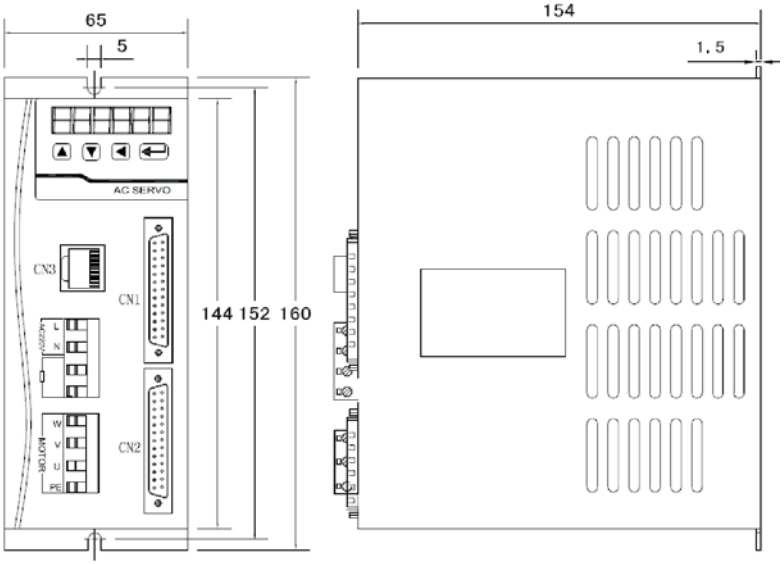
Chapter 1 INSTALLATION

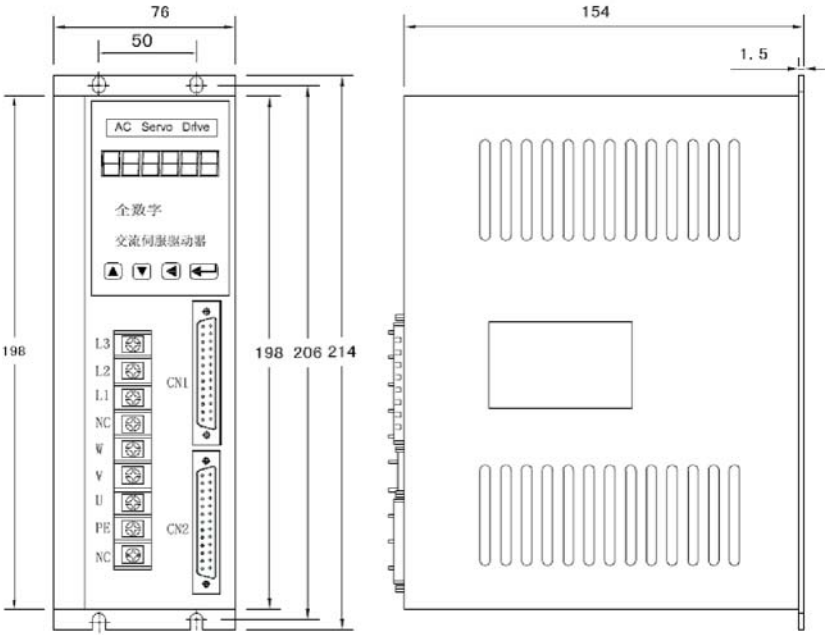
2.1 Driver Installation Size:

1) Front Side (mm)

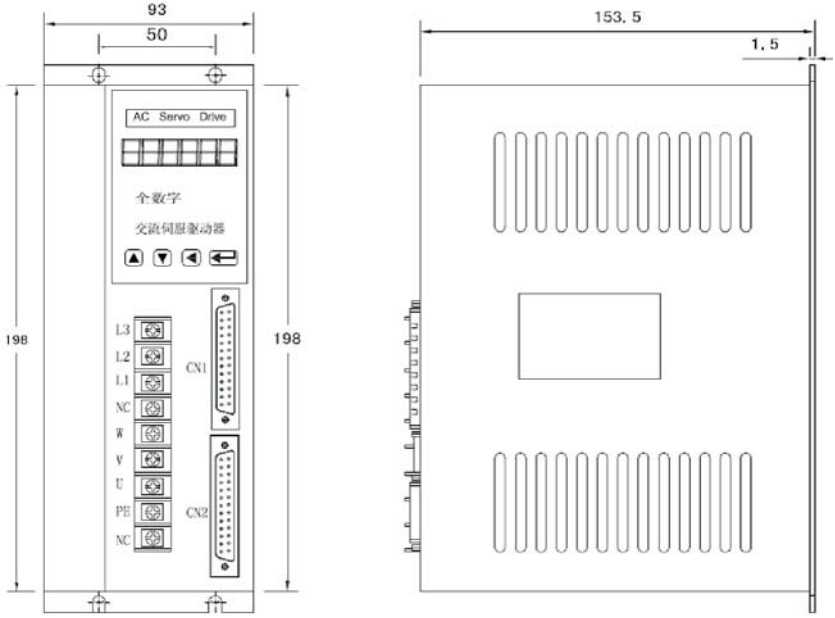


K0 low power (0.2KW-0.8KW) Servo Driver installation dimension.

Caution:L and N is the 220VAC power supply input interface,P and D is the external braking resistor interface.Don't take mistakes.



K1 Mid-Power(1KW-2.5KW)Servo Driver installation Size



K2 high-power(2.5KW-5KW)Servo Driver Installation Size

1.3.1 Instalment Environment Conditions

Enviroment	Servo Driver	Servo Motor
Operature Temperature/Humidity	0~-55°C(non-frezing) 90%RH or less (non-condensing)	-10°C-40°C (non-frezing) 90%RH or less(non-condensing)
Storage Temperature/Humidity	-20°C~80°C 90%RH or less (non-condensing)	-40°C~55°C 85%RH or less (non-condensing)
Ambience	Indoor,no direct sunlight,free from corrosive gas,flammable gas, oil mist,dust and dirt	
Vibration	0.5G(4.9m/s^2) 10 Hz -60Hz or less	
Protection Class	IP00	IP54

When several Servo Drivers installed in the control cabinet,pls note to keep enough space between the drivers,to keep the elimination of heat;And also add some radiator fun,to make the driver running environment temperation is less than 55 degree.

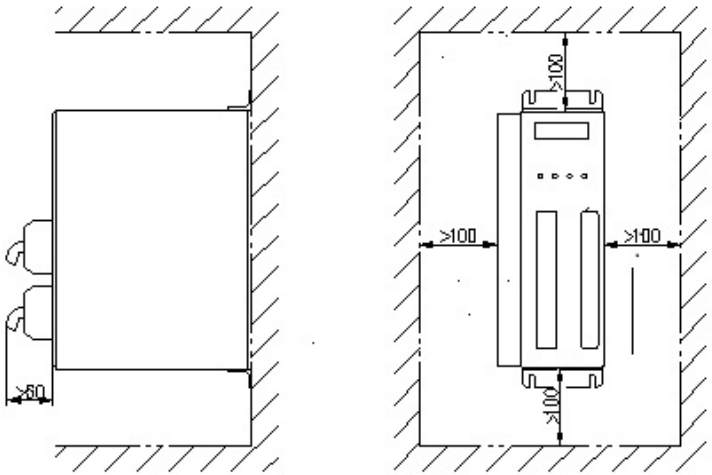
When install pls invoid any foreign material inside the drivers.

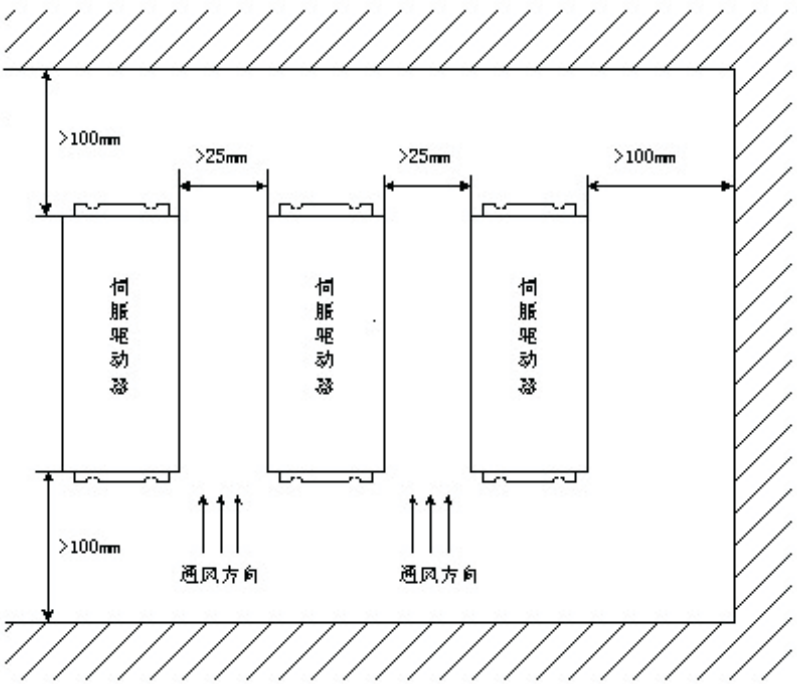
Use M4 screw for driver mounting.

As around there is some source of shaking,such as backing-out punch,pls use vibration absorbor,or install antivibration rubber gasket.

If around there is big size magnetic swich,heat sealing machine,the driver is easy to be interfered and running wrong actions,so pls install a noise flitter;but noise flitter can increase missing current,so in the input interface of the driver,install a insulated transformer.

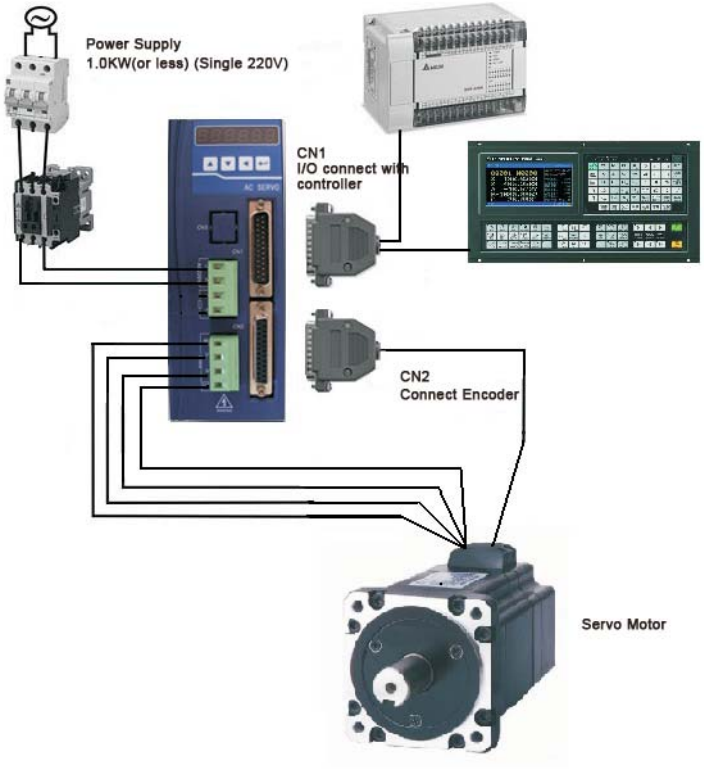
1.3.2 Servo Installation Commands and Space

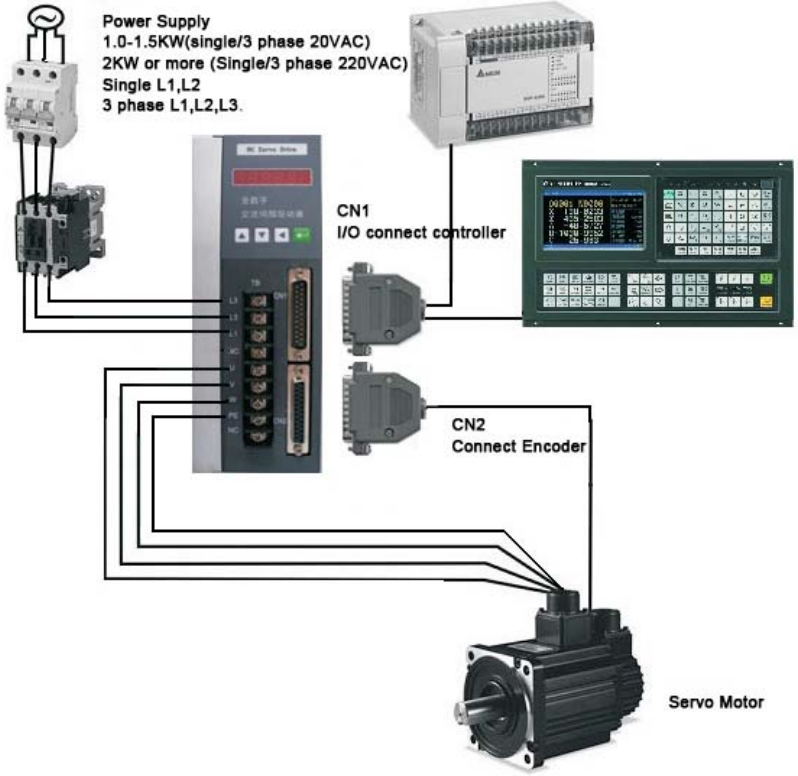



>100mm
>25mm
>25mm
>100mm
伺服驱动器
伺服驱动器
伺服驱动器
>100mm
通风方向
通风方向

Chapter 2　Servo Driver and Motor Connections

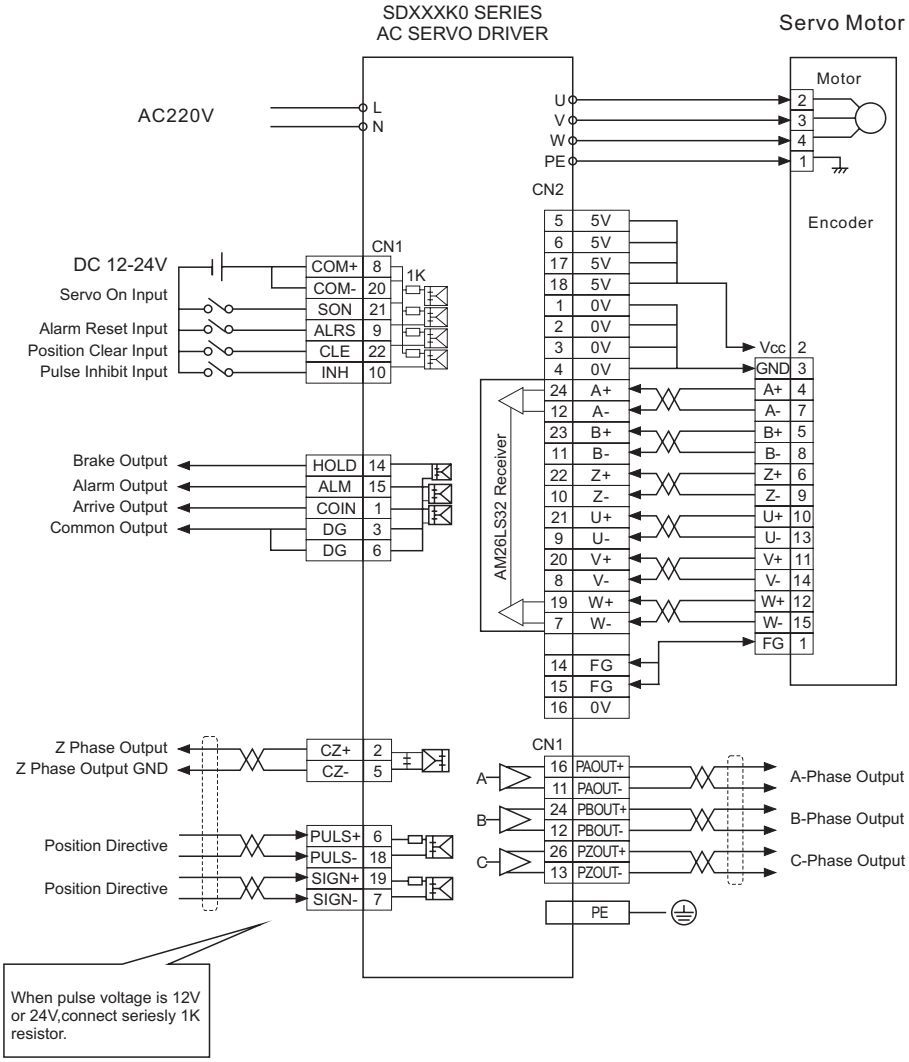
2.1 Servo Driver power supply and connections



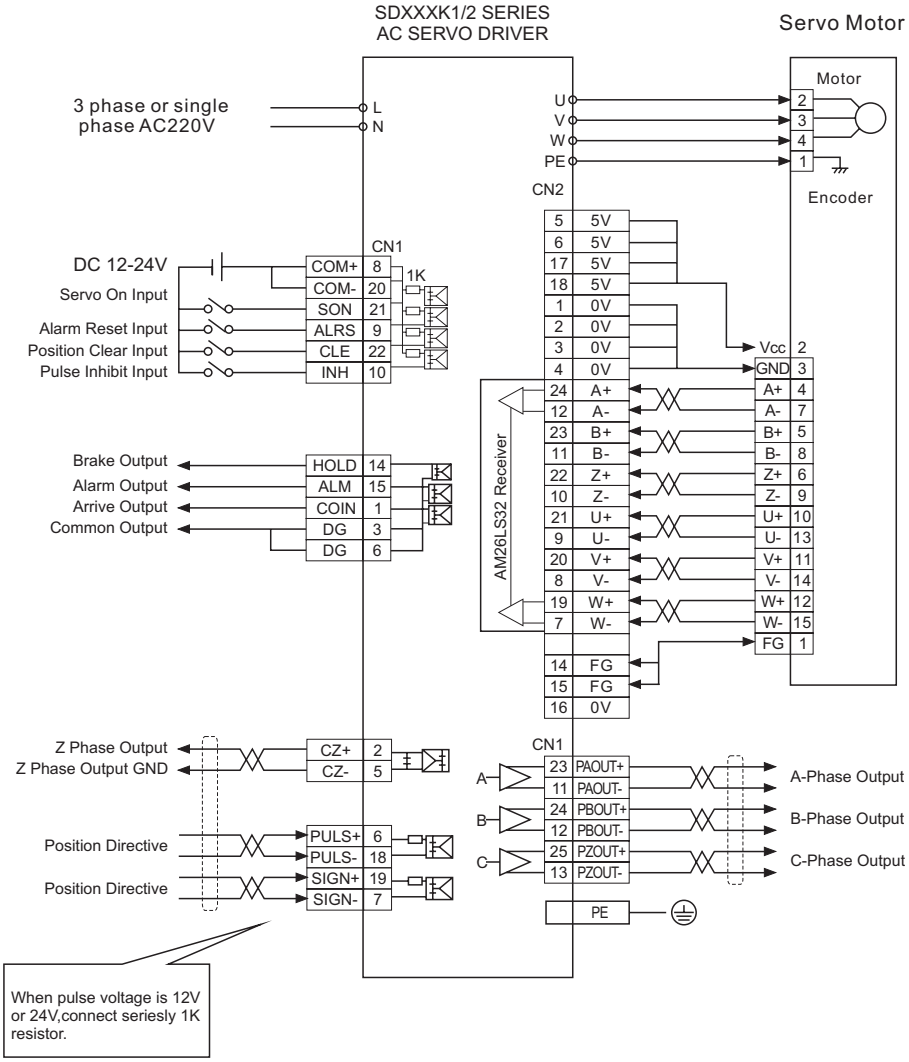


SD***K1/K2 Series Servo Driver Connection

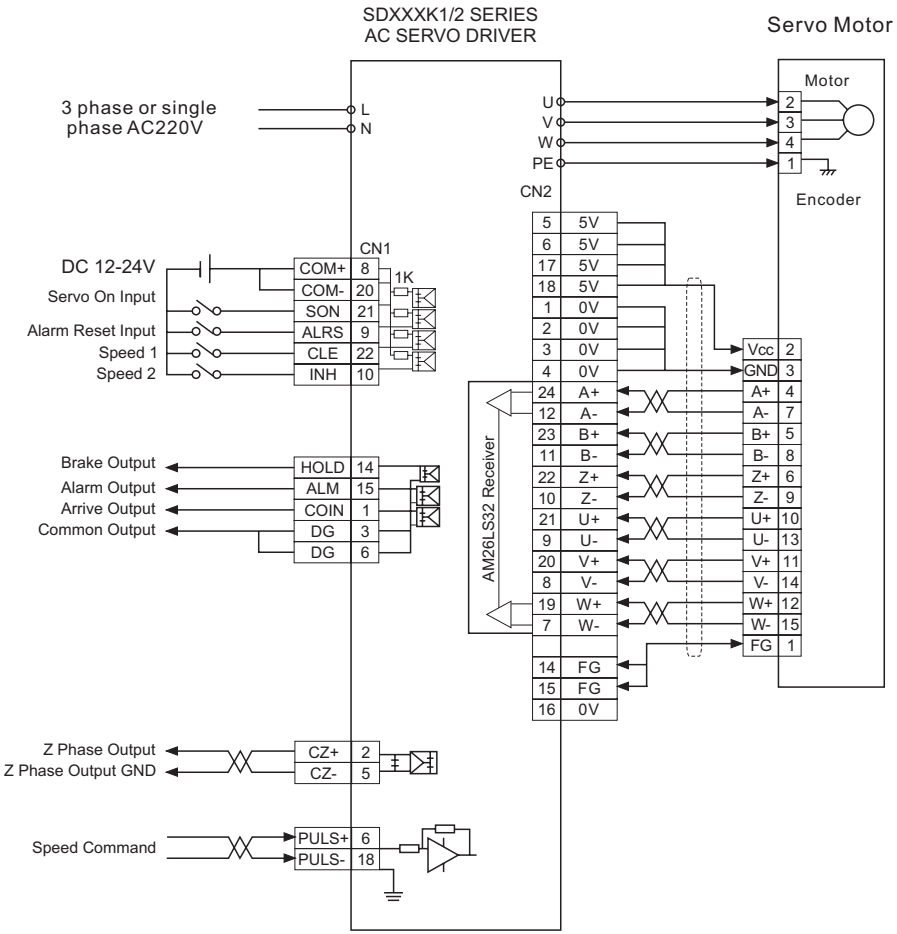
2.2 Speed Position Controller Mode Connection



Position Control Mode



Position Control Mode



Speed Control Mode

2.3 Connection

2.3. 1、Power supply interface (SD***K0 series)

Terminal	Description	Function
L N	Main Power Supply Single Phase	Main power supply input interface:220V 50Hz. Note: Don't connect with U,V,W of motor.
PE	Connect GND	GND resistor＜100Ω;Servo Moto ouput and power supply output common connect with ground.
W V U	Servo Motor Output	Servo Motor output interface should connect with W,V,U according.

2、Power Supply Termimal (SD***K1/K2 series)

Terminal	Description	Function
L1 L2 L3	Main Power Supply Single or 3 phase AC220V	Main power supply input interface:220V 50Hz Note: Don't connect with U,V,W of motor.
PE	Connect GND	GND resistor＜100Ω；Servo Motor ouput and power supply output common connect with ground.
U V W	Servo Motor Output	Servo Motor output interface should connect with W,V,U according.

2.3. Power supply interface CABLES

♦ L1、L2、L3、PE、U、V、W terminal, diameter ≥1.5mm2(AWG14-16),L、N terminal, diameter≥1.0 mm2(AWG16-18).

♦ The GND cable should be thick enough.Driver and Motor connect the ground at PE terminal,the GND resistor＜100Ω

It's suggested to supply power through a three phase isolation transformer for personnel safety.

♦ It's suggested to use a NFB in the power supply circuit for emergent turnoff.

2.3. 3 Signal Interface

SD Servo Driver unit Terminal interface are as below.CN1 signal control terminal interface is DB25 pins.CN2 feedback interface is DB25.

1） Signals for CN1

（P means in position control mode；S means in Speed control mode)

In next Page you will see the all the CN1 pins functions.

Pins	Signal Name	Symbol	I/O	Control Mode	Function
CN1-8 CN1-20	Power Supply Input Positive	COM+	Power Supply	S/P	Power Input Terminal Positive side,drive photocoupler DC12～24V,Curent≥100mA
CN1-21	Servo On	SON	input	S/P	SON ON: Servo driver operate. SON OFF: Driver no working,motor free.
CN1-9	Error Clear	ALRS	input	S/P	ALRS ON：Clear system error ALRS OFF：Keep system error
CN1-22	Deviation Counter Clear	CLE	input	P	CLE ON：When in position control Mode, Position deviation couter clear.
	Speed Selection 1	SC1	input	S	Speed selection 1 input terminal,in the speed control mode,SC1 and SC2 for selecting different internal speed. SC1 OFF,SC2 OFF：internal speed 1; SC1 ON,SC2 OFF：internal speed 2; SC1 OFF,SC2 ON：internal speed 3; SC1 ON, SC2 ON：internal speed 4. Note: Internal speed 1-4 you can set from the parameter.
CN1-10	Pulse Inhibit Input	INH	input	P	When the signal is available,input pulse inhibited,motor steop running.
	Speed Selection 2	SC2	input	S	SC1 OFF,SC2 OFF:Internal Speed 1. SC1 ON, SC2 OFF:Internal Speed 2. SC1 OFF,SC2 ON: Internal Speed 3. SC1 ON, SC2 ON: Internal Speed 4.
CN1-1	Position/ Speed Arrive	COIN	output	S/P	When the servo setting position is near the target postion(Pn12 value),Output ON.
CN1-15	Alarm Output	ALM	output	S/P	SERVO Alarm output terminal. ALM ON:Driver no alarm,alarm output ON. ALM OFFLDriver with alarm,alrm ouput OFF.
CN1-3/16	Output Common	DG	common	S/P	Control Signal Output Common GND.
CN1-2	Encoder Z Phase Output	CZ	output	S/P	Encoder Z Phase Output Terminal Motor photoelectric Z phase pulse output CZ ON：Z phase pulse output
CN1-5	Encoder Z Phase GND	CZCOM	output	S/P	Encoder Z phase output Common.
CN1-18	Command Pulse Signal	PULS+	input	P	External command pulse input Terminal. Note:PN8 set the pulse input mode 1.Command Pulse+sign mode; 2.CCW/CW command pulse mode.
CN1-6		PULS-			
CN1-7	Command Direction Signal	SIGN+	input	P	
CN1-19		SIGN-			
CN1-4	Analog Voltage Signal	VCMD	input	S	Input Analog Voltage ±10V Input resistor20K
CN1-17	Analog Voltage GND	GS		S	
CN1-14	Brake output positive	HOLD+	output	S/P	Drain open output,when work normally, optical coupling conduct.Output ON. No servo on,driver inhibit.When error, optical coupling stop,output OFF.
CN1-3	Brake output negative	HOLD-		S/P	
CN1-23	A Phase Output+	PAOUT+	output	S/P	Encoder feedback output signal.Standard is 2500/line.According adjust Pn41 and Pn42 to set electrical gear ratio,example: Encoder every turn is 2500 pulses,set the Pn1/Pn2=4/5,so A,B phase output signal is 2500*Pn41/Pn42=2000 pulses.
CN1-11	A Phase Output-	PAOUT-			
CN1-24	B Phase Output+	PBOUT+			
CN1-12	B Phase Output-	PBOUT-			
CN1-25	Z Phase Output+	PZOUT+		S/P	One turn the motor moving,output one pulse.
CN1-13	Z Phase Output-	PZOUT-			
CN1-PE	Shield	PE			

2) Feedback Signal Interface CN2

Pins	Signal Name	Symbol			Function
		Mark	I/O	Mode	
CN2-5-6-17-18	Power Supply+	+5V	PS	S/P	Servo Motor Photoelectric encoder use +5V power supply;If the cables too long,use core wire parallel connection.
CN2-1-2-3-4	Power Supply-	OV	GND	S/P	
CN2-24	Encoder A+	A+	I	S/P	Connect with encoder A+ Phase of motor.
CN2-12	Encoder A-	A-			Connect with encoder A- Phase of motor.
CN2-23	Encoder B+	B+	I	S/P	Connect with encoder B+ Phase of motor.
CN2-11	Encoder B-	B-			Connect with encoder B- Phase of motor.
CN2-22	Encoder Z+	Z+	I	S/P	Connect with encoder Z+ Phase of motor.
CN2-10	Encoder Z-	Z-			Connect with encoder Z- Phase of motor.
CN2-21	Encoder U+	U+	I	S/P	Connect with encoder U+ Phase of motor.
CN2-9	Encoder U-	U-			Connect with encoder U- Phase of motor.
CN2-20	Encoder V+	V+	I	S/P	Connect with encoder V+ Phase of motor.
CN2-8	Encoder V-	V-			Connect with encoder V- Phase of motor.
CN2-19	Encoder W+	W+	I	S/P	Connect with encoder W+ Phase of motor.
CN2-7	Encoder W-	W-			Connect with encoder W- Phase of motor.
CN2-14				PE	Shield

2.3. 4 Signal Terminal Cables

♦ Cable selection:It's better to use s twist shield cables,dimension≥0.12mm2(AWG24-26), the shield layer should connece with PE.

♦ Cable length: Cable length is shorter is better.Control CN1 cable no longer than 3M and feedback cable CN2 no longer than 20M.

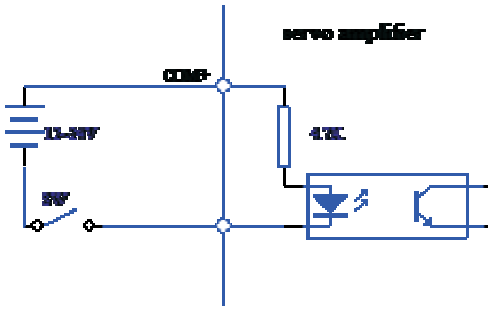
♦ Wiring: The wiring is better to be far away from power supply,to avoide interference.Also pls install some surge absorbing componnets.DC coil inverse parallel fly-wheel diode,and AC coil parallel connect resistor to absorb loop.

2.4 Signal Terminal Principle

2.4. 1 data input terminal circiut

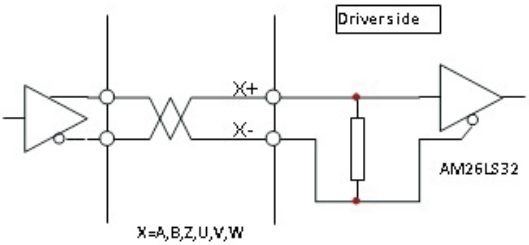
Data input Terminal circuit can be controlled by relay or open collector transistor circuit.The user supply the power supply,DC12-24V,current≥100mA;

Note: If the current pole connect reversely,will make driver no work.



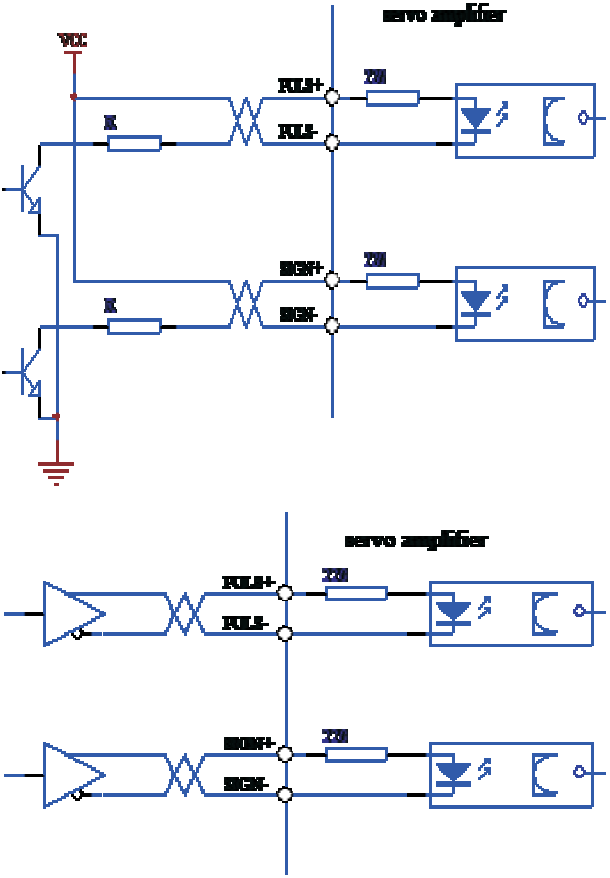
2.4. 2 Servo Motor photoelectric encoder input termimal:

In the mode of differencial output,use M26LS32,MC3487 some other similar as RS422 as the receiver.



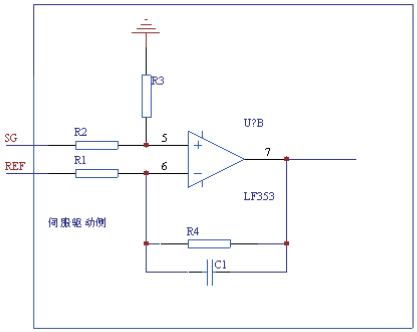
2.4. 3 Pulse signal input terminal circuit

In order to send the impulse data correctly,it's advised to use differencial drive mode.In Differencial driver mode,use AM26LS31、MC3487or some similar as RS422 driver.When use single end drive mode,will make the movement frequency lower.Accroding pulses input circuit,driver current 10～25mA,limit extermal power supply max. voltage is 24V,to get the resistor R's value.As the experience:VCC=24V, R=1.3～2k；VCC=12V, R=510～820Ω. When use single end driver mode,external power supply the user supply.But pls note,if the power supply poles connect reversely,will make the drive components burned.

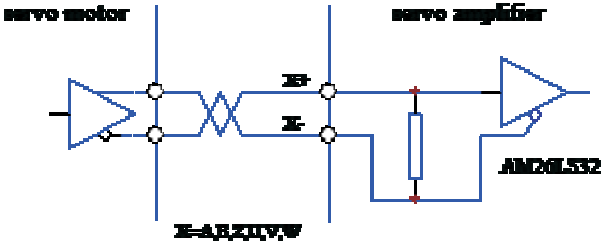

servo amplifier
VCC
R
220
R
220
servo amplifier
220
220

2.4. 4 Analog quantity input Terminal

Analog input voltage cannot be more than ±10V, over-big voltage will make driver damaged;and advised to use twisted pair cable to connect.

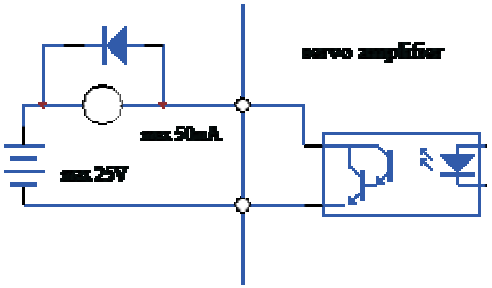


2.4. 5 Diver speed output terminal.



2.4. 6 Data ouput Terminal circuit.

When use the external power supply,pls note the pole ofit.Wrong connection will make driver damaged.Data output will use the open collector mode.External Max. voltage is 24V,Max Current 10mA. To say as the load,when use relay or some inductive load,need to add diode and inductive load parallel connection,if the pole of diode is wrong,the driver will be damaged.



Chapter 3 Operation and Display

3.1 Keys operation

On the servo panel there are 6 LED nixie display and 4 keys,to display all the status,parameter setting and so on.The keys functions as below:

: Series No. and value increase or menu forward.

: Series No. and value reduce or menu back step.

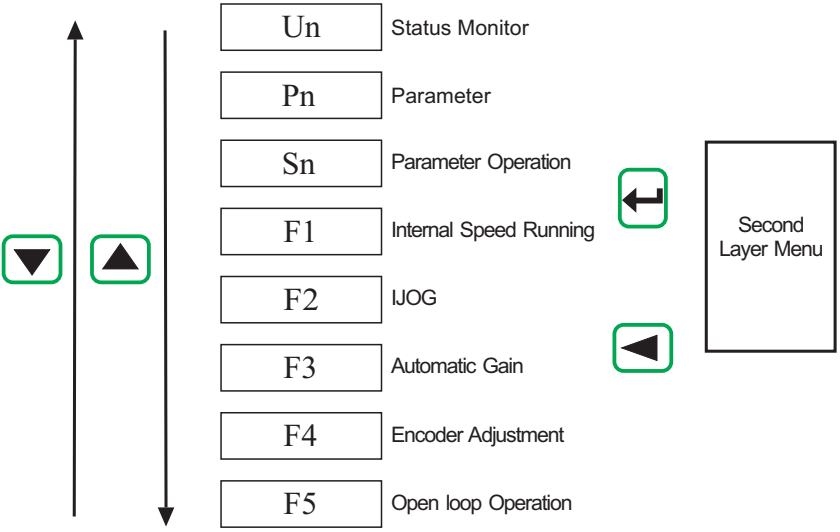
: Back to upper menu,or operation cancel.

: Into the next branch menu,or iinput confirm.

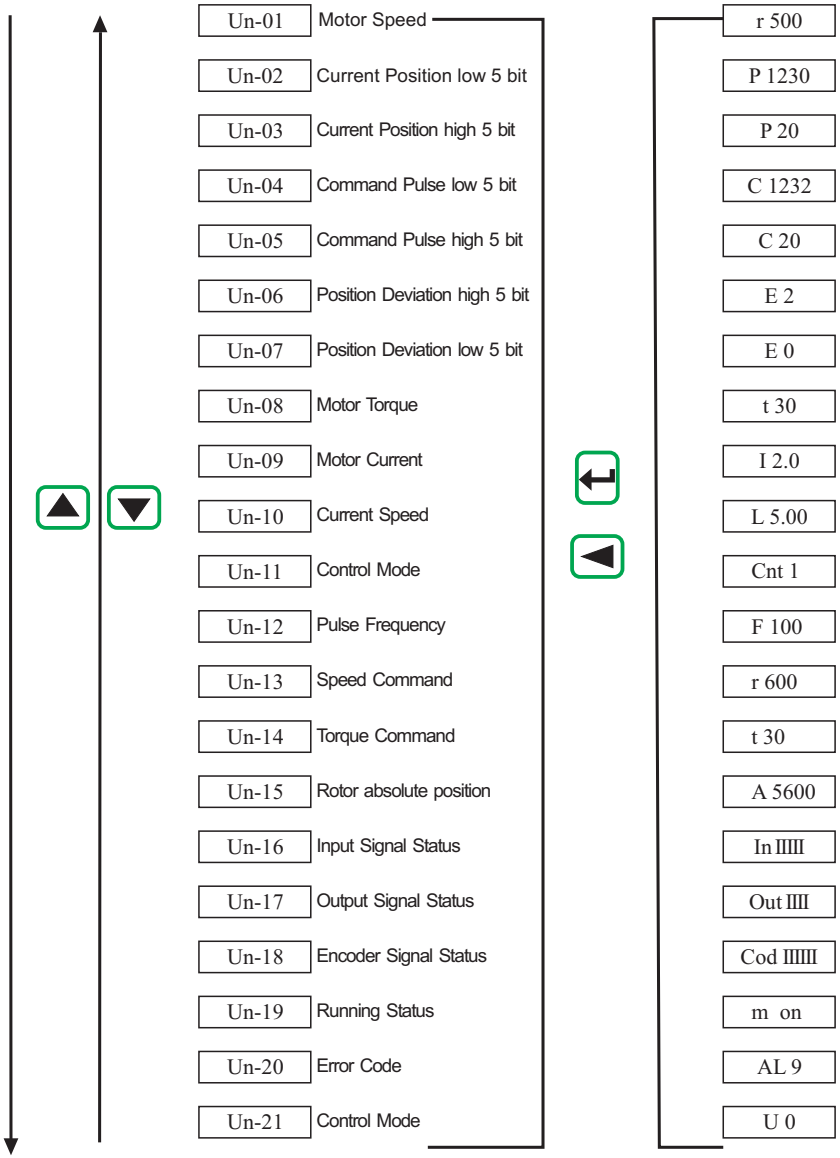
Note: and keep pressing,the operation will be done repeatly,and the time pressing longer the repeated speed is faster.

6 bit LED nixie tube display all the status and data of the system,when the decimal points on all the nixie tube or the most of the right side mixie tube is flashing,then it shows error.

Operate multilayer menu,the first layer is main menu,include 8 kinds operation mode,the second layer is the branch menu under the main meu.The drawing below shows:

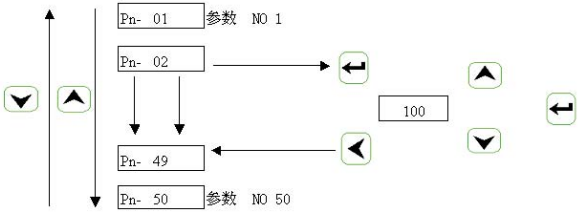


At the first layer and select “Un-“,and press then enter into monitor mode;Totally there are 21 kinds display status,user can use and to select.



3.3 Parameter Setting

In the first Relay and select “PN-”,Press ↵ and enter into the parameter setting mode. Select the Parameter code by pressing ▲ and ▼,Press ↵ key,display the value of this parameter,use and keys can modify the value.Press ▲ or ▼ keys one time,the parameter value will increase or reduce decrease by 1.Keep pressing ▲ or ▼ keys,the parameter value can keep increasing or decreasing.When the parameter is revised,the most right decimal point on the LED nixie tube lights up,press ↵ keys and confirm the revised parameter effectively.Then the most right decimal points turns to be blanking.And press ▲ or ▼ keys to revise the parameter again,when modification finished and press ◄ keys and be back to selection status.If user is not satifify with the data already revised,don’t press ↵ keys to confirm,to press the ◄ keys to cancel,the parameter will keep on the original ones and back to parameter selecting status.



4 Parameter administration

Parameter administration mainly deal the operation between the memory and the EEPROM.At the first layer select “Sn-”,and press ↵ key to enter into the parameter administration mode.Firstly select the operation mode,there are 5 kinds mode totally,use ▲ and ▼ to select.Take the “parameter write in” for example,select “Sn-Set”,then press ↵ key for 2 seconds or more,if operate successfully,it display “DONE”,if failure then display “ERR”.And press ◄ key to back to the operation mode selection status.

Sn－SEt: Parameter set.Shows save the parameter in the memory into the parameter zone of EEPROM.The user modifyied parameter,only changed the parameter in memory,when restart it will recovery to the original parameter.If users want to modify the parameter permanently then they need to execute “parameter set”,to save the parameter into parameter zone of EEPROM,then if restart the driver will use the revised parameter.

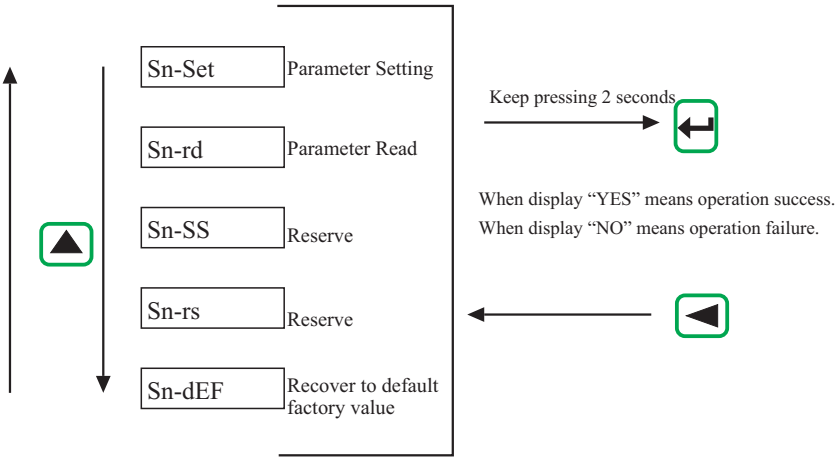
Sn－rd: Parameter Read.Means save the parameter which in EEPROM

into memory.This process only excute one time when power on,at beginning,the parameters in memory are the same as in the EEPROM.But the users modified parameter,which will be changed in the memory.When users are not satisified the revised parameters,execute “Sn-rd”,then the parameters in the EEPROM can be saved to the memory,recovery to the parameters when power on.

Sn－SS Reserve

Sn－rS Reserve

Sn－dEF Recover to default factory value,means that put all the default factory values into the memory,also write into the parameter zone of EEPROM,when restart next time,the driver will use the default factory values.When the users set parameter wrongly and driver cannot work normally,operate it and all the parameter can recover to default values.Because different model have different default values,before recovery,pls make sure motor ID(parameter PN1) is right.



3.5 F1 operateion mode.(Panel trial function)

In the first relay select “F1-”,and press ↵ key into the speed test run mode.Test Run mode’s symbol is “S”,the value unit is r/min.Speed Commad sent by keys,use ▲ and ▼ keys can change the speed commands,motor will run at the given speed. ▲ Control speed increasing,and ▼ control speed decreasing.When display the speed value at positive,motor run at clockwise rotation and when display the negative value motor run at counter-clockwise rotation.

3.6 F2 JOG run mode

At the first layer select “F2-”,and press ↵ key into the JOG run mode.JOY Run mode’s symbol is “J”,value unit is r/min,speed command sent by keys.After enter into F2,press ▲ and keep on,motor JOG mode running,release key and motor stop running.Press ▼ key and keep on,motor JOG running at a revserse direction,release keys,motor stop running.JOG speed is set by parameter PN22.

3.7 Others

Aging function: Set the Pn1 to 6,Pn57 to 1.The servo driver excute CW/CCW program automatically.The speed can be set by Pn23.The periodic time of CW/CCW is 2S.Used for the age motor or driver.

F4 is for the encoder zero clamp function,motor factory use it.The end user don’t use pls.

F5 function reversed.

Chapter 4 Parameter

SD series servo driver totally have 96pcs parameter for the users.According to the usage there are 3 kinds parameter.Pn1-Pn59 is the user parameter,Pn60-Pn96 is for the motor complete set parameter;Pn5-Pn16 is position control parameter; Pn17-42 is speed control parameter;Pn43-Pn50 is current control parameter; Pn51-Pn59 is I/O control parameter; Pn60-Pn96 is for motor complete set parameter.

No.	Name	No.	Name
0	Password	34	Analog Speed/Torque Zero Clamp Mode
1	Motor ID	35	Zero offset amount 1
2	System Software Version	36	Zero offset amount 0
3	Initial Display Status	37	Analog Speed/Torque Motor Rotate Direction
4	Control Mode Selection	38	Reversed
5	Position Proportional Gain	39	Reversed
6	Position Feed-forward Gain	40	Speed Mode Selection
7	Position Feed-forward lowpass Fliter	41	Speed output electric gear ratio molecular
8	Position Command Pulse Input Mode	42	Speed Output electric gear ratio denominator
9	Position Command Gear Ratio molecular	43	Current loop proportional gain
10	Position Command Gear Ratio denominator	44	Current loop integral time constant
11	Reverse Position Command	45	Internal CCW torque limit
12	Location completing range	46	Internal CW torque limit
13	Position Out-of-tolerance Range	47	External CCW torque limit
14	Position Out-of-tolerance invalid	48	External CW torque limit
15	Position Smoothing Fliter	49	Internal Speed Run,Jog run torque
16	Driver forbit input invalid	50	Torque Command Fliter
17	Speed Proportional Gain	53	Input terminal low 4 bit reverse.
18	Speed Integral Time Constant	54	Input terminal high 4 bit reverse.
19	Speed Inspect Lowpass Fliter	55	Output Terminal bit reverse.
20	Max. Speed limit	56	I/O port fliter time constant
21	Arrived Speed	57	Automatically servo on motor.
22	JOG running speed	58	Encoder fault line invaid
23	Internal Speed 1	59	Driver production date
24	Internal Speed 2	60	Motor Inertia ratio
25	Internal Speed 3	61	Motor Rated Torque
26	Internal Speed 4	62	Motor rated speed
27	Motor magnetic pole position	64	Motor Rated Current
28	Reversed	65	Max. overload capacity system allowed
29	Acceleration Time Constant	68	Current Command lowpass fliter
30	Deceleration Time Constant	86	Encoder Lines
31	Analog Speed/Torque Command Gain	87	Encoder Zero bit
32	Reversed	92	Motor Number of pole-pairs
33	Analog Speed/Torque Command Fliter	95	Automatically servo on valid

No.	Name	Function	Range
0	Password	1) There are passport for users' parameter and system parameter. 2) If want to modify motor ID(Pn1) you should set it to 0, User passport is 100.System parameter pls ask the factory.	0~500
1	Motor ID	Used for the matched motor Model.Every motor have only one ID No. When modify,set the passport Pn1 to 0,then can modify the parameter.	1~100
2	Software ID	Reserved for factory	900
3	Initial Display Status	0: Display motor speed; 1: Display current position last 4 bit; 2: Display current position first 4 bit; 8: Display Motor Current; 11: Display position command pulse frequency; 12: Display Speed Command; 13: Display Torque Command; 14: Display the absolute positon of rotor in one turn.	0~20
4	Control Mode	0: Position Control Mode; 1: Speed Control Mode; 2: Inernal Test Run Control Mode; 3: JOG Control Mode; 6: Aging test mode	0-6
5	Position Proportion Gain	Set Position loop proportional gain. The value is bigger,the gain is highe,the rigidity harder,in the same frequency command puls,the position hysteretic quality is smaller.But if value too big may cuase concussion or overshoot.	1-1000
6	Position Feed-forward	It determines the reponse of position control.If the value is bigger,the response is getting better and reduce the position determination time. However,the high limit value depends upon machine resonant frequency.If the value is too big to make the vibration,there is a noise in the mechanical part and big overshoot.	100
7	Position Feed-forward lowpass Fliter barrior frequency	The barrier frequency is higer,then it's easy to trace,but easy to make vibration.1~1200	1~1200
8	Position Command Pulse Input Mode	0: Pulse+symbol; 1: CCW pulse/CW pulse;	0~1
9	Position Command Gear Ratio modecular	Electric Gear Ratio Molecular.	1~32767
10	Position Command Gear Ratio denominator	Electric Gear Ratio Denominator	0-32767
11	Position Control Motor Direction	0: Normal; 1: Reverse Direction	0-1
12	Locate completing Range	Set the completing range in mode of position control. This parameter will shows it complete locating or not in the mode of position control.	0-30000
13	Position Out-of-tolerance Range	Set the position out-of-tolerance range. In the mode of position control,when the current counter No. is bigger than the parameter,Driver will give position out-of-tolerance ERROR.	0~10000
14	Position Out-of-tolerance invalid	0: Position out-of-tolerance inspect valid. 1: Position out-of-tolerance invalid,stop inspect the error.	0-1
15	Position command Smoothing Fliter	Flitering for the position command pulse smoothing,with acceleration/deceleration in exponential mode.the value means the time constant. Fliter never lose input pulse,but delay it sometimes; When set as 0,fliter invalid.	0ms ~30000 ×0.1ms
16	Driver inhibit input invalid	0: CCW,CW input inhibit valid; 1: Cancel CCW,CW input forbit.	
17	Speed Proportion Gain	It determines the response of speed control.If the value is bigger the response is getting faster to reduce the rising time.The value is in direct proportion to the load inertia.	1-2000Hz

No.	Name	Function	Range
18	Speed Integral Time Constant	The smaller value make integral time faster and inertia bigger.Load inertia bigger,the value will bigger.In the status of high frequency of stop-start,the value is less,to avoid overshoot.	1~500ms
19	Speed Inspect Lowpass Fliter	The smaller value,the lower barrier frequency,and lower motor noise. If the load inertia is big,can reduce the value according.But value is too small,will make too long response time and concussion.Bigger value and bigger barrier frequency,response time will be faster.	1%~500%
20	Rated Speed	Motor's Rated Speed	3000
21	Reserved.		
22	JOG speed	Set JOG speed.	-3000-3000 r/min
23	Defined speed 1	In mode of Speed Control,when SC1 OFF and SC2 OFF,select internal speed 1 as the commands.	-3000-3000 r/min
24	Defined speed 2	In mode of Speed Control,when SC1 ON and SC2 OFF,select internal speed 2 as the commands.	-3000-3000 r/min
25	Defined speed 3	In mode of Speed Control,When SC1 OFF and SC2 ON,select internal speed 3 as the commands.	-3000-3000 r/min
26	Defined speed 4	In mode of Speed Control,When SC1 ON and Sc2ON,select internal speed 4 as the commands.	-3000-3000 r/min
27	Motor magnetic pole position	Motor magnetic pole position	1-7
29	Acceleration Time Constant	The value is the acceleration time from 0r/min to 1000r/min.The acceleration character is linear.Only used in speed control mode, position control mode invalid;If driver operate with external postion loop,this parameter should be 1.	1-1000ms
30	Deceleration Time Constant	The value shows the deceleration time from 1000r/min~0r/min.The character is liear.Only used in Speed control mode,position control mode invalid;if driver used with external position loop,the value is 1.	1-1000ms
31	Analog Speed/ Torque Command Gain	Analog command shift to speed/torque gain.Bigger gain bigger speed gain.Then bigger slope of curves.	20-500HZ
32	Reserved.		
33	Analog Speed/ Torque Command Fliter	Fliter to analog command.Bigger value,the motor runs more steady, but weaker tracing ability.Smaller value,make better speed and trace ability,but easy to vibrate.	1-1000ms
34	Analog Speed/ Torque Command Zero Clamp Mode	0: high and low speed separate to do zero adjusting. 1: High and Low speed all use high speed to do zero adjusting.	0-1
36	Alanog zero correction 0	In Speed control mode,when no voltage input,motor also rotates lightly.Adjust this parameter can keep speed at zero speed.	512-1500
37	Analog Speed/ Torque Motor Rotate Direction	0: Normal; 1: Analog command reverse; 2: Output pulse reverse; 3: Analog command and output pulse all reverse.	0-3
38	Reserved		
39	Reserved		
40	Speed Mode Selection	In the Speed control mode,the speed is from internal speed or analog command:0: Internal Speed ;1: Analog command.	0-1
41	Speed output electric gear ratio molecular	Eevery 1 turn feedback pulse from encoder,which output from gear.	0-255
42	Speed Output electric gear ratio denominator	Eevery 1 turn feedback pulse from encoder,which output from gear.	0-255
43	Current loop proportion gain	Bigger value,bigger gain, smaller current tracing error.But too big gain will make vibration or noise.It related to motor,don't relate to load.	1-500HZ

No.	Name	Function	Range
44	Current loop integral time constant	Smaller value,faster integral speed,smaller current tracing error. Related with motor,don't related with load.As no vibration,set value as bigger as possible.	1-1000ms
45	Internal CCW torque limit	Set the internal torque limited value when CCW;the setting value is the percent of rated torque.	0%-300%
46	Internal CW torque limit	Set the internal torque limited value when CW;the setting value is the percent of rated torque.	0%-300%
47	External CC torque limit	Set the external torque limited value when CCW;the setting value is the percent of rated torque.	0%-300%
48	External CW torque limit	Set the external torque limited value when CW;the setting value is the percent of rated torque.	0%-300%
49	Reserved		
50	Torque Command Fliter	Set fliter character of torque command.Can depress sympathetic vibration.Smaller value,lower barrier frequency,smaller motor noise. If load inertia very big,can set a smaller value.But too small value,will\ make slow response,generate instable system.	1%~500%
53	Input terminal low 4 bit reverse	Input signal XX XX ALRS SON reverse by bit	0000
54	Input terminal high 4 bit reverse	Input signal XX XX INH CLE reverse by bit	0000
55	Output Terminal bit reverse	Output signal CZ COIN ALM XX reverse by bit	0000
56	IO signal sample time	I/O port sample time	1-100ms
57	Automatically servo on motor	Automatically servo on motor	0-1
58	Encoder fault line invaid	0: check fault lines 1: don't check fault lines	0-1
59	Driver production date	Driver production date	0910
60	Motor Inertia ratio	Set Motor Inertia ratio	1-32767
61	Motor Rated Torque	Set Motor Rated Torque	1-1000
62	Motor rated speed	Set motor rated speed	0-3000 r/min
64	Motor Rated Current	Set motor rated currents.	1-1000 ×0.1A
65	Max. overload capacity system allowed	Set over-load multiple which system allowed.	0-300%
68	Current Command lowpass fliter	Used to limit current commands frequency range,avoid current shock and vibration,to make current response steady.	1-1500HZ
86	Encoder Lines	Set the encoder lines every Rotation	1-10000 lines/R
87	Encoder Zero bit	Set the encoder Zero position.	0-9999 Pulse
92	Number of pole-pairs	Set the Number of pole-pairs of the motor.	1-6
95	Automatically servo on valid	0: SON determined by I0 port input signal; 1: SON forced to be ON.	0-1

Chapter 5 Operation and Setting

5.1 Power Supply Connection

1) Connect 3 phases 220VAC voltage to power supply terminal of driver.(SD***K1/K2 servo driver 3 phase connect L1、L2、L3,single phase connect L2、L1),(SD***K0 servo driver connect L、N)

2) Connect the power supply,after 2 seconds,servo ready signal is ON,then can accept SERVO ON signal.After Check that the servo on signal is effective,driver output valid,motor in running status.Check that servo on signal invalid or with error,motor in free status.

3) Connect/cut-off power supply frequently,may damage soft-start circuit and dynamic braking circuit;the connect/cut-off frequency is best to limit to 10 times per hour,50 times every day.If Servo Driver or motor is over-heat,after debugging,after 5 munites cooking,then you can connect power supply again.

5.1.1 Power Supply Connection Sequence

1）After power supply connection,1S later Servo Alarm signal output,1.5S later Ready signal output,10ms later response Servo On signal,within 10ms motor motivation locked,wait for running.

5.2 Position Control Mode Operation

1) Connect CN1,send the pulse into pins of 18,6,19,7 of CN1,Servo On signal set to OFF.

2) Connect main control circuit and main power supply,driver unit display lighting up.If error occurs,pls check connections.

3) In control mode selection set the Pn4=0,then it is position control mode,according to controller output signal set parameter Pn8,and also set a suitable electric gear ratio(Pn.9 Pn.10).

4) Confirm no error output or other abnormal status,servo on signal turn to ON,motor in motivation status,current speed zero.

5) Adjust input signal pulse frequency,motor run as the commands.

5.3 Speed control mode operation

In Speed control mode there are external analog voltage speed control and internal speed control two kinds.

A. External analog voltage speed control mode:

1) Connect CN1,connect analog signal into pins 17 and 4 of CN1,set SON OFF.

2) Connect main control circuit and main power supply,driver unit display lighting up.If error occurs,pls check connections.

3) Select control mode as speed control mode(Pn4-1),and also set Pn40 as 1.

4) Confirm no error output or other abnormal status,servo on signal turn to ON,motor in motivation,at external analog voltage control running status,motor turns slightly,set parameter Pn36,to make motor speed as zero.

5) Change the analog voltage of controller output,can change the motor speed;and change the voltage polarity,can change the direction of motor running.

B. Internal Speed Control Mode:

1) Connect CN1,input control signal:Servo ON (SON),Speed Selection 1 (SC1), Speed

Selection 2(SC2) OFF.

2) Connect main control circuit and main power supply,driver unit display lighting up.If error occurs,pls check connections.

3) Select the control mode selection to speed control mode(Pn4=1),Set Pn40=0,according to the request set the speed parameter Pn23-Pn26.

4) Confirm no alarm or anyother abnormal status,set SON to ON,motor in motivation,in the internal speed 1 running status.change the status of SC1 and SC2 terminal status in CN2,motor runs at the setting speed.

5.4 Speed Trial Operation Mode

1) Connect CN1,make the SON signal as OFF;

2) Connect main control circuit and main power supply,driver unit display lighting up.If error occurs,pls check connections;

3) Select the control mode selection to speed trial mod(Pn4=2);

4) Confirm no alarm or anyother abnormal status,set SON to ON,motor in motivation at zero speed;

5) Press some keys and enter into F1 speed trial mode,the symbol is “S”,the value unit is r/min,system in the status of speed trial mode,speed commands operated by keys,use keys to change the speed commands,motor runs at the given speed.

5.5 JOG Operation

1) Connect CN1,make the SON signal as OFF;

2) Connect main control circuit and main power supply,driver unit display lighting up.If error occurs,pls check connections;

3) Select the control mode to JOG mode(Pn4=3);

4) Confirm no alarm or anyother abnormal status,set SON to ON,motor in motivation at zero speed;

5) Press some keys and enter into F2 JOG operation status,the symbol is “J”,value unit is r/min,system in the status of speed control mode,speed and direction are determined by Pn.22,press ▲ motor run at the values of Pn22 given,press ▼ and motor run at a revsersed direction.

5.6 Debug

During the debug and application,if there is noise,vibration or precision missing,users can adjust the parameters as below:

When motor in inactive and locked status,if appears vibration or sharp noise,decrease the Pn43 value;In the condition of no concussion,we can set this parameter as bigger as possible.Bigger parameter and better current tracing ability,and quicker motor response.But too big will make noise and vibration.

A. Speed control mode parameter adjustment

1) [Speed Proportion Gain] (Parameter Pn17) In the condition of no concussion,set the value as bigger as possible.Gernarally,load inertia is bigger,the set value also should be bigger.

2) [Speed Integral Time Constant](Parameter Pn18) According to the given condition,set the value as small as possible.IIf set value over smaller,response speed will be improved but easy to make concussion.So in the condition of no concussion,set the value as smaller as possible.When setting value too big,when load changed,speed change will be higher.

(2): Position control mode parameter adjustment

1) As the above methods,set suitable Speed Proportion Gain and Speed Integral Time Constant.

2) [Position Feed-forward Gain](Parameter Pn6) set to 0%。

3) [Position Proportional Gain] (Parameter Pn5) In the steady range,set this value as bigger as possible.When bigger value,position command tracing character is very good,lay error smaller,but when stop location,easy to make concussion.When the value is smaller,the system is steady,but postion tracing character not good,lay error is big.

4) If request the positon tracing character is very high,increase the Pn6 Value,but too big,will make overshoot.

Chapter 6 ALARM TROUBLESHOOTING

Code	Alarm Name	Possible Cause
AL-0	Normal	
AL-1	Overspeed	Servo motor speed exceed parameter.
AL-2	Main Circuit Over-Voltage	Main Circuit Over-Voltage
AL-3	Main circuit short of voltage	Main circuit short of voltage
AL-4	Position out of toleration	Position out of toleration exceed Pn13 parameter.
AL-6	Speed amplifier saturate	Speed amplifier satuate for a long time
AL-9	Encoder is fault	Encoder line cutoff or short circuit.
AL-10	Control Power Supply Under-Voltage	Control Supply alittle lower than ±15V.
AL-11	Over current 1	IPM modular output current over big
AL-12	Over current 2	DSP inspection current over big
AL-13	Over load	Output torque exceed set value.
AL-14	Brake Fault	Brake circuit Fault.
AL-15	Encoder counter fault	Encoder A B phase fault.
AL-16	Memory fault	Servo Internal EEPROM abnormal
AL-17	Encoder Z pulse abnormal	Motor rotate 2 turns,encoder cannot find Z pulse.
AL-18	Encoder UVW signal abnormal	Encoder UVW signal fault or encoder mismatch.
AL-19	Encoder UVW signal illegal code	UVW signal in all high level or al low level.
AL-20	CPLD communication abnormal	CPLD communication abnormal.

Code	Alarm Name	Possible Cause	Troubleshooting
AL-1	Overspeed	Input pulse frequency over-high	Input pulse correctly
		Input electronic gear Ratio too high.	Correctly set Pn9 and Pn10.
		Encoder zero bit fault.	Ask factory adjust zero again.
		Motor U,V,W cable connection wrong	Connection correctly.
AL-2	Main Circit Over-Voltage	Input L1 L2 L3 power supply voltage higher than AC260V	Reduce the voltage
		Capacity of brake loop is not enough.	Encrease acceleration/ deceleration time constant. Ask factory for a bigger brake resistor.
AL-3	Main circuit Short of voltage	Input L1 L2 L3 power voltage less than AC170V.	Check the external cause of the low voltage.
		Servo Driver protection action.	Change servo driver.
AL-4	Position out of Toleration	Send pulse but motor don't move and alarm	Check motor UVW phase connection is not right.
			Input frequency too high.
			Pulse electric ratio value too big. Set correctly of Pn9 and Pn10.
		Alarm when Running. (input pulse abnormal)	Confirm frequency and width.
		Alarm when Running. (Range too small)	Set Pn13 value bigger.
		Alarm when Running. (Position P Gain too small)	Encrease Pn5 setting value.
		Alarm when Running. (Torque not enough)	Use a bigger power motor.
AL-6	Speed amplifier Saturated	Motor mechanical jammed	Check motor mechanical part.
		Overbig load	Reduce load.
			Change a bigger power driver and motor.
AL-9	Encoder is fault	Encoder wrong connection or cable cutoff	Change the encoder cables
		Local interference	Set Pn58 to 1
		Cable too long,cable voltage too low.	Shorten cables.
AL-10	±15V Control Power Supply Under-Voltage	Control supply over lower than ±15V	Change servo driver.
AL-11	Over-Current 1	GND wrong connections	Connect GND correctly
		Motor insulation damaged	Change the motor
		Motor winding is short-circuit	Change the motor.
		The motor parameter mismatch	Set motor ID Pn1 correctly
		Current surge	Reduce value of Pn43 and Pn5 Encrease value of Pn6.
		Input purlse non-uniform.	Encrease smoothness value Pn15
		Servo driver protection action	Change the servo driver.
AL-12	Over-Current 2	Motor insulation damaged	Change servo motor.
		Wrong connection GND	Connect GND correctly.
		Servo driver protection action.	Change servo driver.
AL-13	Over load	Output torque exceed allowed value.	Mechanical part jammed or high pressure.Motor selection not match,change with a bigger power supply driver and motor.

Code	Alarm Name	Possible Cause	Troubleshooting
AL-14	Brake Fault	Servo protection action.	Change servo driver
		Brake loop capacity not enough.	Encrease acceleration/ deceleration time constant. Change higher power servo motor and driver
		Main circuit power supply too high.	. Check AC input power supply.
AL-15	Encoder counter fault	Encoder cable wrong connection.	Check connection.
		GND abnormal.	GND correctly.
		Servo motor abnormal.	Chang servo motor
AL-16	EEPROM abnormal	Internal EEPROM read abnormal.	Change servo driver
AL-17	Encoder Z pulse abnormal	Z pulse not exist,encoder damaged. The cable Shield not good. Encoder interface circuit fault.	Check encoder cable or interface
AL-18	Encoder UVW signal abnormal	Encoder UVW signal damaged Encoder Z signal damaged. The cable Shield not good.	Change the encoder Check the encoder interface circuit.
AL-19	Encoder UVW signal illegal code	Encoder UVW signal damaged Fault cables. The cable Shield not good.	Change the encoder; Check encoder interface circuit.
AL-20	CPLD abnormal	CPLD communication abnormal	Change servo driver.