 1:(in the following table, "0x" means the data after 0x is hexadecimal.)

0x7200	0x7201	0x7202	0x7203	0x7204	0x7205	0x7206
Write 0x11, execute the command	00=incremental position operation	Incremental pulse number high 16bit	Incremental pulse number Low 16bit	Speed (Positive)	Acceleration/Deceleration	Direction
	01=Zero Speed Delay Command	Delay Time ms High 16bit	Delay Time ms Low16bit			
	02=Fixed Speed Operated a certain time	Operating Time ms High 16bit	Operating Time ms Low 16bit	Speed (Positive)	Acceleration/Deceleration	Direction
	03=Incremental position operation(Direction defined by the symbol of the speed)	Incremental pulse number high 16bit	Incremental pulse number Low 16bit	Speed (with Symbol)	Acceleration/Deceleration	
	04=Fixed Speed Operated a certain time(Direction defined by the symbol of the speed)	Delay Time ms High 16bit	Delay Time ms Low 16bit	Speed (with Symbol)	Acceleration/Deceleration	
	05=Forced Stop	0x11=Instant Stop 0x22=Decelerating Stop				
	06=Clear Cache					
	10=Operated to Absolute Position (Coordinate Value with symbol 32bit)	Absolute Coordinate Value High 16bit	Absolute Coordinate Value Low 16bit	Speed (Positive)	Acceleration/Deceleration	
	11=set absolute coordinate value command (Coordinate Value with symbol 32bit)	Absolute Coordinate Value High 16bit	Absolute Coordinate Value Low 16bit			

Eg:（ID address is 1,use 0x10 command）

①Incremental operated 10000 pulse,speed 500rpm,accelerate 1,direction CCW,command frame like the following:



②Absolute value operated to the coordinate value of -10000,speed 500rpm,accelerating 1,direction CCW,the command frame like the following:

Upper computer send: 01 10 72 00 00 07 0E 00 11 00 0A FF FF D8 F0 01 F4 00 01 00 11 96 EF

Driver feedback: 01 10 72 00 00 07 9A B3

Note:

(1) when set PA4=18, it is MODBUS motion control mode. there is designed level 1 cache in the driver, means:when the current command is executing, it can send the next command needed to execute, it will save to cache automatically. When the current command is finished executing, the command in the cache will go into executing at once, then it can send the next command.

Cache can check PA198 finished status, when PA198=0, the upper computer can send command, when PA198=1, means cache is full and there is a command in the cache. When the current command finished operation. PA198 will change to 0 automatically, then it can send command to cache.

(2) PA-171 means Modbus command executing status. PA171=0 means no command under executing, PA171=1 means there is command under executing.

(3) Coordinate Value. "PA172+PA173" means the coordinate value after the current command finished executing. It is 32bit with symbol binary number.

(4) **Electronic gear ratio PA12 and PA13 need to set at 1:1.** It means, for incremental 2500ppr encoder, 10000pulses for 1 cycle;for absolute encoder, including 17bit or 23bit, 65536pulese for 1cycle.

9 Speed Mode Explanation

9.1 Two Source of Speed Command

There are two source of speed command, selected by PA22.

① PA22=0,Inner speed mode,select inner speed 1-4 by SC1 and SC2 signals. Or select inner speed

1-8 by ACLR,SC1 and SC2 signals. Such as the following 4 stage speed mode.

SC1	SC2	Selecting Speed
OFF	OFF	PA24
ON	OFF	PA25
OFF	ON	PA26
ON	ON	PA27

② PA22=1,-10V~+10V analog voltage speed command mode, the value of the analog defines the motor output speed value.

③ PA22=2,0V~+10Vanalog voltage speed command mode, the value of the analog defines the motor output speed value. The direction the motor rotated defined by input terminal FIL,RIL(IO port).

9.2 Parameter of Speed Mode

No.	Name	Applicable way	Parameter Range	Factory Default Value	Unit
4	Driver Working Mode		1=Inner 4 stage speed 12=Inner 8 stage speed	0	
5	Speed Gain	# M	0~20000	400	
6	Speed Integral	# M	1~10000	1000	
8	Speed Given, Detect(feedback) Filter	#	1~2000	200	Hz
22	Inner/extra speed command selection	!	0~2	0	
23	Max Speed Restriction, Over speed Alarm Threshold Value	M	0~4000	3600	
24	Inner Speed 1	#	-3000~3000	100	
25	Inner Speed 2	#	-3000~3000	500	
26	Inner Speed 3	#	-3000~3000	-500	
27	Inner Speed 4	#	-3000~3000	-100	
40	Acceleration Time Constant	#	1~10000	10	ms
41	Deceleration Time Constant	#	1~10000	10	ms
43	Analog Speed Command Input Gain	#	10~3000	300	
44	Analog Speed Command	!	0~1	0	

	Direction Negation				
45	Analog speed command zero offset compensation	#	-1500~1500	0	mV
46	Analog Speed Command Filter	#	1~1000	300	
124	Analog Speed Positive Direction Dead Zone	#	0~1500	0	mV
125	Analog Speed Negative Direction Dead Zone	#	-1500~0	0	mV
157	Analog Command Power-on Auto Zero Offset Compensation Permit bit	#	0~1	0	
166	Inner Speed 5	#	-3000~3000	100	rpm
167	Inner Speed 6	#	-3000~3000	500	rpm
168	Inner Speed 7	#	-3000~3000	-500	rpm
169	Inner Speed 8	#	-3000~3000	-100	rpm
188	Rated Speed	#	1~10000		rpm

9.3 External Analog Speed Command

Inner hardware ports:

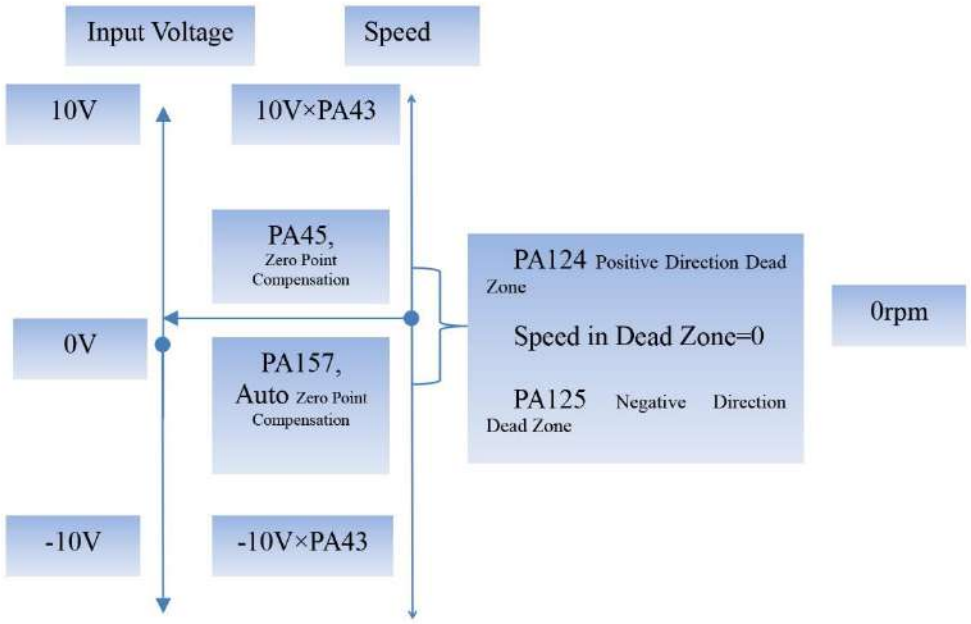
Upper Computer Signal		Servo Driver Input Signal	Pin
Analog Input Voltage VSP+		AIN+	35
Analog Input Voltage VSP-		AIN-	36
Analog GND 0V		AGND	34
Shielding		FG	31

Single End Wiring:0----10V,Upper computer GND wires to pin 36 and pin 34,Upper computer analog command analog command VSP+ wires to Pin 35.

Differential Wiring:-10V --- +10V,Upper computer VSP- wires to Pin 36, VSP+ to Pin 35,GND to Pin34.

Analog voltage input range is ±10V,input resistance is 10K ohm.

Parameter PA43 is the speed corresponding to 1V analog;PA44 is analog negation.
The following fig. Shows the relation of terminal input voltage and speed:



10 Torque Mode Explanation

10.1 Source of Torque Command

There are two sources of Torque Command,it is selected by PA59.

① In analog voltage torque command mode, the value of analog defines the motor output torque directly.

② Inner command mode,change the value of "PA2 inner torque register",then it can adjust torque output.It can also adjust via communication mode or(the buttons or nixie tube) HMI from the servo.

10.2 Parameters

No.	Name	Applicable way	Parameter Range	Factory Defaul	Unit

				t value	
2	Inner Torque Register		-10000~10000	0	0.01N.m
4	Control Mode		4=Torque Control Mode	0	
29	Analog Torque Command Input Gain	#	10-100; Percentage of Rated Torque corresponding to 1V Analog	30	%
33	Torque Command Direction Negation		0-1;	0	
39	Analog Torque Command Zero Offset Compensation		-10000~10000mV	0	mV
50	Speed Restriction of Torque Control		0-5000;	3000	
59	Source Selection of Analog Torque Command		0-3; 0=analog voltage mode; 1=inner register mode (PA2) 3=Analog 0-10V Input, Direction selected by RIL, FIL.	0	
154	(CCW/CW)Torque Arrival Point		1-5000	1000	0.01 N.m
155	COIN Signal Source Selection		1=Torque Arrival	0	
156	Torque Arrival Filter Time Constant		100		Ms
180	Motor Rated Current		1-3200, two decimals		0.01A
187	Current Torque Coefficient		1-1000, two decimals		0.01N.m/A
216	Speed Restriction Source of Torque Control (Special Edition Supported)		0-1, 0=Parameter PA50, 1=External Speed Analog Command	0	

10.3 External Analog Torque Command Method

Hardware Ports Table:

Upper Computer Signal		Servo Input Signal	Pin
Analog Input Voltage VSP+		AIN+	35
Analog Input Voltage		AIN-	36

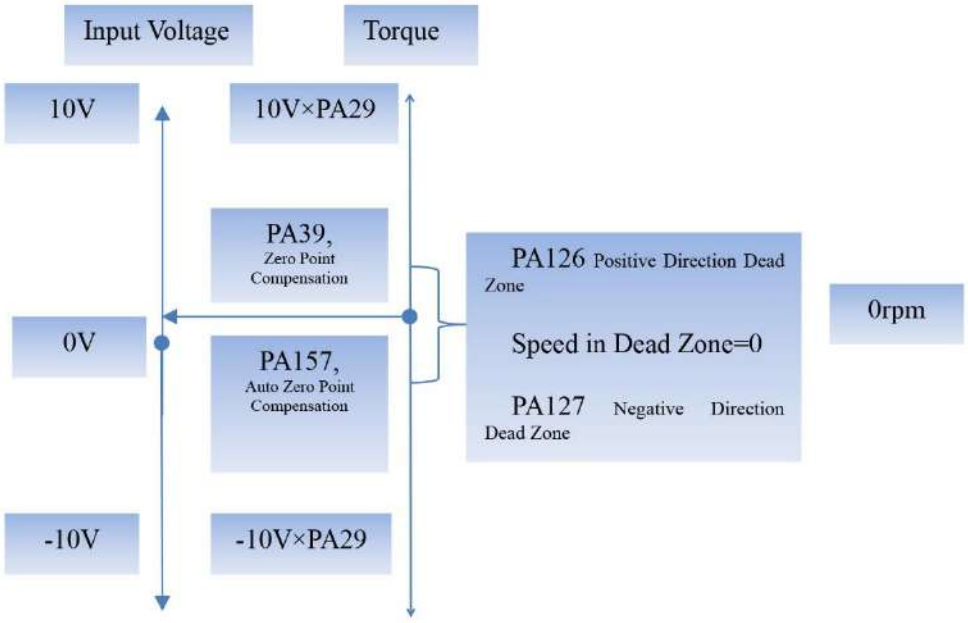
VSP-			
Analog GND 0V		AGND	34
Shielding		FG	31

Single End Wiring:0----10V,upper computer 0V wires to Pin 36 and Pin 34,upper computer analog command VSP+ wires to Pin35.
Differential Wiring:-10V --- +10V,upper computer VSP- wires to Pin 36,VSP+ to Pin 35, Upper computer 0V to Pin 34.

Analog voltage input range is ±10V,Input resistance is 10K Ohm.
Parameter PA29 is Percentage of rated torque corresponding to 1V analog;Rated Torque= PA180* PA187.
PA180=Motor rated current Ie,PA187=current torque coefficient

Eg:PA29=20,PA180=5.0,PA187=0.9, then torque corresponding to 1V analog=20÷100×5×0.9=0.9N.m

The following fig. Shows the relation of terminal input voltage and torque:



10.4 Internal Analog Torque Command Method

By Parameter PA2 to set output torque, unit is 0.01N.m.

Eg: If need to Output 1N.m torque, then need to set PA2=100(Unit is 0.01N.m).

10.4 Torque Arrival Output COIN Signal

PA155=1;COIN signal originated from torque arrival, the default value is 0.
PA154:Torque Arrival Point, Unit is 0.01Nm,the default value is 1000.
PA156:Torque Arrival Filter Time,Unit ms,the default value is 100.

10.5 Speed Restriction of Torque Mode

Speed Restriction Value selected by PA126. When PA216=0,Speed Restriction value is equal to the value of PA50.
When PA216=0, speed restriction value defined by external speed command analog.(Special edition supported.)

11 Inner Fixed Length Explanation

In inner fixed length control,when PA4=9 or PA4=14, the servo driver designed three IO input port,when IO is valid, the driver is in position mode, it will rotate with the speed and acceleration the parameter set and move with the displacement bit set by the parameter. When PA=14, in DI2, when it is arrived,it will return to original position according to the former parameter.

Terminal signal explanation

Input Signal	Servo Terminal （CN1Terminal）	Movement Parameter	Note
DI0 （ Valid when Short-Circuited with 24V-Edge）	INH （4）	Fixed Length PA148=Operation Speed （ -3000~3000 rpm） PA149=Movement bit low 4 bit(Pulse) PA150=Movement bit high 4 bit （Pulse*10000） PA151=Acceleration/Deceleration（1-20，1=2000rpm/s）	Operation Direction defined by the positive and negative values of PA148;Eg:the motor needs to rotate 2.5cycle,means 25000pulses then set PA149=5000,PA150=2.

DI1 （ Valid when Short-Circuited with 24V-Edge）	CLE （19）	Fixed Length PA158=Operation Speed （ -3000~3000 rpm） PA159=Movement bit low 4 bit(Pulse) PA160=Movement bit high 4 bit （Pulse*10000） PA161=Acceleration/Deceleration（1-20，1=2000rpm/s）	Operation Direction defined by the positive and negative values of PA158;
DI2 （ Valid when Short-Circuited with 24V-Edge）	ACLR（2）	Fixed Length PA162=Operation Speed （ -3000~3000 rpm） PA163=Movement bit low 4 bit(Pulse) PA164=Movement bit high 4 bit （Pulse*10000） PA165=Acceleration/Deceleration（1-20，1=2000rpm/s） PA201=Stop Time（Unit 0.1s）	Operation Direction defined by the positive and negative values of PA162;when PA4=14,when arrival,it will delay the time set by PA201 value, and return to the original position with the original way automatically.
DI3 （ Valid when Short-Circuited with 24V-electrical level）	RSTP	Fixed Length PA196=Operation Speed （ -3000~3000 rpm） PA197=Acceleration/Deceleration（1-20，1=2000rpm/s）	Operation Direction defined by the positive and negative values of PA196;Electrical level valid. PA20 needs to set as 0.
ESP Instant Stop （ Valid when Short-Circuited with 24V-）	FSTP（18）		Instant Stop PA20 needs to set as 0.
24V+	COM+（20）		
24V-			

The function of other terminals and set of PA parameter is same as other normal servo set.

One of the input terminal DI0,DI1and DI2 short-circuited with 24V-, it will move with set speed,acceleration and deceleration and displacement bit.The edge is valid, one falling edge will have one move. The priority order of DI0,DI1 and DI2 will be in the following:DI0 > DI1 > DI2,means if all are valid, the priority will be DI0.

12 Dual Working Mode Explanation

12.1 Function Explanation

PA4=15, speed-torque mode;
PA4=16, position-torque mode;
PA4=17, position-speed mode;
Switch between the modes via IO port ,FSTP.
Under all modes, the function is same as the normal servo usage.Only the function of FSTP and RSTP terminals canceled.（FSTP terminal used for mode switch.）.

12.2 Pins Setting

① Mode switch pins:use FSTP(Pin 18 of CN1) pin to switch. Pin 20 COM+ wired to 24V+;

PA4	FSTP=OFF	FSTP=ON	Note
PA4=15, speed-torque mode	Speed Mode	Torque Mode	
PA4=16, position-torque mode	Position Mode	Torque Mode	
PA4=17, position-speed mode	Position Mode	Speed Mode	

FSTP=ON,means, pin 18 wired with 24V_GND.
FSTP=OFF,means, pin 18cut off with 24V_GND.

② Excluding FSTP and RSTP signals, the other signals of the terminals are same with normal servo usage.

12.3 Parameter Setting

Must set parameters:
① Working mode,PA4=15 or 16 or 17; （Default value of PA4=0）
② PA20=0, enabled FSTP,RSTP functions;（Default value of PA20=1）

Additional parameters:
① Related to Position mode:
PA214,Delay time in mode switch with 0 torque.Default value is 2,Unit is 0.1 second.
PA215,switch speed in mode switch.Default value is 10,unit is rpm.
Explanation:Before switch to position mode,the servo will output 0 torque, means the motor is in free stop status and start to time, and then detect the motor speed continuously.When the speed is less than PA215, the time counted is over the value of PA124, then it is in position mode.

②Related to Speed mode:
PA40=acceleration time constant, respond time of 0-1000rpm step change. If the motor speed is high in mode switch, then need to set the value of this parameter high..
PA41=deceleration time constant, respond time of 1000-0rpm step change.If the motor speed is high in mode switch, then need to set the value of this parameter high..

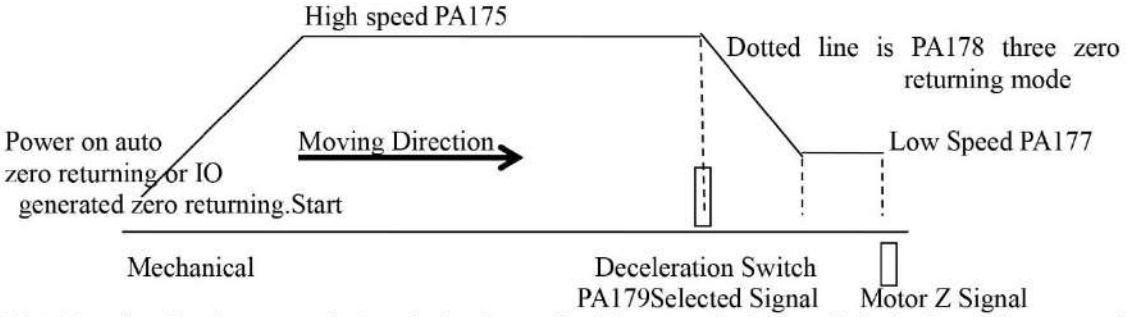
③ Note:
It is best to make the motor in static status before mode switch.Especially in position mode, because position mode is connected with motor position. If the motor goes into position mode with a high speed, it will have a instant stop.

13 Auto Zero Returning Function Explanation

13.1 Incremental Encoder Zero-Returning

13.1.1 Basic Function

（1）The Servo will go auto zeroing when power on. After the servo enabled, before going to normal working mode, it will return to mechanical zero point automatically.
（2）In normal working, IO port generated zeroing, PA220 selected the IO port.When the motor is in static status or the rotated speed lower than 5rpm, it is allowed to zero returning.
Note:when in zero-returning,can not send motion command to the driver,eg,send pulses.In zero returning,COIN signal is invalid;After zero returned, COIN signal output is valid.
PA4=all modes are valid.



Note:Deceleration is a normal closed signal usually. When touched the switch, it changed to normal open.There is parameter in the servo can be negation.

13.1.2 Parameter Explanation

PA No.	Name	Function	Default Value	Range(Unit)
174	Power on auto zero-returning	0=no need zero-returning, 1=need zero-returning	0	0-1
175	Zero-returning Speed	Zero-returning Speed, positive and negatives values mean the zero-returning direction.	300	-3000~3000
176	Zero-returning Acceleration and Deceleration	Acceleration and Deceleration	10	1-100
177	Zero-returning Low Speed operation speed	Zero-returning Speed, positive and negative values means zero-returning direction (Above 15)	20	-3000~3000
178	Zero-returning Mode	0=touched the deceleration switch, instant stop 1=touched the deceleration switch, decelerated the speed to the value of PA177 set, stop 2=touched the deceleration switch, decelerated the speed to the value of PA177 set, Stop after waiting Motor Z signal appeared.	1	0-2
179	Deceleration Switch Signal Selection	0=No this function; 1=RSTP Terminal; 2=FSTP Terminal; 3=INH Terminal. (Select RSTP and FSTP signals,should set PA20=0.)	0	0-3
220	IO Port Zero-returning Request Signal Select Address	0=No Zero-returning Function; 1=FIL Terminal; 2=RIL Terminal.	0	0-2
20	Enable FSTP,RSTP Signals	0=Enable FSTP,RSTP signals; 1=No Enable	1	0-1

13.1.3 Terminal Signal Explanation

Input Signal	Servo Terminal（Servo CN1 Terminal）	Parameters	Note
Enable	SON（17）		Enable Signal, valid when short circuited with 24V-
DI0	INH （4）	PA179=0, normal signal. PA179=3,select the signal as deceleration switch signal	In normal condition: cut off the short-circuit with 24V-, the signal is valid,means normal closed,when the journey touched,it will cut off.
DI1	RSTP（3）	PA179=0,normal signal. PA179=1,select the signal as deceleration switch signal.（Select this signal,need to set PA20=0.）	In normal condition: cut off the short-circuit with 24V-, the signal is valid,means normal closed,when the journey touched,it will cut off.
DI2	FSTP（18）	PA179=0,normal signal. PA179=2,select the signal as deceleration switch signal.（Select this signal,need to set PA20=0.）	In normal condition: cut off the short-circuit with 24V-, the signal is valid,means normal closed,when the journey touched,it will cut off.
DI3	FIL（16）	PA220=0,normal signal. PA220=1, the signal is zero-returning generated signal.	Edge is valid.
DI4	RIL（1）	PA220=0,normal signal. PA220=2, the signal is zero-returning generated signal.	Edge is valid.
24V+	COM+（20）	External power 24V+ Input	
24V—		External power 24V—	

Note:

1. The function of other terminals and PA parameters definition is same as the normal servo. Please take reference of the normal servo manual for details.
2. After zero-returning, the former function of terminals selected for deceleration switch or zero-returning signal will be invalid. Therefore, it is better to select the terminals the system usually not needed as original point deceleration switch signal.

13.2 Absolute Encoder Zero-returning

13.2.1 Basic Function

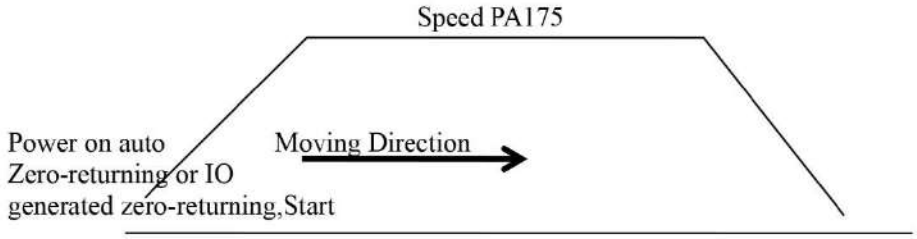
（1）The Servo will go auto zeroing when power on(selectable). After the servo enabled, before going to normal working mode, it will return to mechanical zero point automatically.

（2） In normal working, IO port generated zeroing, PA220 selected the IO port.When the motor is in static status or the rotated speed lower than 5rpm, it is allowed to zero returning.

Note: （1） when in zero-returning,can not send motion command to the driver,eg,send pulses.

（2）In zero returning,COIN signal is invalid;After zero returned, COIN signal output is valid.

（3） PA4=PA4=all modes are valid.



Single Cycle Zero returning with the position set by PA222 and PA221 :return to position set by PA221

13.2.2 Parameter Explanation

PA No.	Name	Function	Default Value	Range(Unit)
174	Power on auto zero-returning	0=no need zero-returning, 1=need zero-returning	0	0-1
175	Zero-returning Speed	Zero-returning Speed, positive and negatives values mean the zero-returning direction.	300	-3000~3000
220	IO Port	0=No Zero-returning Function;1=FIL	0	0-2

	Zero-returning Request Signal Select Address	Terminal;2=RIL Terminal.		
221	Zero point Single-cycle value	16bit (17bit or 23bit encoder united to 16 bit)	0	0-65535
222	Zero point Multi-cycle value	16bit	0	0-65535
223	External IO Zero-point position save signal	0= no zero-returning function;1=RSTP Terminal;2=FSTP Terminal;3=INH Terminal; Edge is valid, take the current position as zero-point position and save to PA222 and PA221.	0	0-3
224	Button Zero-point Position Save	This parameter value changed from 0 to 1, then take the current position as zero-point position and save to PA222 and PA221.	0	0-1
225	Absolute zero-returning mode	0=multi-cycle zero-returning,1=single-cycle zero-returning	0	0-1
20	Enable FSTP,RSTP Signals	0=Enable FSTP,RSTP signals;1=No Enable	1	0-1

PA221 and PA222, position value of zero point, can also set by the buttons on the servo panel or communication mode by hand.

13.2.3 Terminal Signal Explanation

Input Signal	Servo Terminal (Servo CN1 Terminal)	Parameter	Note
Enable	SON (17)		Enable Signal, valid when short circuited with 24V-.Electrical level is valid.
DI0	INH (4)	PA223=0,normal signal. PA223=3,select the signal as zero-point position save signal.	Valid when short circuited with 24V-.Edge is valid.
DI1	RSTP (3)	PA223=0,normal signal. PA223=1,select the signal as zero-point position save signal.	Valid when short circuited with 24V-.Edge is valid.

		（Select this signal,need to set PA20=0.）	
DI2	FSTP（18）	PA223=0,normal signal. PA223=2,select the signal as zero-point position save signal. （Select this signal,need to set PA20=0.）	Valid when short circuited with 24V-.Edge is valid.
DI3	FIL（16）	PA220=0,normal signal. PA220=1, the signal is zero-returning generated signal.	Valid when short circuited with 24V-.Edge is valid.
DI4	RIL（1）	PA220=0,normal signal. PA220=2, the signal is zero-returning generated signal.	Valid when short circuited with 24V-.Edge is valid.
24V+	COM+（20）	External power 24V+ Input	
24V—		External power 24V—	

Note:

1. The function of other terminals and PA parameters definition is same as the normal servo. Please take reference of the normal servo manual for details.
2. After zero-returning, the former function of terminals selected for deceleration switch or zero-returning signal will be invalid. Therefore, it is better to select the terminals the system usually not needed as original point deceleration switch signal.

13.2.4 Check of Current Position

(1) Check via Servo Panel;

DP-ABS:Absolute single-cycle value, 16bit, 0-65535, calculated to 16bit.

DB-ABT:Absolute multi-cycle value, 16bit, 0-65535.

(2) Check with communication mode

It read register command via MODBUS 0x03 to know absolute position information, communication address is in the following:

Address	Name	Parameter Range	Factory Default value
90 Or 0x90	Single-cycle value low 16bit	0-65535	
91 Or 0x91	Single-cycle value high bit	17bit Encoder:1bit 23bitEncoder:7bit	
92 Or 0x92	Multi-cycle value	0-65535	

Note:

（1）“0x”means hexadecimal.

（2）Multi-cycle value needs battery power to memory the value. If the battery is out of service, the value is 0.

14 Position Feedback of Absolute Encoder

1. It can read register command via MODBUS 0x03 to know absolute position information, communication address is in the following:

Explanation:Multi-cycle value needs battery power to memory the value. If the battery is out of service, the value is 0.

Address	Name	Value Range
90 (Decimal) Or 0x90 (hexadecimal)	Single-cycle value low 16bit	0-65535
91 (Decimal) Or 0x91 (hexadecimal)	Single-cycle value high bit	17bit Encoder:1bit 23bitEncoder:7bit
92 (Decimal) Or 0x92 (hexadecimal)	Multi-cycle value	0-65535

2. Explanation of some relevant parameters of Absolute driver

（1）The motor code of absolute one, is usually add +100 to the incremental code.Eg. Incremental 80-02430 motor code is 6, then absolute one 80-02430 is 106.

（2）Electronic Gear Ratio:numerator,PA-12;denominator is PA-13.

The driver is fixed 65536（16bit） pulse to make the motor have one cycle rotate. The default value of PA12 is 4096, the default value of PA13 is 625.Then the default is the upper computer(PLC or

controller) send 10000 pulses the motor have one cycle rotate.

Namely,10000×4096÷625=65536, it means the pulse number for 1 cycle.

If it wants the motor have one cycle with 5000 pulses,then set PA12=8192,PA13=625;

If it wants the motor have one cycle with 20000,then set PA12=2048,PA13=625;

Please reduced the fraction of numerator and denominator as lower as power.

3. Absolute position monitor

In DP menu of the driver can monitor the value of the encoder.

No.	MODBUS Address (decimal system)	Sign	Description
1	4096	SPD	Current speed
.....			
.....			
36	4131	ABS	Encoder single-cycle position, 0-65535
37	4132	ABT	Encoder multi-cycle position0-65535

DP-ABS displays encoder single-cycle value high 16bit, namely, one cycle range is 0-65536.

DP-ABT displays encoder multi-cycle value.Value range is 0-65536.

If the upper computer reads the encoder position, it can read the above two address also.The difference is for single-cycle value bits is 16bit.

15 Operation

15.1 Working Time Sequence

15.1.1 Power Connecting Sequence

Please check fig.15-1 to know the power wiring and connecting the power with the order below:

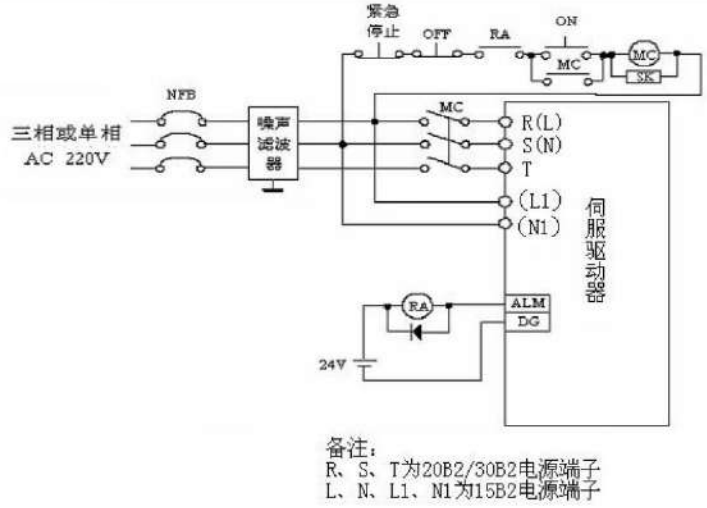


fig.15-1:power wiring figure

1) Wiring the power via ac contractor to the main circuit power input terminals(Three phases,wiring R,S,T;single phase,wiring L,N).

2) The power of control circuit L1,N1 wiring at the same or ahead of the wiring the main circuit power. If it is only wiring the control circuit power, the Servo Ready (SRDY) is OFF.

3) After wiring the main circuit power,delay about 1.5second, Servo Ready signal(SRDY) is ON. Then the servo enabled (SON) signal can be received. If the SON is detected valid, the output of drive is valid too. The Motor is activated and under operation status。If the SON is invalid or has alarm, the base circuit will switch off and the motor is under free situation.

4) When the SON and the power is wiring together,base circuit will be wiring in around 1.5 second.

5) To switch on and off the power frequently will do damage to the soft starting circuit and energy consumption brake circuit. The frequency to switch on and off should be limited to 5 times every hour,30 times every day. After troubleshooting because of overheat of drive or motor,it needs 30 minutes to cool down and then re-switch on the power.

15.1.2 Sequence Chart

Power wiring sequence and alarm sequence:

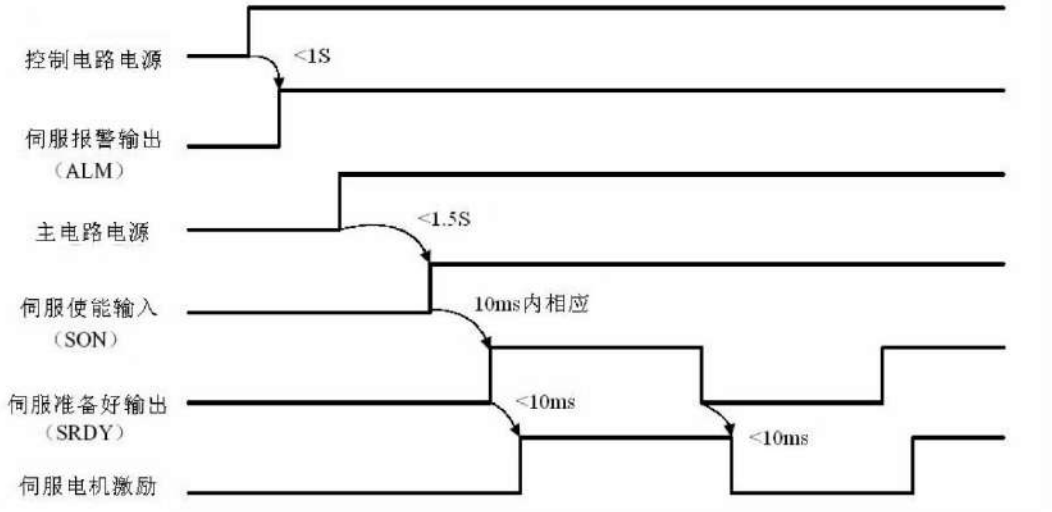


fig.15- 2:power wiring sequence figure

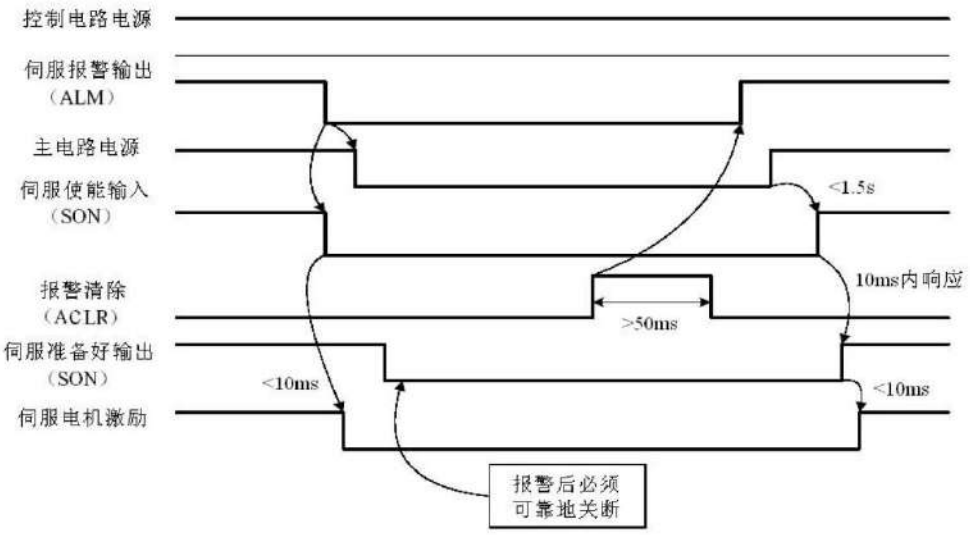


fig. 15- 3:Alarm Sequence Figure

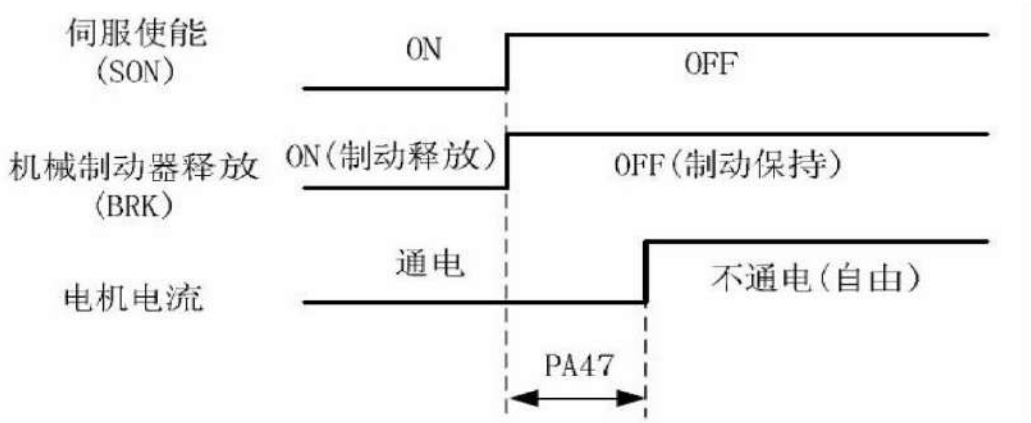


fig. 15- 4: Mechanical Brake Action Sequence when motor stops

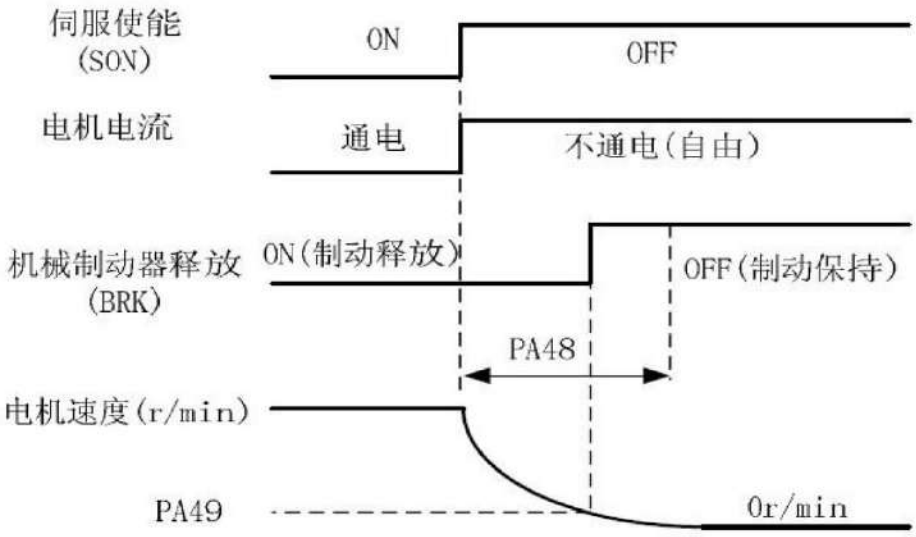


fig. 15- 5:Mechanical Brake Action Sequence when motor operates

15.2 Precautions

1. The start-stop frequency is limited by the requirement of servo drive and motor.

   (1) Servo Drive Allowable Frequency

   Apply to the occasion of high frequency of start-stop, it needs to confirm whether it is in the range of frequency or not. The allowable frequency range differs with the motor types, capacities, load inertia and motor speed. At first, setting the acceleration and deceleration time to prevent excess renewable energy (Under Position Control Mode, set the acceleration and deceleration time of output pulse from the upper controller. When the load inertia is the times m of motor inertia, the allowable start-stop frequency of the servo motor is as follow:

Load Inertia Times	Allowable Start-stop Frequency
m≤3	>100 times/minute; Acceleration and Deceleration Time: 60ms or less than 60ms
m≤5	60 ~ 100 times/minute; Acceleration and Deceleration Time: 150ms or less than 150ms
m>5	<60 times/minute; Acceleration and Deceleration Time: above 150ms

   If it still can not meet the demand, it can do with decreasing the internal torque limitation (Parameter PA34, PA35) and lower the Maximum motor speed (Parameter PA23).

   (2) The allowable start-stop frequency of the servo motor differs by the load occasion and operation time. Please consult the motor manual.

2. Usually the load inertia times should be in 5. Under application of big inertia, it will be often to happen the main circuit over voltage when deceleration and braking abnormal. It can solve by the the following methods:
   - Decrease internal torque limitation (Parameter PA34, PA35) ;
   - Reduce the maximum motor speed (Parameter PA23) ;
   - Install external regenerative device;

3. The servo drive is installed with power supply for the encoder in the servo drive. To make sure proper operation, it is a must to maintain the output voltage at 5V±5%. Longer Cable will cause the loss of the voltage. Under that occasion, please do power supply the encoder with multi-cores cables to reduce the voltage drop from the cable.

15.3 Examination before Operation

15.3.1 Examination before Operation

After installation and wiring, please check the following items before power on:

- Power terminal wiring correct or not, reliable input voltage correct or not?
- Whether there is short circuit of the power and the motor wires, whether they are wired the ground?
- Wiring of encoder cable correct or not?
- Whether the control signal terminal is wiring correct or not? Power polar and volume correct or not?
- Whether the drive and the motor is fixed solidly or not?
- Is the motor shaft connected to the load or not?

15.4 Self-testing Mode Operation

15.5 JOG Operation

This mode can apply only to internal testing of the factory. Please don't apply this test mode when it is load or on machine tool.

1. Setting PA4=3;
   Press "←" to exit the menu, press "up" and "down" to "FA-", then press "ENTER", and then press "up" and "down" to select and enter "FA-JOG", and press "ENTER", the servo will enable automatically and display "J- 0". It is the motor self-trial operation Mode.

2. Press "UP" and hold on, the motor operation with 100rpm in negative direction and display "J-100". Let go the keypad, the motor will stop operation with rotating speed is 0.
   Press "DOWN" and hold on, the motor operation with 100rpm in positive direction and display "J 100". Let go the keypad, the motor will stop operation with rotating speed is 0.
   If it needs to change the motor rotating speed, it can be realized by setting the motor testing rotating speed parameter "PA-21". Please check the rated speed of the motor before setting "PA-21", please don't set the parameter value over the rated speed.
3. Short Press "←", the motor will stop power on and stop freely.
4. Please switch off the power to change the motor, cables and drive.

15.6 Speed Trial Operation

This mode can apply only to internal testing of the factory. Please don't apply this test mode when it is load or on machine tool.

1. Setting PA4=2;
   Press "←" to exit the menu, press "up" and "down" to "FA-", then press "ENTER", and then press "up" and "down" to select and enter "FA-SR", and press "ENTER", the servo will enable automatically and display "0.0". It is the motor trial operation Mode.
2. Press "UP" and "DOWN" to adjust the motor rotating speed.
3. Short Press "←", the motor will stop power on and stop freely.
4. Please switch off the power to change the motor, cables and drive.

15.7 Simple Wiring Operation of Position Control Mode

15.7.1 Wiring

1. Main circuit terminals, three phases AC220V, wiring R,S,T terminals;Single Phase AC220V,wiring L,N terminals;
2. Control Voltage terminal L1,N1 wiring single phase AC220V;
3. Encoder signal connector CN2 wiring with servo motor;
4. Control signal connector CN1 wiring as the figure below;

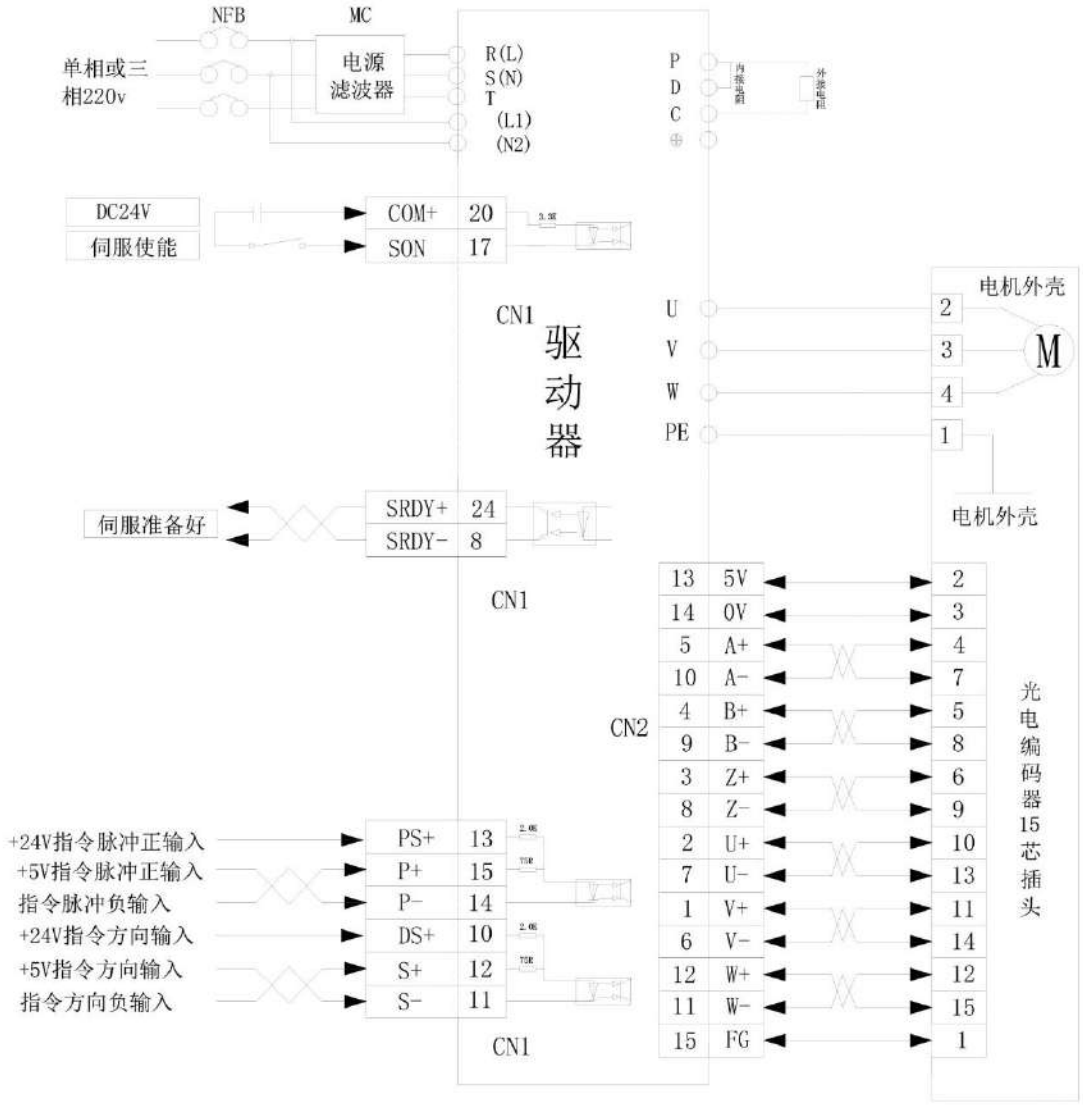


fig. 15-7 Simple Wiring figure of Position Control Mode

15.7.2 Operation

(1) Wiring the power of control circuit and main power, it will display on the screen;

(2) Setting the parameter value as the following table and write them to EEPROM

Parameter No.	Meaning	Parameter Value	Factory Default
PA4	Control Mode Selection	0	0
PA12	Electronic Gear Numerator	User Setting	1
PA13	Electronic Gear Denominator	User Setting	1
PA15	Motor Rotating Direction	User Setting	0

(3) No alarm and any abnormal conditions, the servo enabled(SON)on, low frequency pulse signal will send to the drive from the control and make the motor operate in a low speed.

15.7.3 Electronic Gear Setting

The encoder installed in the drive is 2500 pulses/cycle. Any pulse numbers can be set by electronic Gear Parameter PA12, PA13.

Note:Any ratio can be set by setting the value of numerator and denominator. However, the range should be restricted in 1/50-50.

Table 15.7.3.1:The relation of input pulse numbers and rotating cycles

Input Pulse Numbers	Cycles of Motor Rotating $\frac{Pulse \times PA12}{10000 \times PA13}$	Electronic Gear Numerator PA12	Electronic Gear Denominator PA13
10000	1	1	1
5000	1	2	1
3000	1	10	3
800	1	25	2
20000	1	1	2
1000	2/3	20	3

4000	3	30	4

Table 15.7.3.2:The relation of input pulse frequency and rotating speed

Input Pulse Frequency (Hz)	Motor Rotating Speed (r/min) $\frac{Frequency \times 60 \times PA12}{10000 \times PA13}$	Electronic Gear Numerator PA12	Electronic Gear Denominator PA13
300k	1800	1	1
500k	3000	1	1
100k	1200	2	1
100k	1800	3	1
50k	1000	10	3
200k	800	2	3
100k	300	1	2

15.8 Adjustment

15.8.1 Gain Adjustment

(1) Speed Control

- The setting value of "speed ratio gain" (PA5) should be big if there is no vibration. Generally, the bigger the load inertia is, the bigger the setting value of "speed ratio gain" will be .
- The setting value of "speed integral time constant" should be smaller according to the given condition. When the setting value of "speed integral time constant" is bigger, the change of the speed will be bigger should there is any change of the load. Generally, the bigger the load inertia is, the bigger the setting value of "speed integral time constant" will be .

(2) Position Control

- Set the appropriate "speed ratio gain" and "speed integral time constant" with the methods mentioned above.

The setting value of "position ratio gain" (PA9) should be bigger within the scope of stability. With a bigger "position ratio gain", the tracking characteristic is well, the delay error is low. However it is easy to cause vibration when stopping position. If there is a higher requirement of

position tracking characteristic, the setting value of "position feed-forward gain" could be increased. However, if the value is too higher, it will generate over strike.

[Note] : When the setting value of "position ratio gain" is lower, the system is in a table state. However, the position tracking characteristic will be fall and the delay error is bigger.

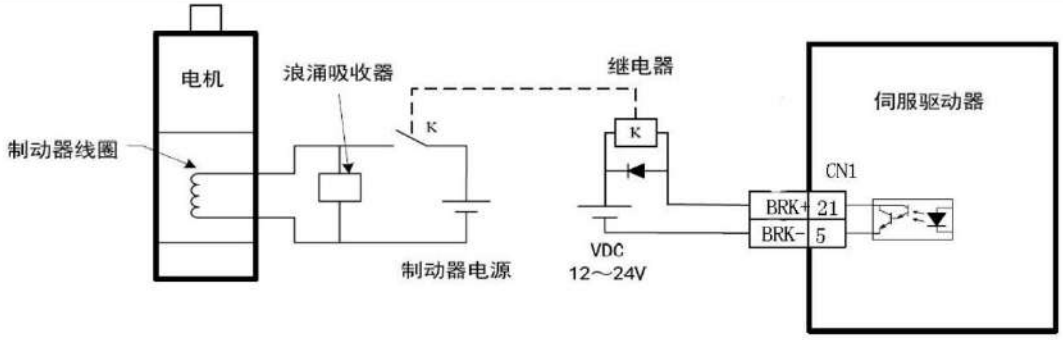
Refer to the following table to set the value of "Position Ratio Gain"

Stiffness	Position Ratio Gain
Low Stiffness	58~118
Medium Stiffness	118~138
High Stiffness	138~198

15.9 FAQ

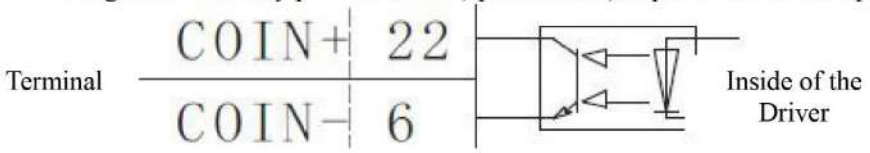
15.9.1 Brake

Electromagnetic brake (holding brake, power-off brake) is used to lock the vertical or horizontal working table connected to the motor to avoid the falling down of the working table after power off of the servo. If this function is needed, please choose and buy the motor with brake. The brake is used only to keep the working table not falling down, it can never use to decelerate the speed or stop the motor movement. The standard wiring is in the following:



15.9.2 COIN Signal Usage Explanation.

（1）COIN Signal:can identify position arrival,speed arrival,torque arrival or low speed.



（2）Parameter PA155: COIN output signal source.0:position arrival or speed arrival,1:Torque arrival,2=zero speed abnormal signal.

PA155	PA4	COIN information	Other relevant parameters
0	0 Position Mode	Position Arrival.Position offset ≤ PA16	PA16
	1 Speed Mode	Speed Arrival.Speed≥PA28	PA28
	4 Torque Mode	Speed Arrival.Speed≥PA28	PA28
1	No Relevant	Torque Arrival. Actual output torque ≥PA154	PA154
2	No Relevant	Low speed.Enabled, with torque command,but the speed ≤ PA153,and the continuous time is more than the value of PA170,output signal	PA153,PA170
3	No Relevant	Motor arrived the max restricted value.Actual output torque ≥ PA34/PA35 （Inner Max Torque Restricted）	PA34,PA35
4	4 Torque Mode	Torque Arrival. （Actual Output Torque—Target Torque）≤PA154	PA154

PA16: position arrived set range.When in position mode, the difference of command pulse and actual

position is less than PA16, COIN output is valid.
PA28:speed arrived set range. When in speed mode, the difference of speed command and actual speed is less than PA28.COIN output is valid.
PA154:Torque arrival point.20160630 Unit is 0.01Nm.Default value is 1000.
PA156:Detecting filter time when torque arrival after output COIN signal. The unit is ms.Default value is 100ms.
PA153:Low speed signal valve value, Unit:RPM.When the speed is lower than the value of PA153, and over the time the value of PA170,output COIN signal.
PA170:Low speed signal filter time. Unit:ms.

Appendix A Servo Drive Specification

Model			DZ-30B2	DZ-20B2	DZ-10B2
Output Power(KW)			2.3kw	1.2kw	0.5kw
Input Power			Three Phase AC220V -15～+10% 50～60Hz	Single Phase AC220V -15～+10% 50～60Hz	
Encoder Type			5V,2500 wires incremental Encoder; 9-wires incremental Encoder		
Control Mode			①Position Control ②Speed Control ③Torque Control ④RS485 MODBUS position Control		
Regenerative Brake			Internal,External		
Control Characteristics	Speed frequency response		Above 200Hz		
	Speed Fluctuation Ratio		＜±3% (Load 0～100%)；＜±2% (Power -15～+10%) (Value is corresponding to the rated speed.)		
	Speed Ratio		1:5000		
	Input Pulse Frequency		≤500kHz		
Position Control		Input Mode	①Pulse+Signal ②CW Pulse+CCW Pulse③Orthogonality AB Phases Pulse		
		Electronic Gear Ratio	1～9999/1～9999		
		Feedback Pulse	500～10000 pulse/cycle,settable		
Feedback Mode			Feedback of Motor Shaft Incremental Pulse Encoder		
Parameter Setting Method			① the Keypads of this device input setting, ② RS485 MODBUS Communication Recording		
Service Load Inertia			3 times less than the inertia of the motor		
Braking Mode			Resistance Energy Consumption Braking		

Installation Method		Wall-mounted Installation
Grounding Mode		Case Grounding, Grounding Resistance≤0.1Ω
Monitor Function		Rotate Speed, Current Position, Command Pulse Accumulation, Positional Deviation, Motor Current, Command Pulse Frequency, Operation Status, Input and Output Terminal Signal, etc
Protection Function		Over speed, Main power Under-voltage and Over-voltage, Over-current, Over-load, Braking Abnormal, Encoder Abnormal, Position Out of Tolerance, etc
Display and Operation		6 LED Nixie Tubes, 4 Keypads
Application Environment	Temperature	Working:0～55℃ Storage:-20℃～80℃
	Humidity	Less than 90% (No Dew)
	Vibration	Less than 0.5G(4.9m/S^2), 10～60 Hz (Non-continuous Operation)

Appendix B Warranty Terms

1 Warranty Period

There will be one year quality guarantee for Weide' s product. Within the warranty period, free maintenance service can be provided for the defect products.

2 No warranty for the following cases.

- Improper wiring, eg.wiring the negative and positive polar wrong or Hot-plugging.
- Change the internal devices without permission.
- Use beyond the requirement of electric and environment.
- Bad heat dissipation Environment.

3 Maintenance Process

Please follow the following steps to maintain the products.

(1) Call Weide Company to report the default cases before sending back the products.

(2) Have a paper report of the default cases of the drives and the voltage, current and environment when the default happened to send with the product, the contact person, telephone no and address also included.

(3) Prepay the Postage cost

4 Warranty Restriction

The warranty range of Weide' s product is confined to the device and technology (namely, consistency).

Weide cannot guarantee its products is applicable to the customer' s concrete use. Whether it is applicable is up to the technical requirement and working condition and environment. It is not advise to apply it to clinical care.

5 Maintenance Requirement

Please write the 'Default Report' (Please ask it from Weide Commercial Department) before send the products back. It is good for us to analyze the problem.

Delivery Address: Room303, E Building, Science City, Guangzhou, Guangdong Province