FULL-DIGITAL AC SERVO MOTOR SYSTEM

BL series AC servo motor is the latest high performance servo motor. Which adopts the rare-earth permanent magnet, high resolution optical encoder and the most up-to-date designation, has the advantage of compact size, high response, low-noise, low vibration, high resolution and high speed.

- Full series including: low inertia, middle inertia, hign inertia, Output range : 30W~4000W
- Frame number：57、60、80、92、123
- With 2500ppr encoder, the resolution is 10000 pulse / round
- Max speed: 4500r/min
- Standard Installation Demension:（The installation demension of 200W、400W、750W Servo Motor are the same with that of National Motor.）
- We can also make motors as customer's requirements.
- Supplied standard cables

PSDA series AC servo driver is the latest full digital servo driver. Which adopts the DSP technology, CPLD technology, high quality IGBT module, and the full software, realizes the close-loop servo control of current, speed and position.

- With 5 control mode options：Position mode, Velocity mode, Analog speed mode, Torque mode, Inner PLC control mode
- With the protection of over current, over voltage, undewr voltage, over load, over heat, encoder fault
- With the simple operation , it is very easy to use.
- With the standard ModBus RTU protocol, it is very easy to communicate with all kinds of HMI.
- With the 3 fold over load capacity, it is suited to the large dynamic application.

- With the RS-232 and RS-485 communication interface
- With 12 selectable watching items

Low-Inertia Servo Motor

Output	P_N	W	30	50	100
Motor Type			57-03-30	57-05-30	57-10-30
Power	V_{1N}	V	220VAC		
Rated Speed	n_N	rpm	3000		
Rated Torque	T_N	Nm	0.0955	0.159	0.318
Max. Torque	T_P	Nm	0.287	0.477	0.954
The Highest Speed	n_P	rpm	5000		
Velocity & Position Sensor	Optical Encoder with 2500 ppr				
Electrical Potential Coefficient	k_e	Vs/rad	0.108	0.127	0.127
Torquec	k_t	Nm/A	0.108	0.127	0.127
Rotor Inertia	J_r	Kgm^2	1.50×10^{-6}	2.29×10^{-6}	4.29×10^{-6}
Resistance Of Armature Winding	R	Ω	22.7	15.0	5.87
Inductance Of Armature Winding	L	mH	34.3	23.7	10.2
Friction & Hysteresis Torque	T_f	Nm	0.003	0.00493	0.00986
Damping Coefficient	β	Nms/rad	0.768×10^{-5}	1.28×10^{-5}	2.56×10^{-5}
Rated Line Current	I_N	A	0.729	1.03	2.58
Rated Line Voltage	V_N	V	47.9	50.5	51.7
Peak Current	I_P	A	2.19	3.09	7.74
Rated Power ‘s Rate of Rise	Q_N	KW/sec	6.08	11.0	23.6
Mechanical Time-constant	T_m	msec	2.92	2.12	1.53
Electrical Time-constant	T_e	msec	1.51	1.58	1.74
Weight	G	Kg		0.41	
Work Duty	Cont.				
Withstand Voltage	AC1500V， 1min				
Insulation Class	B				
Insulation Resistance	DC500V， 10MΩ Minimum				
Vibration	2.5G Minimum				
Mount Type	Flange				
Struture	Totally-enclosed self cooled				
Altitude	No greater than1000m				
Ambient temperature	0~40℃（free from condensation）				
Ambient humidity	No greater than 90%RH（free from condensation）				
Storage temperature	-20~60℃（free from condensation）				
Storage humidity	No greater than 90%RH（free from condensation）				

Low-Inertia Servo Motor

Output	P_N	W	200	400	600
Motor Type			60-20-30	60-40-30	60-60-30
Power	V_{1N}	V	Three Phase / Single Phase220VAC		
Rated Speed	n_N	rpm	3000		
Rated Torque	T_N	Nm	0.637	1.273	2.387
Max. Torque	T_P	Nm	1.911	3.819	7.161
The Highest Speed	n_P	rpm	3600		
Velocity & Position Sensor	Optical Encoder with 2500 lines				
Electrical Potential Coefficient	k_e	Vs/rad	0.411	0.411	0.556
Torquec	k_t	Nm/A	0.411	0.411	0.556
Rotor Inertia	J_r	Kgm^2	0.167×10^{-4}	0.302×10^{-4}	0.438×10^{-4}
Resistance Of Armature Winding	R	Ω	15.42	6.06	3.297
Inductance Of Armature Winding	L	mH	30.08	13.51	9.56
Friction & Hysteresis Torque	T_f	Nm	0.01383	0.01808	0.06561
Damping Coefficient	β	Nms/rad	4.831×10^{-5}	7.403×10^{-5}	3.069×10^{-4}
Rated Line Current	I_N	A	1.265	2.497	3.577
Rated Line Voltage	V_N	V	119.8	114.7	144.392
Peak Current	I_P	A	3.686	7.334	10.731
Rated Power ‘s Rate of Rise	Q_N	KW/sec	24.3	53.7	83.3
Mechanical Time-constant	T_m	msec	1.52	1.08	0.905
Electrical Time-constant	T_e	msec	1.95	2.23	2.9
Weight	G	Kg	0.99	1.39	1.79
Work Duty	Cont.				
Withstand Voltage	AC1500V，1min				
Insulation Class	B				
Insulation Resistance	DC500V，10MΩ Minimum				
Vibration	2.5G Minimum				
Mount Type	Flange				

Struture	Totally-enclosed self cooled
Altitude	No greater than1000m
Ambient temperature	0~40℃（free from condensation）
Ambient humidity	No greater than 90%RH（free from condensation）
Storage temperature	-20~60℃（free from condensation）
Storage humidity	No greater than 90%RH（free from condensation）

Low-Inertia Servo Motor

Output	P_N	W	500	750	1000
Motor Type			80-50-30	80-75-30	80-100-30
Power	V_{1N}	V	Three Phase/ Single Phase220VAC		
Rated Speed	n_N	rpm	3000		
Rated Torque	T_N	Nm	1.592	2.387	3.183
Max. Torque	T_P	Nm	4.776	7.161	9.549
The Highest Speed	n_P	rpm	3600		
Velocity & Position Sensor	Optical Encoder with 2500 ppr				
Electrical Potential Coefficient	k_e	Vs/rad	0.402	0.402	0.402
Torquec	k_t	Nm/A	0.402	0.402	0.402
Rotor Inertia	J_r	Kgm^2	0.760×10^{-4}	1.08×10^{-4}	1.40×10^{-4}
Resistance Of Armature Winding	R	Ω	3.12	1.74	1.23
Inductance Of Armature Winding	L	mH	6.45	4.00	2.89
Friction & Hysteresis Torque	T_f	Nm	0.0465	0.0494	0.0522
Damping Coefficient	β	Nms/rad	8.82×10^{-5}	10.16×10^{-5}	11.50×10^{-5}
Rated Line Current	I_N	A	3.23	4.78	6.34
Rated Line Voltage	V_N	V	104	103	102
Peak Current	I_P	A	9.69	14.4	19.0
Rated Power ‘s Rate of Rise	Q_N	KW/sec	33.4	52.8	72.5
Mechanical Time-constant	T_m	msec	1.46	1.16	1.06
Electrical Time-constant	T_e	msec	2.06	2.30	2.34
Weight	G	Kg	2.4	2.9	3.3
Work Duty	Cont.				
Withstand Voltage	AC1500V，1min				
Insulation Class	B				
Insulation Resistance	DC500V，10MΩ Minimum				
Vibration	2.5G Minimum				
Mount Type	Flange				
Struture	Totally-enclosed self cooled				
Altitude	No greater than1000m				
Ambient temperature	0~40℃（free from condensation）				
Ambient humidity	No greater than 90%RH（free from condensation）				
Storage temperature	-20~60℃（free from condensation）				
Storage humidity	No greater than 90%RH（free from condensation）				

Low- Inertia Servo Motor

Output	P_N	W	500	750	1000	1200
Motor Type			92-50-30	92-75-30	92-100-30	92-120-30
Power	V_{1N}	V	Three Phase/ Single Phase220VAC（Three Phase 220VAC is recommended）			
Rated Speed	n_N	rpm	3000			
Rated Torque	T_N	Nm	1.592	2.387	3.183	3.820
Max. Torque	T_P	Nm	4.776	7.161	9.549	11.460
The Highest Speed	n_P	rpm	3600			
Velocity & Position Sensor	Optical Encoder with 2500 ppr					
Electrical Potential Coefficient	k_e	Vs/rad	0.527	0.556	0.570	0.646
Torquec	k_t	Nm/A	0.527	0.556	0.570	0.646
Rotor Inertia	J_r	Kgm^2	1.66×10^{-4}	2.36×10^{-4}	3.07×10^{-4}	3.42×10^{-4}
Resistance Of Armature Winding	R	Ω	4.543	3.297	1.906	1.692
Inductance Of Armature Winding	L	mH	12.156	9.560	6.293	11.054
Friction & Hysteresis Torque	T_f	Nm	0.04374	0.06561	0.08748	0.09842
Damping Coefficient	β	Nms/rad	2.046×10^{-4}	3.069×10^{-4}	4.092×10^{-4}	4.604×10^{-4}
Rated Line Current	I_N	A	2.517	3.577	4.652	4.910
Rated Line Voltage	V_N	V	136.521	144.392	143.951	162.009
Peak Current	I_P	A	7.551	10.731	13.956	14.730
Rated Power ‘s Rate of Rise	Q_N	KW/sec	15.3	24.1	33.0	42.7
Mechanical Time-constant	T_m	msec	2.80	2.52	1.80	1.39
Electrical Time-constant	T_e	msec	2.676	2.900	3.302	6.533
Weight	G	Kg	2.9	3.4	4.0	4.5
Work Duty	Cont.					
Withstand Voltage	AC1500V，1min					
Insulation Class	B					
Insulation Resistance	DC500V，10MΩ Minimum					
Vibration	2.5G Minimum					
Mount Type	Flange					
Struture	Totally-enclosed self cooled					
Altitude	No greater than1000m					
Ambient temperature	0~40℃（free from condensation）					
Ambient humidity	No greater than 90%RH（free from condensation）					
Storage temperature	-20~60℃（free from condensation）					
Storage humidity	No greater than 90%RH（free from condensation）					

Low- Inertia Servo Motor

Output	P_N	W	1100	1500	2000	3000	4000
Motor Type			123-110-30	123-150-30	123-200-30	123-300-30	123-400-30
Power	V_{1N}	V	Three Phase/ Single Phase220VAC （Three Phase 220VAC is recommended）				
Rated Speed	n_N	rpm	3000				
Rated Torque	T_N	Nm	3.501	4.775	7.003	9.549	12.732
Max. Torque	T_P	Nm	10.503	14.325	21.009	28.647	38.196
The Highest Speed	n_P	rpm	3600				
Velocity & Position Sensor	Optical Encoder with 2500 ppr						
Electrical Potential Coefficient	k_e	Vs/rad	0.533	0.533	0.533	0.533	0.533
Torquec	k_t	Nm/A	0.533	0.533	0.533	0.533	0.533
Rotor Inertia	J_r	Kgm^2	7.2×10^{-4}	9.2×10^{-4}	13.2×10^{-4}	17.2×10^{-4}	25.2×10^{-4}
Resistance Of Armature Winding	R	Ω	1.899	1.002	0.559	0.378	0.225
Inductance Of Armature Winding	L	mH	5.874	4.040	2.45	1.747	1.104
Friction & Hysteresis Torque	T_f	Nm	0.120	0.167	0.199	0.221	0.255
Damping Coefficient	β	Nms/rad	1.656×10^{-4}	2.042×10^{-4}	2.780×10^{-4}	3.530×10^{-4}	4.090×10^{-4}
Rated Line Current	I_N	A	5.381	7.334	10.679	14.475	19.214
Rated Line Voltage	V_N	V	137.121	134.184	132.159	131.536	129.696
Peak Current	I_P	A	16.143	22.002	32.037	43.425	57.642
Rated Power ‘s Rate of Rise	Q_N	KW/sec	17.024	24.783	37.153	53.014	61.327
Mechanical Time-constant	T_m	msec	4.822	3.251	2.601	2.293	1.997
Electrical Time-constant	T_e	msec	3.093	4.032	4.385	4.619	4.91
Weight	G	Kg	4.6	5.8	8.2	10.6	15.4
Work Duty	Cont.						
Withstand Voltage	AC1500V，1min						
Insulation Class	B						
Insulation Resistance	DC500V，10MΩ Minimum						
Vibration	2.5G Minimum						
Mount Type	Flange						
Struture	Totally-enclosed self cooled						
Altitude	No greater than 1000m						
Ambient temperature	0~40℃（free from condensation）						
Ambient humidity	No greater than 90%RH（free from condensation）						
Storage temperature	-20~60℃（free from condensation）						
Storage humidity	No greater than 90%RH（free from condensation）						

Safety Precautions（Important）

Observe the following precautions in order to avoid injuries of operators and other persons, and mechanical damages.

	**DANGER**	**Indicates a potentially hazardous situation, which, if not avoided, will result in death or serious injury.**
	**CAUTION**	**Indicates a potentially hazardous situation, which, if not avoided, will result in minor or moderate injury and physical damage.**
	**ATTENTION**	**This symbol indicates that the operation is prohibited.**
	**ATTENTION**	**This symbol indicates that the operation must be performed without fail.**

DANGER

	An over-current protection, earth leak breaker, over temperature protection and emergency stop should be installed.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.
	Perform the transportation, wiring and inspection at least 10 minutes after the power off.	Failure to observe this instruction could result in electric shocks.
	Ground the earth terminal of the driver.	Failure to observe this instruction could result in electric shocks.
	Install an external emergency stop device so that you can shut off the power in any emergence cases.	Failure to observe this instruction could result in electric shocks, injuries, fire, malfunction and/or mechanical damages.
	Don’t insert your hands in the driver.	Failure to observe this instruction could result in burns and/or electric shocks.
	Don’t touch the rotating part of the motor in motion.	Failure to observe this instruction could result in injuries.
	Do not expose the cables to sharp edges, excessive pressing forces, heavy loads and pinching forces.	Failure to observe this instruction could result in electric shocks, malfunction and/or damages.

CAUTION

	Use the motor and driver in the specified combination.	Failure to observe this instruction could result in fire.
	If an error occurs, remove the cause of the error and secure the safety before restarting the operation.	Failure to observe this instruction could result in injuries.
	Execute the trial operation with the motor fixed but without the motor load connected. Connecting a load to the motor is possible only after successful trial operation.	Failure to observe this instruction could result in injuries.
	Don't touch the motor, driver or its regenerative resistor, since they become hot.	Failure to observe this instruction could result in burns.
	Don't touch the rotating part of the motor in motion.	Failure to observe this instruction could result in injuries.
	Don't modify, dismantle, or repair the driver.	Failure to observe this instruction could result in electric shocks and/or injuries.
	Don't hold the cables or motor shaft when transporting the motor.	Failure to observe this instruction could result in injuries.
	After recovery from the power failure, the equipment may restart suddenly. Don't approach to the equipment.	Failure to observe this instruction could result in electric shocks and/or injuries.
	Don't block the heat dissipation hole or insert foreign matters in it.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.
	Make sure that the wirings are made correctly.	Failure to observe this instruction could result in electric shocks, injuries and/or fire.

Matters need attention before operation

	After opening the package, make sure the product is what you ordered.	If the product is not correct, contact dealer of sales agent.
	Check whether the product has been damaged or not during transportation.	If the product is damaged, contact dealer of sales agent.

1. Installation and Wiring

1.1 Installation notes of motor

- **Location**:

  Indoors, where the driver is not subjected to rain water and direct sun beams.
  Avoid the place where the driver is subjected to corrosive gases, flammable gases, grinding liquids, oil mists, iron powders and cutting particles.
  Place in well ventilated, and humid- and dust- free space.
  Easy maintenance, inspections and cleaning are also important.

- **How to install**：

  The motor can be installed either vertically or horizontally. Observe the following notes.

  A. Horizontal mounting---- Place the motor with the cables outlet facing down to prevent the entry of oil and water.
  B. Vertical mounting---- If the motor is coupled with mechanical devices, make sure the oil and water of the mechanical device does not enter into the motor.

- Don't hit the end bracket of the motor; otherwise the encoder will be damaged.
- Flexible coupling is recommended in order to keep the radial load smaller than the permissible value.
- Don't hit the shaft with a hammer directly while attaching/detaching the coupling to the motor shaft. (Otherwise the encoder or the end bracket will be damaged.)
- Make sure that both of radial and thrust load be applied to the motor shaft during installing and running becomes within the specified value of each model.

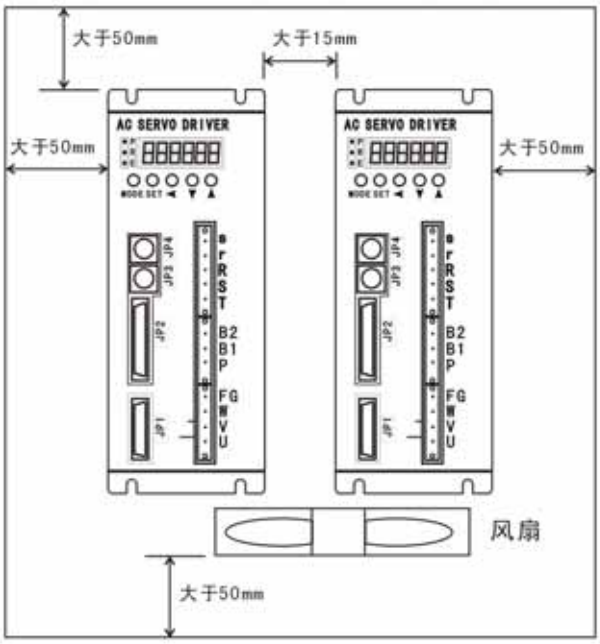
1.2 Installation notes of driver

- **Location**:

  Indoors, where the driver is not subjected to rain water and direct sun beams.
  Avoid the place where the driver is subjected to corrosive gases, flammable gases, grinding liquids, oil mists, iron powders and cutting particles.
  Place in a well ventilated, and humid- and dust- free space.
  Place in a vibration-free place.

- **How to install**：

  Place the driver vertically. Allow enough space surrounding for ventilation.
- Fit to noncombustible such as metal.
- If it is possible, please install fans to provide a uniform distribution of temperature in control box.
- When the power supply of the driver is shared with machines such as electric welding machine or a discharge processing machine, or even when it is not shared but a source of a high-freqency noise is in the surrounding environment, take actions such as inserting an insulating transformer and a noise filter to the power supply.
- Allow enough space to ensure enough cooling, ventilation and dry.
- Avoid the place where the driver is subjected to vibration and knockout.
- Prevent metal grinding rust and iron powders to enter into the driver possibly.
- Make sure that the driver is fixed firmly during installation.
- Be sure to use a crimp contact with insulated coating for connection to each terminal on the terminal block.
- Avoid the damage to the driver , a 10 seconds of interval between power off and power on again is preferable.
- After shutting off the driver supply, leave it at least for 10 minutes or more to touch the driver terminals. Failure to observe this instruction could result in electric shocks.
- On installation of two or more servo drivers, leave a large clearance between the top of the servo amplifier and the internal surface of the control box, and install a fan to prevent the internal temperature of the control box from exceeding the environmental conditions.



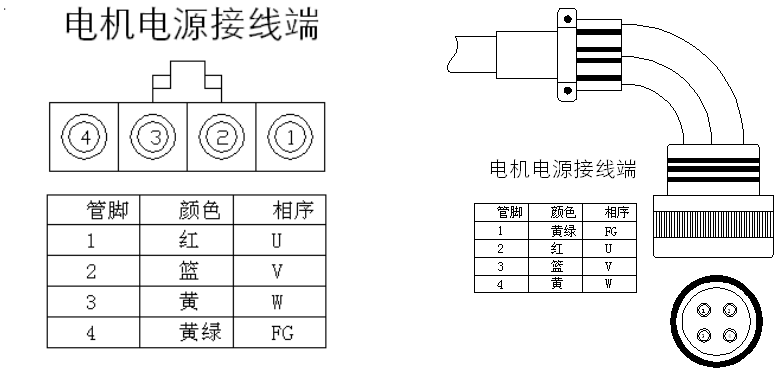
Installation diagram of multiple dirvers

1.3 Wiring notes

Item	Purpose	Wiring type	Specification	Remarks
1	Power wires	Proper wire gauge, environmental conditions	Leave a space of 30cm or more between the power wires and do not wire them in the same duct.	Ensure that wire gauge is proper to the motor current
2	Motor wires			Ensurer that motor phase sequence is matching the driver
3	Signal wires	Twisted-pair shielded wire	The max. length of the command input wire is 3m.	
4	Encoder wires		The max. length of the encoder input wire is 20m.	
5	Grounding wires	Wires as heavy as possible	One-point grounding must be applied, and the max. grounding resistance is 100Ω .	If the motor is electrically insulated from the machine, ground the motor.
6	Analog signal wires	Shielded wire		
7	Regenerative brake resistor			Well connected and well ventilated
8	Brake			the surge absorbing diode is needed

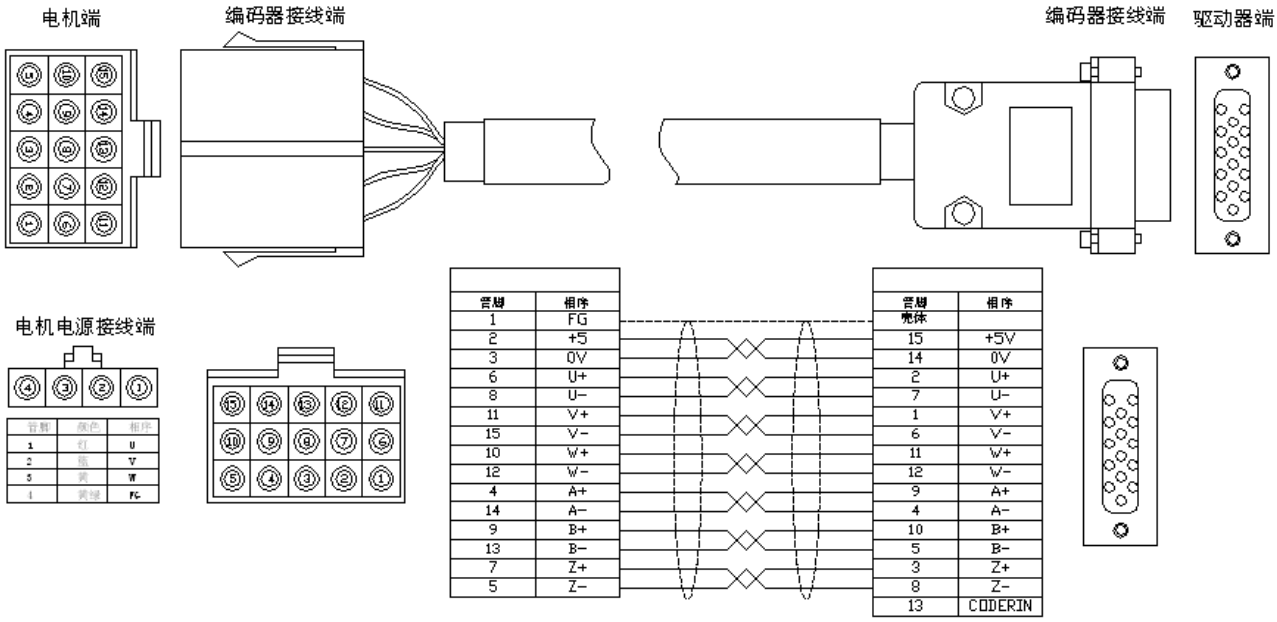
1.4 Motor power cord define

Motor		Symbol			
Motor model	Drawing type	U	V	W	FG
57BL~80BL	Plastic 4-cord plug	1(Red)	2(Blue)	3(Yellow)	4(Green/Yellow)
92BL~123BL	Connector	1(Red)	2(Blue)	3(Yellow)	4(Green/Yellow)

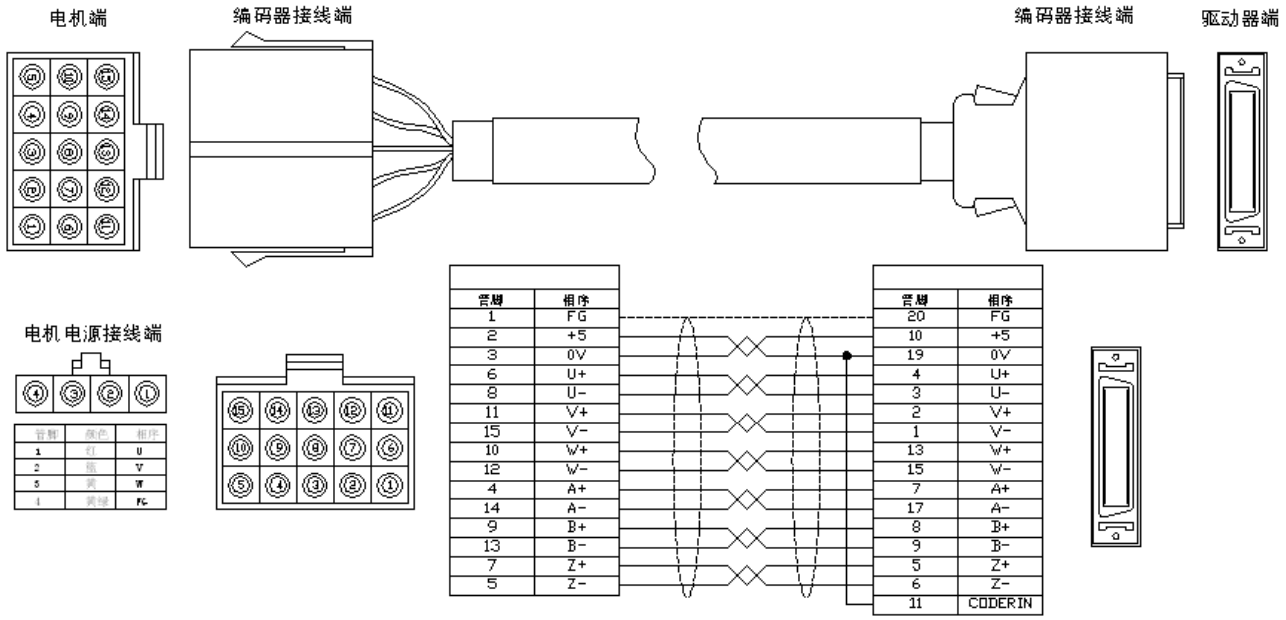


1.5 Motor encoder wire definition

1) On the side of the motor is plastic plug, and on the side of the driver is D-type connector. (The power of the motor is between 30 and 100 watts.)



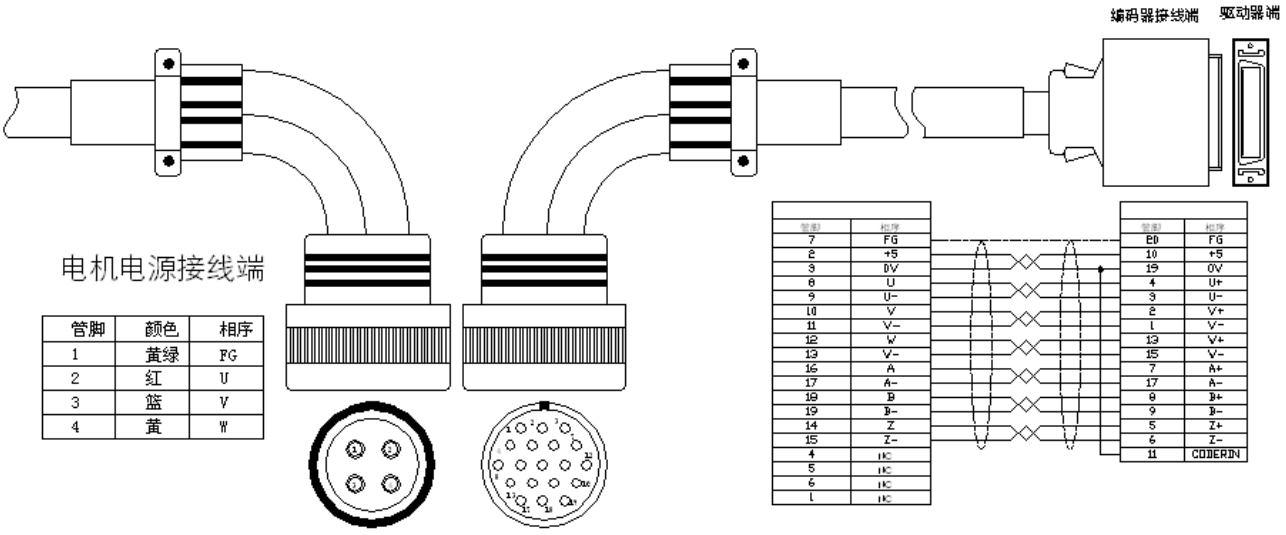
2) On the side of the motor is plastic plug, and on the side of the driver is SCSI-type connector.



管脚	相序
1	FG
2	+5
3	0V
6	U+
8	U-
11	V+
15	V-
10	W+
12	W-
4	A+
14	A-
9	B+
13	B-
7	Z+
5	Z-

管脚	相序
20	FG
10	+5
19	0V
4	U+
3	U-
2	V+
1	V-
13	W+
15	W-
7	A+
17	A-
8	B+
9	B-
5	Z+
6	Z-
11	CODERIN

3) On the side of the motor is plug, and on the side of the driver is SCSI-type connector.(the motor power is between 200 and 1500 watts)

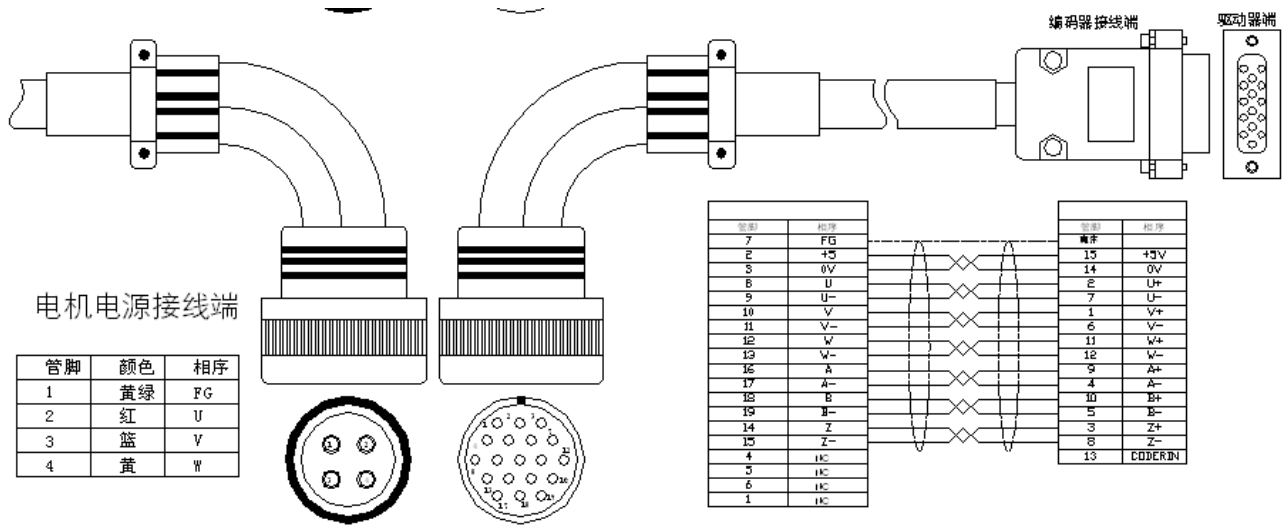


管脚	颜色	相序
1	黄绿	FG
2	红	U
3	蓝	V
4	黄	W

相序
FG
+5
0V
U
U-
V
V-
W
W-
A
A-
B
B-
Z
Z-
NC
NC
NC
NC

相序
FG
+5
0V
U+
U-
V+
V-
W+
W-
A+
A-
B+
B-
Z+
Z-
CODERIN

4) On the side of the motor is plug, and on the side of the driver is D-type connector.(the motor power is between 2000 and 4000 watts)



管脚	颜色	相序
1	黄绿	FG
2	红	U
3	蓝	V
4	黄	W

相序
FG
+5
0V
U
U-
V
V-
W
W-
A
A-
B
B-
Z
Z-
NC
NC
NC
NC

相序
备用
+5V
0V
U+
U-
V+
V-
W+
W-
A+
A-
B+
B-
Z+
Z-
CODERIN

2. Control mode and wiring (PSDA-0233A4----PSDA-1533A4)

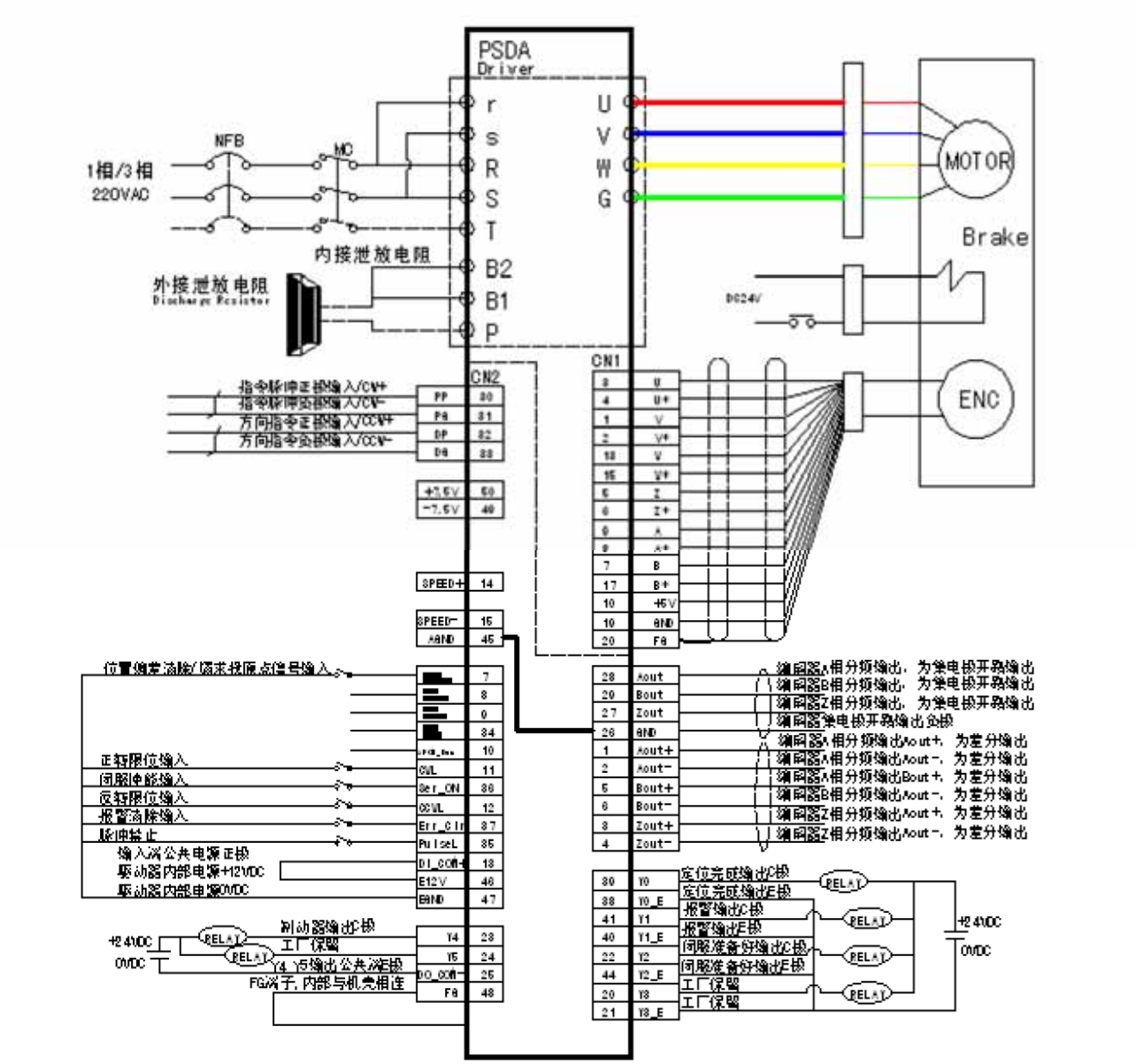
2.1 Position control mode:

Parameters must be changed: Control mode Pr51:=1

Need to be changed: Pulse mode Pr5E:= 0: Pulse+Sign 1: Phase pulse 2: CW+CCW

Need to be changed:Motor rotating direction Pr5B= 0:CW 1:CCW

Need to be changed: Electronic gear ratio, numerator Pr34/ denominator Pr35

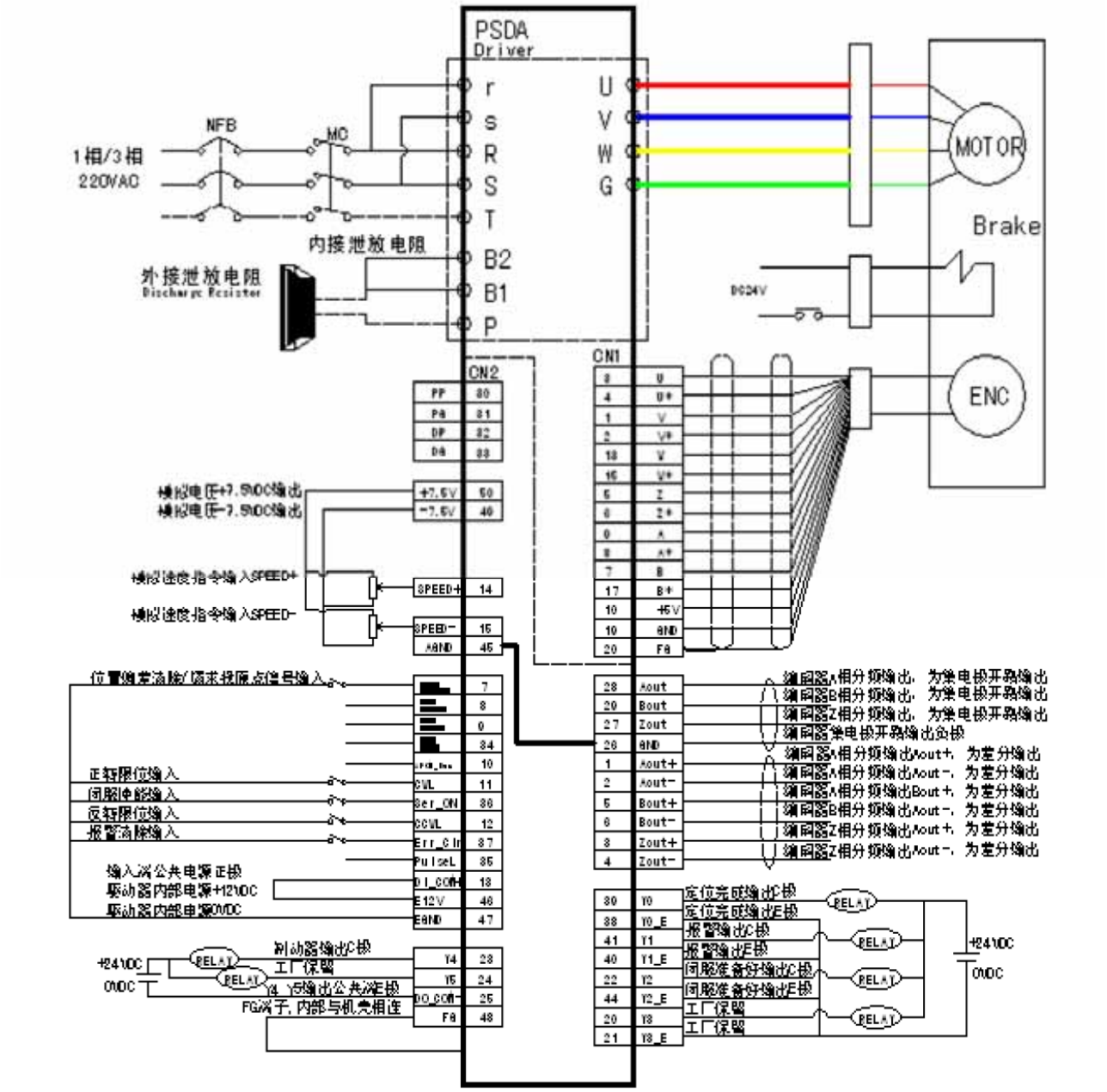


2.2 Speed control mode:

Parameters must be changed: Control mode Pr51:=2

Need to be changed: Speed input gain Pr48

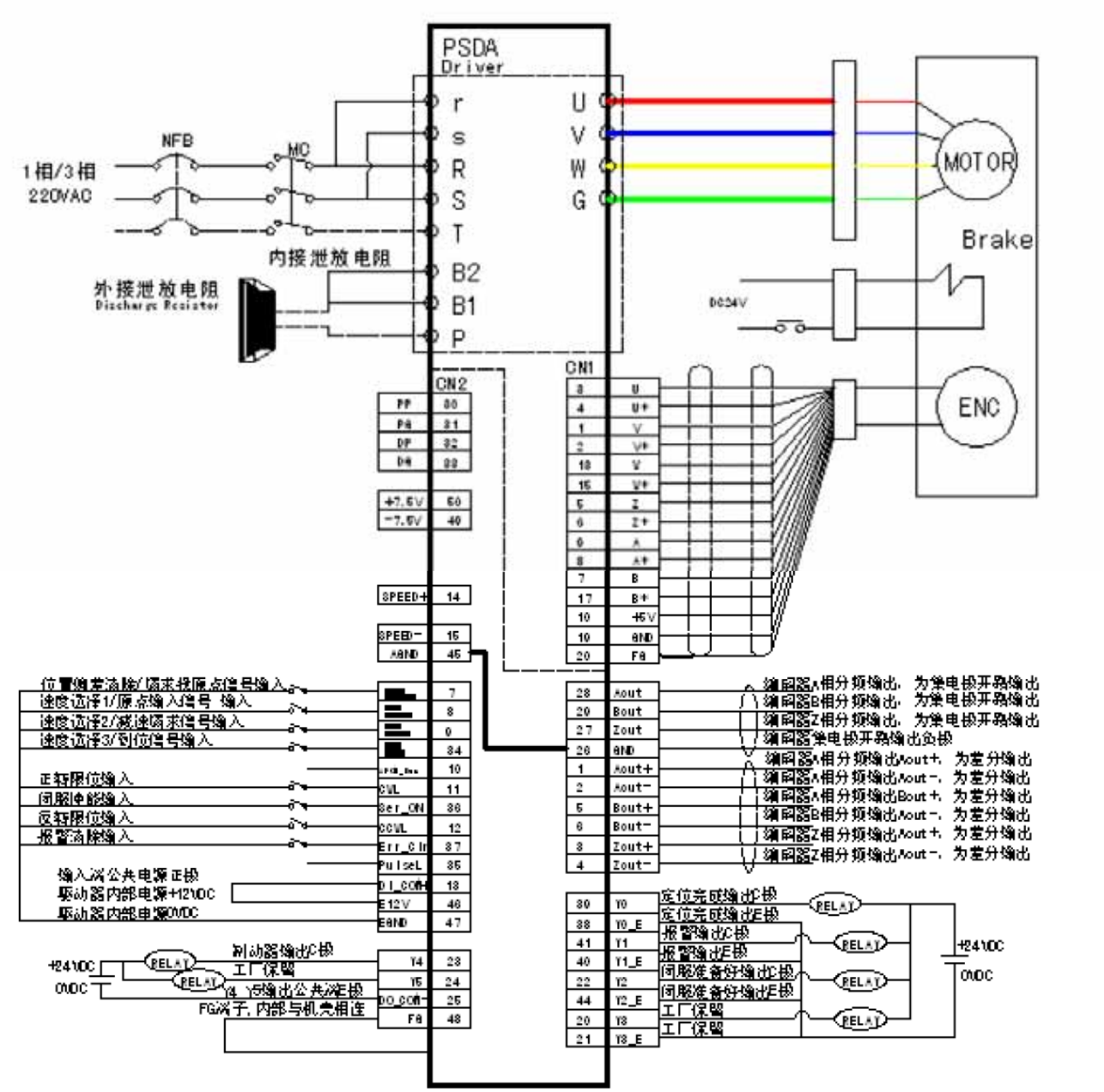
Need to be changed:Motor rotating direction Pr5B= 0:CW 1:CCW



2.3 More section speed Control Mode:

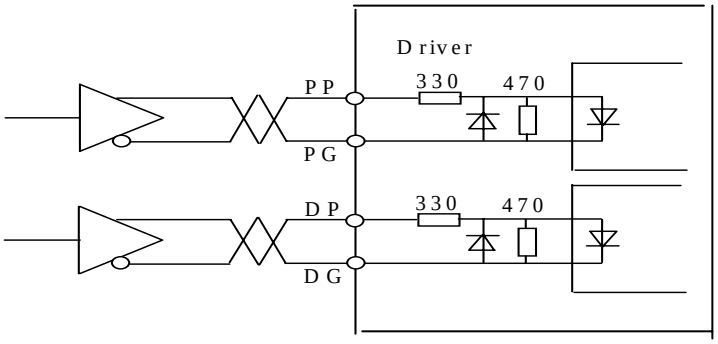
Parameters must be changed: Control mode Pr51:=0

Need to be changed:Motor rotating direction Pr5B= 0:CW 1:CCW



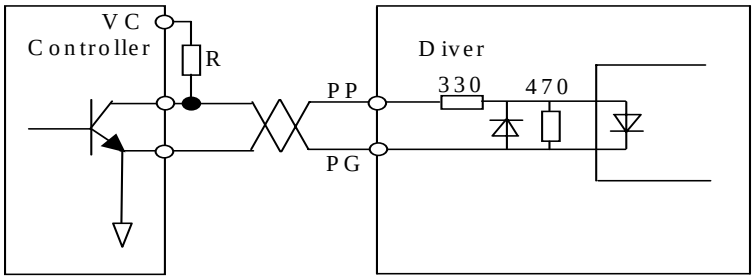
3. Pulse input method and wiring diagram

Output of the controller is line diriver (proper to long distance and high frequency)



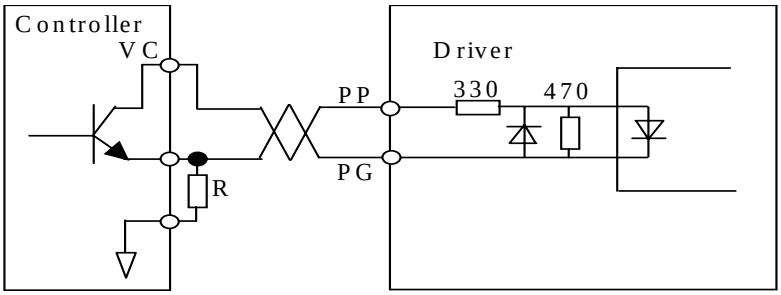
Line driver interface diagram

Output of the controller is open collector



Open collector interface diagram

Output of the driver is emitter follower

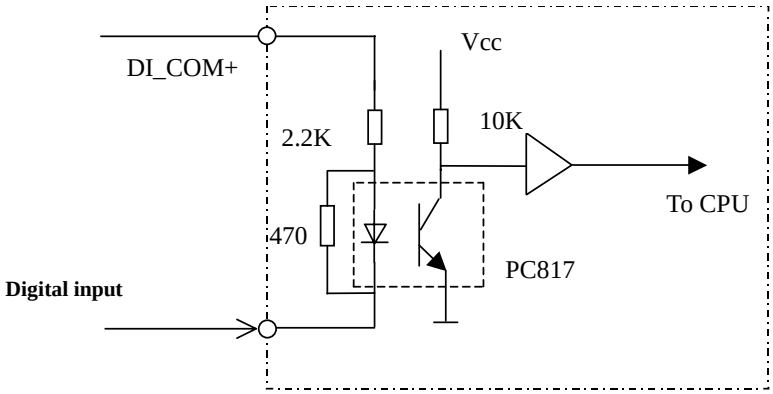


Emitter follower Interface diagram

Note： VC＝24V, R＝1.2K~1.8K；VC＝12V, R＝510~820

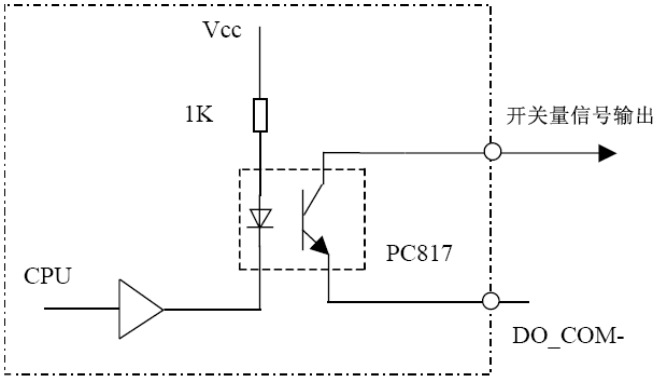
4. Digital Input and Output wiring

Digital Input

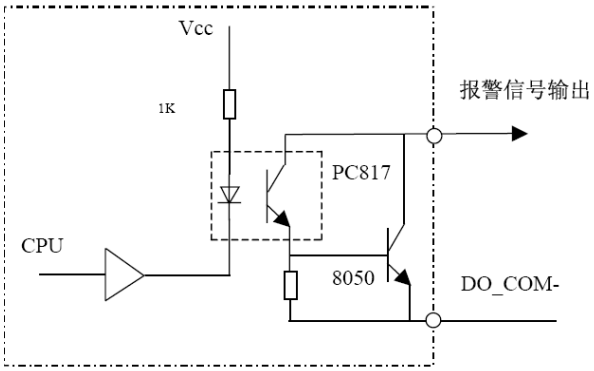


Digital Input interface diagram

Digital Output



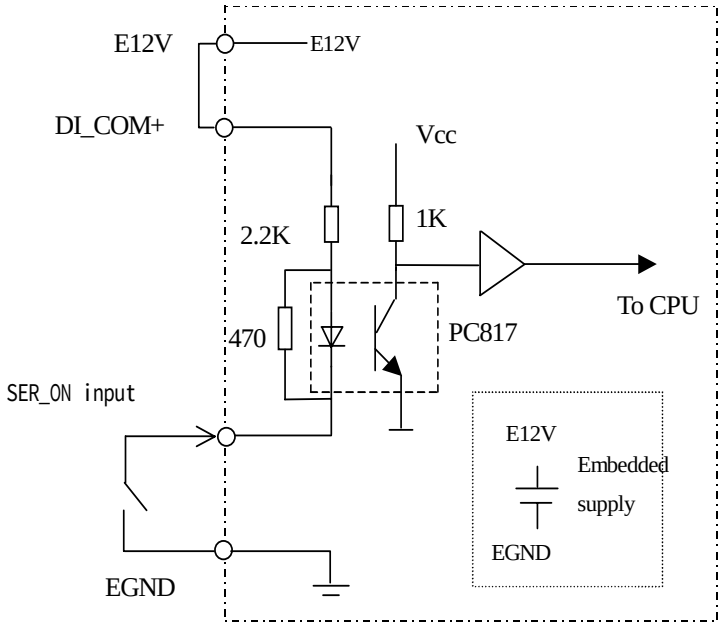
Digital Output interface diagram



Orientation finished,and alarm output interface diagram

Adopting the inner 12V power as the interface power

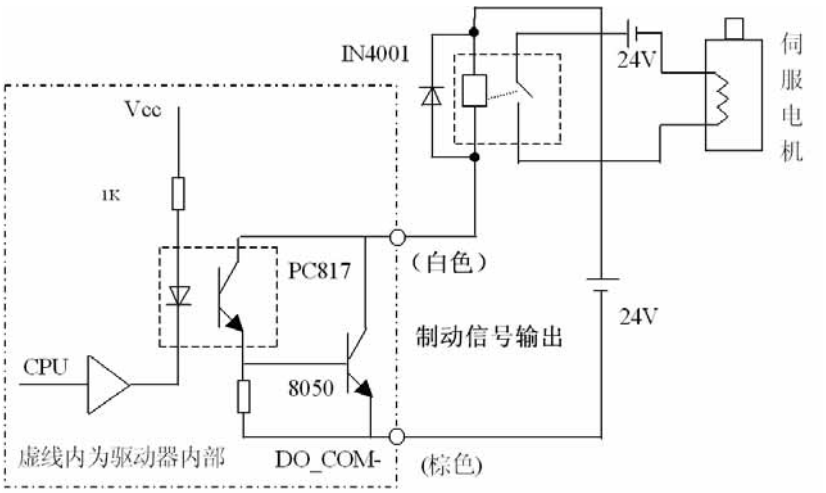
The driver provides an isolated 12V DC supply for the use of the interface. An example of use this supply to interface SER_ON signal is shown as the following. Any other digital input signal can also adopt this method.



Adoptting embedded isolatedsupply as SER_ON signal interface power

5. Wiring of hold brake

Hold brake is used for keeping the rotor position, i.e., the motor not to rotate, when the motor is not supplied.



Note：Hold brake is powered by 24V DC supply.

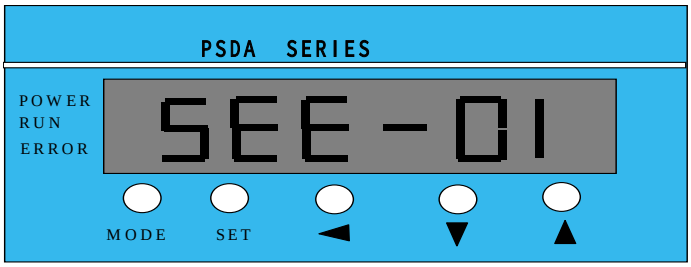
Note：Hold brake is nonpolarity.

Note：Hold brake cannot be used for slowdown the motor or stop the machine.

Note：The control and drive power of the hold brake are provided by the user.

Note：The surge absorbing diode installed to the DC relay designed for control output should be fitted in the specified direction. Otherwise, the signal is not output due to a fault, disabling the forced stop and other protective circuits.

6. Operation Pannel of the driver



Area	Name	Symbol	Function
Indicating lamp	POWER Lamp	Power	Power supply proper
	RUN Lamp	Run	Servo on valid, motor locks the shaft, receving outer command signal is available
	ERROR Lamp	Error	Indicate error information
Number window	Number show window		LED (6 digits), display the status of parameter and run
Keyboard	MODE Button	Mode	Use this button to change work mode
	SET Button	Set	Parameter set button
	◄ Button	Shift	Use this button to shift the digit
	▼Button	Decrement	Press this button to decrease the value
	▲Button	Increment	Press this button to Increase the value

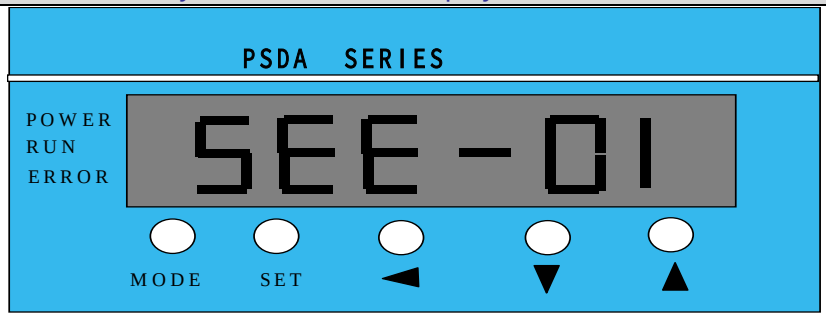
7. Operation Mode of the Pannel

by MODE Key 4 mode can be cyclely selected

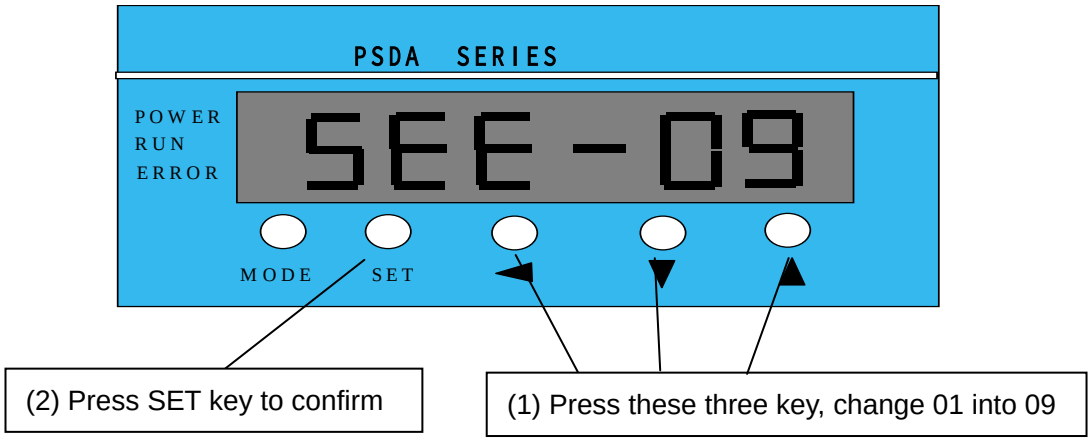
Mode	Symbol	Function
Monitor mode	SEE-01	Select 12 watching items to display, such as current, speed, and so on
Parameter mode	PA-SET	Query or Modify parameters
Data save mode	EE-ALL	Save modified parameters to EEPROM
Auxiliary mode	AF-ENC	Query input or output status, and so on

7.1 Monitor Mode

Enter monitor mode－Press Mode key, until **SEE－XX** displayed, XX means current watching item

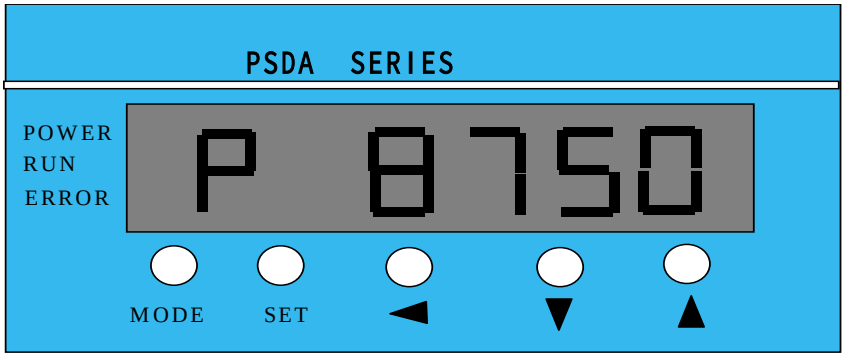


Change watching item－Press Up key and Down key to change value



Display watching item－press SET key to confirm, and system display the actual dynamic data

Shown as the following, P means rotor position, 8750 means current actual position



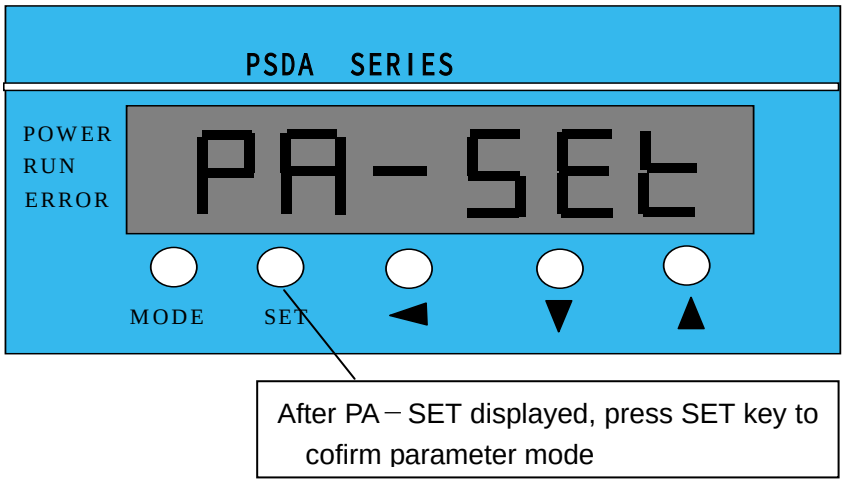
7.2 Parameter Mode

Modifying permittion Switch

Avoiding unwanted modification of the parameters, the driver sets a special parameter, i.e., Pr60, to control the permittion of the modification. Only when Pr60 equals to 5678, the modification of the parameters is permitted.

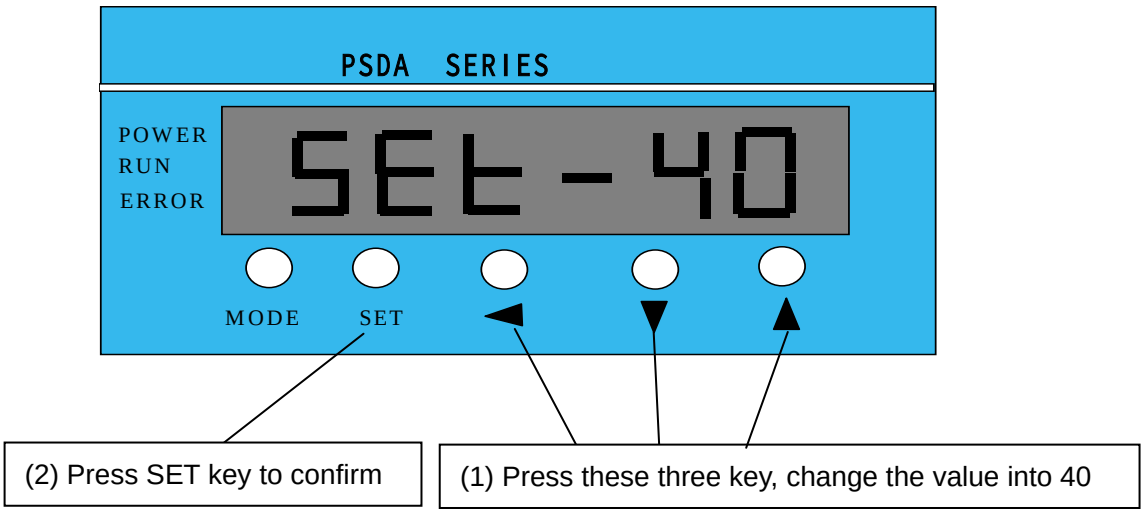
Note: Some parameters will take effect only after modificated and powered on again.

Enter parameter mode－Press Mode key until **PA－SEt** displayed

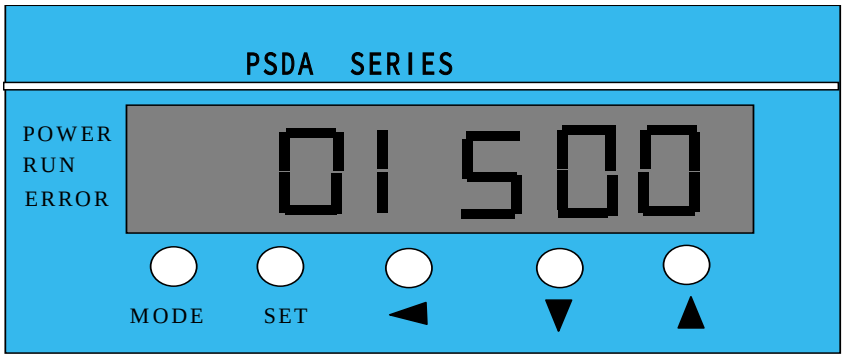


Select Parameter No.－Press SET key, confirm to set up parameters and **SEt－XX** will bedisplayed

Press shift key to select the setting position, press Up / Down key to change the value of the selected setting position, until the wanted parameter No. is displayed. For example, Pr40 is wanted to be modified, then change the XX into 40.

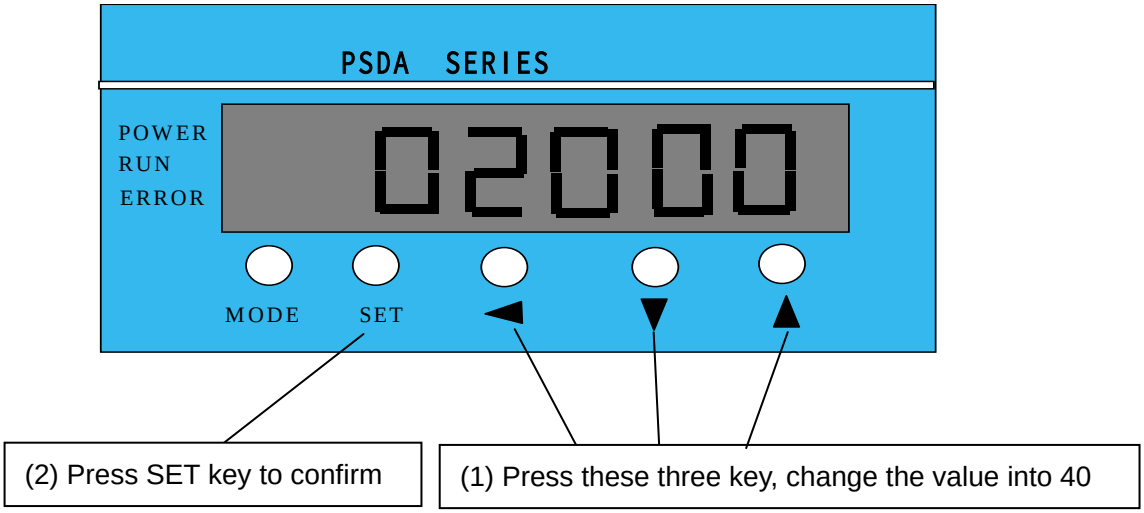


Set the new value－after selected the No., and pressed SET key, then current value will be displayed

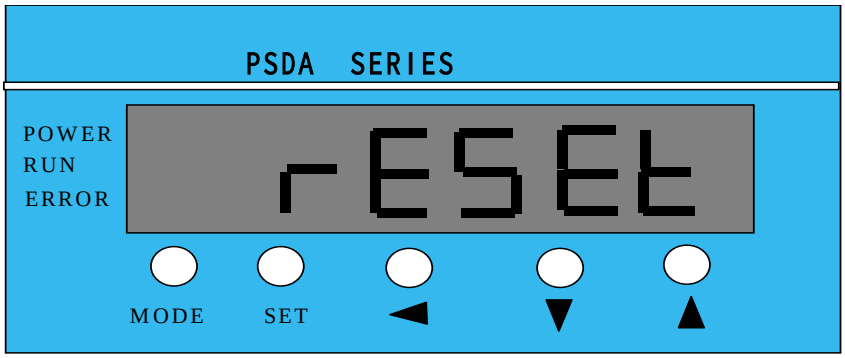


Sets Pr40 as 2000. Press shift key to select the setting position, press Up / Down key to change the value of the selected setting position, until the new value is set. Then press SET key to confirm the modification. After one second **Set-XX** will be displayed again, that means you can set any other

parameter No.



If the current parameter needs powering again for taking effect, then **reset** will be displayed. And the modification will be saved into EEPROM automatically.

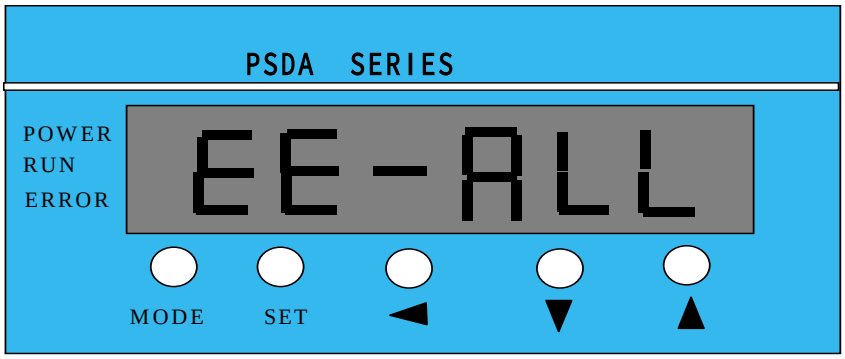


Note: Do not set any out of range data as the parameter value, which would not be accepted.

7.3 Data Save Mode

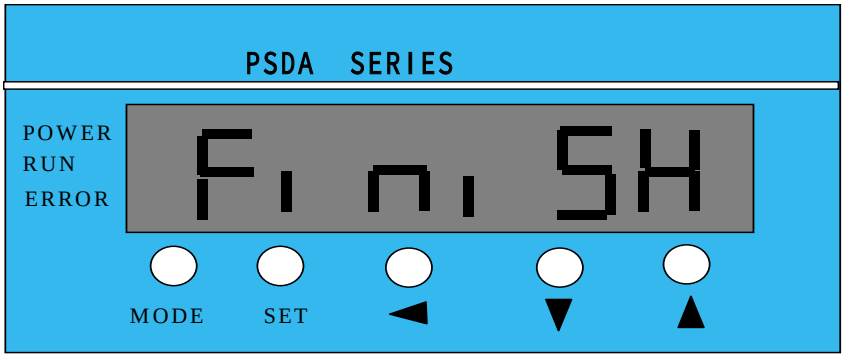
If data save mode is not run, then any modification (except automatically saved into EEPROM one) would be lost after power off.

Enter data save mode－Press Mode key , until **EE**－**ALL** displayed



Save data into EEPROM－press SET key, then save action will start

During the save process, "－" will be displayed to mean the progress. After success saved into EEPROM, then **Finish** will be displayed.



8. Try to run without load (JOG Mode)

After connect the motor and the driver correctly, then we can test the driver and the motor by JOG mode.

Step 1: release the load from the motor

Step 2: Connect the motor cable and the encoder cable of the motor to the driver, let the control cable unplg, power on the driver.

Step 3: Select the auxiliary function 09, . i.e., JOG mode.

Step 4: Set Pr40, adjust the JOG speed of the motor.

Step 5: Press the UP key or DOWN key, let the motor clockwise or counter clockwise rotating

Step 6: Release the key, then the motor stop and the rotor unlocked.

9. Position Mode

9.1 parameter setting

Para. No.	Parameter description	Range	Referance setting	Instruction
20	Velocity loop integration time constant	0－32767	122	
21	Velocity loop gain	0－32767	26000	
30	cpKpp_Step	1－100	10	
31	1st position loop gain	1－100	50	
32	2nd position loop gain	1－100	100	
34	Electronic gear numerator	1－10000	1	

35	Electronic gear denominator	1－10000	1	
3A	In-position range	0-65535	0	
4A	Output pulse division ratio	0－63	0	
51	Control mode	0－5	1	0：internal speed mode 1：position mode 2：analog speed input mode 3：torque mode 5：APCM mode（embedded PLC）
52	Communication BAUD rate	0－4	2	0：57600Bps 1：38400Bps 2：57600Bps 3：115200Bps 4：9600Bps
5B	Rotating direction inverse	0－1	0	0：normal 1：rotating direction inverse
5E	Command pulse input mode	0－2	0	0：pulse + sign pulse : PP-positive, PG－negative direction: DP－positive, DG－negative 1：90 degree two-phase PP, PG－pulse positive & negative DP, DG－pulse positive & negative 2：CW/CCW (OPTIONAL) PP, PG-CW pulse positive & negative DP,DG-CCW pulse positive & negative
60	Password of parameter setting	0－65535	5678	Pr60:=5678, setting is permitted

9.2 Parameter adjustment procedure of position mode

Step1: According to the system requirements, set control mode. Pr51
Step 2: According to the output type of the controller, set pulse input mode. Pr5E
Step 3: According to the required direction, set rotating direction inverse. Pr5B
Step 4: According to the load, mechanical, the highest pulse frequency of the controller, set electronic gear numerator and denumerator, Pr34, Pr35.
Step 5: According to the load, mechanical, run speed and performance, set speed and position loop gain.

1, Control mode

parameter	Name	Value	Function	Default	Remarks
51	Control mode	0	0：internal speed mode	1	Write to EEPROM, taking effect after power on again.
		1	1：postion mode		
		2	2：external analog speed mode		
		3	3：torque mode		
		5	5：APCM mode（embedded PLC）		

2, Pulse input mode

parameter	Name	Value	Function	Default	Remarks
5E	Pulse mode	0	0：pulse + sign	0	Write to EEPROM, taking effect after power on again.
		1	1：90 degree two phase		
		2	2：CW+CCW		

3, Rotating direction polarity

parameter	Name	Value	Function	Default	Remarks
5B	Rotating direction inverse	0	0：normal	0	Write to EEPROM, taking effect after power on again.
		1	1：inverse		

4, Electronic gear ratio

parameter	Name	Value	Function	Default	Remarks
34	Elctronic gear numerator	1~10000	Command pulse frequency multiplication	1	Write to EEPROM, taking effect after power on again.
35	Elctronic gear denumerator	1~10000	Command pulse frequency division	1	

Example：require rosolution of 500 pulse per round, then set Pr34:=20, Pr35: 1.

5, parameters of speed and postion loop

parameter	Name	Value	Function	Default	Remarks
20	Velocity loop integeration time constant	0－32767	Adjust velocity loop response	122	Parameter of velocity loop
21	Velocity loop gain	0－32767	Adjust velocity loop rigidity	12500	Parameter of velocity loop
31	1st position gain	1－100	Adjust position loop rigidity	50	Parameter of position loop
32	2nd position gain	1－100	Adjust position loop rigidity	60	Parameter of position loop

9.3 Gain adjustment procedure of position mode

adjust velocity loop first , then postion loop

1: Increase the value of Pr21 (velocity loop gain) gradually, until the motor (machine) does not generate abnormal sound and vibration.
2: Increase the value of Pr32 (position loop gain) gradually, until the motor (machine) does not generate abnormal sound and vibration.
3: Increase the value of Pr20 (velocity loop integeration time constant) according to the in-position time.
Note: with a too smaller value, positional errors may not be converged.

Velocity loop gain（Pr21）:
- The value larger, the gain higer, and the speed response faster.
- Parameter setting should refer to the load. Generally, the load inertia is more larger, the setting value shuld be more larger.

Velocity loop integeration time constant (Pr20):
- The value larger, the speed errors integeration faster, and the rigidity of velocity loop larger.
- Parameter setting should refer to the load. Generally, the load inertia is more larger, the setting value shuld be more smaller

2nd position loop gain (Pr32) and 1st position loop gain (Pr31):
- The value larger, the gain larger, and the rigidity higher.
- Parameter setting should refer to the load.

Note: Parameter setting should refer to the load. If a load is of a significant difference from another one, the parameter should be adjusted correspondly .

Note: During adjugement, if a shock occurs, release the servo-on signal or switch off the power as soon as possible. Then decrease the value and try again.

10. Parameter setting on hold brake

parameter	Name	Value	Function	Default	Remarks
70	Hold brake control word	0－65535	0：standard motor 64：motor with brake	0	
4C	Mechanical Brake action set-up at motor standstill	0－500	Defines the duration from OFF of the brake release signal (BRKOFF)(i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the halt of the motor.	0	Delay time
4D	Mechanical brake action set-up at motor in motion	0－500	Defines the duration from OFF of the brake release signal (BRKOFF)(i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the motor in motion, not during the halt as handled by Pr4C.	0	Delay time
66	Servo on delay time	0－500	Define the duration from ON of the brake close signal (BRKON) (i.e. brake set free) to the power on of motor current (servo lock) in transition to Servo-ON	0	Delay time

11. Alarm description, Possible cause and corrective action

The PSDA driver has various protective functions. When one of the protections is activated, the motor trips according to the timing chart , and the Servo Alarm Output (ALM) is turned off.

Actions to be taken after trip events

- After a trip event, the LED touch panel displays an alarm code no., and no Servo-ON occurs.
- Any trip status is cleared by keeping A-CLR (Alarm Clear Input) on for at least 120 ms after A-CLR off.
- The overload protection can be cleared by A-CLR at least 10 seconds after the occurrence of the event. If the control power connection between r and t is opened, the time limiting operation is cleared.
- The alarms mentioned above can also be cleared with the LED touch panel.

<Notes>

Protections marked with * cannot be cleared with A-CLR (Alarm Clear Input). They should be cleared by turning the power off, removing the causes, and then turning the power on again

.

Code	Protecion	cause	Corrective action

Err－01	Over current	The current flowing in the converter is larger than the specified value. 1) The driver failed (due to defective circuits or IGBT parts). 2) Motor wires (U, V and W) are shorted. 3) Motor wires (U, V and W) are grounded. Motor burned 5) Poor connection of Motor wires 6) The relay for the dynamic brake is melted and stuck due to the fre quent Servo-ON/OFF. 7) The motor is not compatible with the driver.	1) Disconnect the motor wires, and enter Servo-ON. If this trouble hap-pens immediately, replace the driver with a new one (that is working correctly). 2) Check if the U. V and W wires are shorted at the connections. Reconnect them, if necessary. 3) Measure the insulation resistance between U/V/W and earth wire. If the resistance is not correct, replace the motor with a new one. 4) Measure the resistance between U,V and W. If they are unbalanced, replace the motor with a new one. 5) Check if the U/V/W connector pins are firmly secured with screws. Loosened pins should be fixed firmly. 6) Replace the driver with a new one. Do not start or stop the motor by entering Servo-ON or OFF. 7) Check the capacity of the motor and driver on the nameplate. If the motor is not compatible with the driver, replace it with a correct one.
Err－02	Over voltage	The line voltage is larger than the specified acceptable range, so that the P-N voltage of the converter is larger than the specified value, or the line voltage was raised by a condensive load or UPS (Uninterruptible Power Supply). 1)The internal regenerative discharge resistor is disconnected. 2) The eternal regenerative discharge resistor is not suitable so that regenerative energy cannot be absorbed. 3) The driver (circuit) failed.	Measure the terminal-to-terminal voltages (between R, S and T). Remove the causes. Feed a power of correct voltage. 1) Measure the P-B2 resistance of the driver using a circuit tester. If it read .Aa, the connection is broken. Replace the resistor. Insert an external regenerative discharge resistor between the P and B1 terminals. . 2) Use a resistor having the specified resistance for specified Watt. 3) Replace with a new driver (that is working correctly for another axis).
Err－03	Under voltage	The P-N voltage of the main power converter is lower than the specified value during ervo-ON. 2) The main power line voltage is too low, an instantaneous outage occurred, the power source is too small, the main power is turned off, or the main power is not fed. 3) Too small power source: the line voltage dropped due to the inrush current at power on.	Measure the terminal-to-terminal voltages (between R, S and T). 1) Increase the capacity of the main power or replace it with a larger one. Or remove the causes of the failure of the magnetic contact, and then restart the power source. 2) Increase the capacity of the main power. For the required capacity. 3) Correct the phase (R, S and T) connections of the main power. 4) Check the timing of power-on (for both the main power and control power).
Err－04	Over heat	The radiator is heated up to exceed the limit temperature. The power elements of the driver is overheated. Overload.	The heat sink is heated up to exceed the limit temperature. The power elements of the driver is overheated. Overload.
Err－06	Encoder error	1. Encoder is damaged. 2. Encoder is not well connected with the driver.	1. Check encoder. 2. Check wiring.
Err－07	EEPROM read / write error	1) The data contained in the parameter storage area of the EEPROM is broken, so erroneous data is retrieved. 2) The check code of the EEPROM is broken, so erroneous data is retrieved.	Set all the parameters again. If this error occurs frequently, the driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair.
Err－08	Parameters initiation fault		The driver may have been broken. Replace the driver with a new one. Return the old driver to the sales agent for repair.
Err－09	No encoder	1） Encoder cable is not connected.	1） Re-connect encoder cable.

		2） Encoder cable may be broken.	2） Check encoder cable.
Err－11	position error too large	1) The motor velocity exceeds the specified limit. 2) The position error pulse is larger than Pr63 (position error limit). The motor operation does not respond to the commands.	1) Decrease the target speed (command values). 2) Adjust the electronic gear ratio so that the frequency of the command pulse is 500 kpps or less. If an overshoot occurs, readjust the gains. Correct the encoder wiring per the wiring diagram..B Check whether the motor operates per the position command pulse or not. See the torque monitor to check if the output torque is saturated. Readjust the gains. Maximize the value of Pr12 (torque limit set-up). Correct the encoder wiring per the wiring diagram. Increase the acceleration and deceleration time. Reduce the load and velocity.
Err－12	CW over-travel limits	The CW over-travel limits is not active.	Check the switches, wires and power supply that constitute the circuits.. Check the value of Pr59. Correct the wiring, if necessary.
Err－13	CCW over-travel limits	The CCW over-travel limits are not active.	
Err－14	Overload	Overload protection is activated via the specified time limiting operation when the integration of a torque command exceeds the specified overload level. Caused by a long operation with a torque that exceeds the specified torque limit. 1) Long operation with more load and torque than the rating. 2) Vibration or hunting due to incorrect gains. Cause vibration and/or abnormal sound. 3) Motor wires connected wrong or broken 4) The machine is hit against a heavy hing, or suddenly becomes heavy in operation. The machine is en tangled. 5) The electromagnetic brake is ON. 6) In a system of multiple drivers, some motors are wired incorrectly to other axis.	Monitor the torque (current wave) using an oscilloscope to check whether the torque is surging or not. Check the load factor and overload alarm messages. 1) Increase the capacity of the driver and motor. Lengthen the ramp time of cceleration/ deceleration. Reduce the motor load. 2) Readjust the gains. 3)Correct the motor wiring per the wiring diagrams. Replace cables. 4)Free the machine of any tangle . Reduce the motor load. 5)Measure the voltage at the brake wiring connections. Turn off the brake. 6) Correct the motor and encoder wiring to eliminate the mismatching between the mo.
Err－15	Module Fault		If power on again and the fault is still existence, please replace with a new driver.

12. Annexed table

12.1 Monitor mode

Monitor item	Monitor content	Display format	Instruction
00	Motor speed	r ±XXXX	+: CW －: CCW xxxx actual speed
01	Referance speed	n±XXXX	+: CW －: CCW xxxx reference speed
02	Instant current A	a±XXXX	+: CW －: CCW xxxx phase U current
03	Instant current B	b±XXXX	+: CW －: CCW xxxx phase V current
04	Current	I±X.XXX	+: CW －: CCW xxx.x winding current
05	Referance current	F±X.XXX	+: CW －: CCW x.xxx reference current

06	Position error	EXXXXX	E: error, XXXXX position error in pulses (10000ppr)
07	Torque in percent	tXXXXX	T: torque in percent XXXXX value
08	Zero point position of encoder	oXXXXX	O: Zero position, XXXXX value
09	Rotor position	PXXXXX	P: rotor position, XXXXX value
10	UVW status of encoder	H0000X	H: UVW status of encoder, X: UVW status, example X=3, means U, V:= 0, W:=1
11	Heat sink temperature	C000XX	C: heat sink temperature XX value
12	Inverter bridge voltage	UXXXX.X	U: inverter DC bridge voltage, XXXX.X value

12.2 Auxiliary function

Auxiliary function No.	Symbol	Function
0	AF-ENC FUN-00	Query digital input / output status. Such as Servo-on, CW and CCW inhibit, and so on.
1	AF-ENC FUN-01	Query alarm information.
2	AF-ENC FUN-02	Query serial number.
3	AF-ENC FUN-03	Input authorized code.
4	AF-ENC FUN-04	Reset all the parameters to the default value.
5	AF-ENC FUN-09	JOG fuction. For trial operation.

12.3 Parameter table

Parameter no,	Parameter description	Instruction	Range
12	Max. current of motor	Unit: 1/10 fold, not permit to modify by user	10－30
13	Measuring range of current sensor	Unit: 1/10A, not permit to modify by user	50－500

14	Rated current of motor	Unit: 1/10A, not permit to modify by user	5－100
15	Rated speed of motor	Unit: rpm, not permit to modify by user	500－5000
20	Velocity loop integeration time constant		0－32767
21	Velocity loop gain		0－32767
30	cpKpp_Setp	the duration from 1st position loop gain to the 2nd	1－100
31	1st position loop gain		1－100
32	2nd position loop gain		1－100
34	Electronic gear numerator		1－50000
35	Electronic gear denumerator		1－50000
36	Acc- / deceleration time of position mode	The duration of motor speed changing from 0 to rated speed, or from rated speed to 0 3000rpm.	
3A	In-position range	. You can set-up the output timing of the in-position signal (COIN: CN I/F), completing the travel of the motor (work), after the command pulse entry. . The in-position (positioning complete) signal (COIN) will be fed-out when the position error counter pulsed fall within a preset range	0-30000
40	1st internal speed	1st internal speed	10－3000
41	2nd internal speed	2nd internal speed	10－3000
41	3rd internal speed	3rd internal speed	10－3000
43	4th internal speed	4th internal speed	10－3000
44	5th internal speed	5th internal speed	10－3000
45	6th internal speed	6th internal speed	10－3000
46	7th internal speed	7th internal speed	10－3000
47	8th internal speed	8th internal speed	10－3000
48	Analog speed input gain		10－2000
49	Analog Speed input offset		0－65535
4A	Output pulse division ratio	Output pulse division ratio for close-loop control.	0－63
4C	Mechanical Brake action set-up at motor standstill	Defines the duration from OFF of the brake release signal (BRKOFF)(i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the halt of the motor.	0－500
4D	Mechanical brake action set-up at motor in motion	Defines the duration from OFF of the brake release signal (BRKOFF)(i.e. brake engaged) to the shutdown of motor current (servo free) in transition to Servo-OFF during the motor in motion, not during the halt as handled by Pr4C.	0－500
51	Control mode	0：internal speed mode	0－5
		1：position mode	
		2：external speed input mode	
		3：torque mode	
		5：APCM mode（embedded PLC mode）	
52	Communication baud rate	0：57600Bps	0－3
		1：38400Bps	
		2：57600Bps	
		3：115200Bps	
		4：9600Bps	
53	Encoder type	0：8000PPR	0－1
		1：10000PPR	
58	Software version		

Parameter no,	Parameter description	Instruction	Range
59	Digital input logic inverse	D9 D8 D7 D6 D5 D4 D3 D2 D1 D0 Ser_ON	0－2074
5A	Digital output logic inverse	D1 D0 ALROUT Coin	0－255
5B	Rotating direction inverse	0：Normal	0－1
		1：Rotating direction inverse	
5E	Pulse input mode	0：pulse + sign pulse: PP－positive, PG－negative direction: DP－positive, DG－negative	0－1

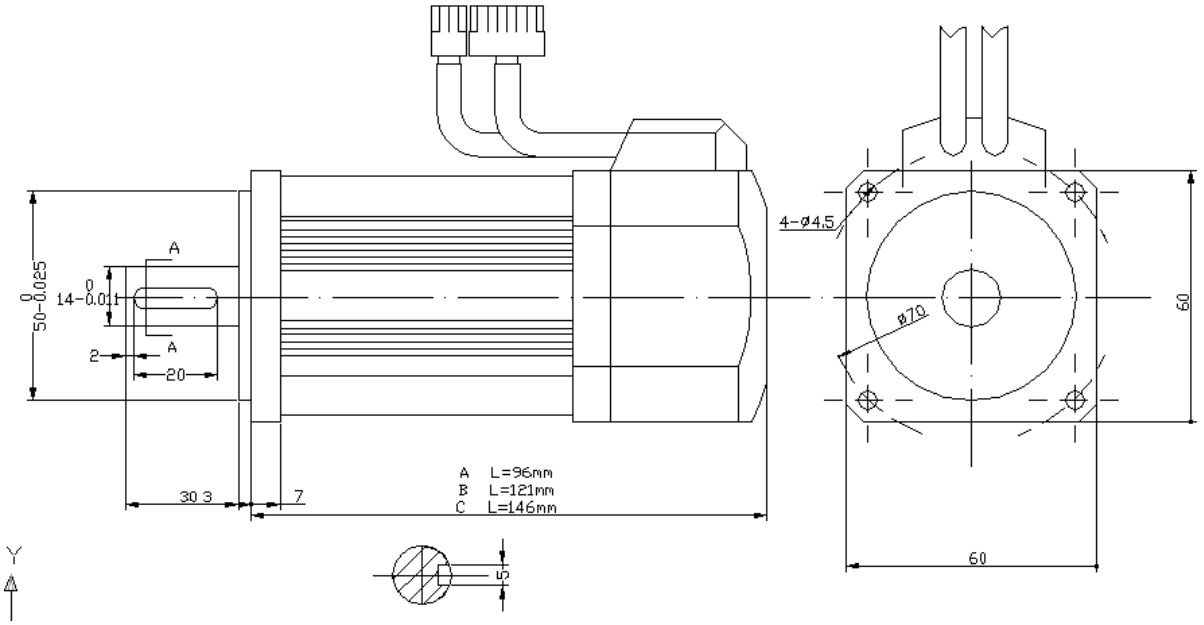
		1：90 degree two-phase PP, PG-positive and negative of one phase DP, DG-positive and negative of another phase	
		2：CW+CCW（optional） PP, PG-CW pulse's positive and negative DP, DG-CCW pulse's positive and negative	
60	Password for parameter setting	5678：permit to set parameters.	0－65535
		Other value, not permit to set parameters.	
61	Machine No.	For net work.	0－255
66	Servo ON delay time	Define the duration from ON of the brake close signal (BRKON) (i.e. brake set free) to the power on of motor current (servo lock) in transition to Servo-ON	300-10000
67	Under voltage protection value	When the inverter bridge voltage less than this value a undervoltage error will be tripped.	Unit: 1/10V
68	Over voltage protection value	When the inverter bridge voltage greater than this value a undervoltage error will be tripped.	Unit: 1/10V
6B	Human & machine interface type	0：OP-320	
		1：HITECH	
		2：EASYVIEW/WINVIEW	
		3：MD-204	
70	Driver control word	0：standard motor	
		64：motor with brake	

13. Wiring table

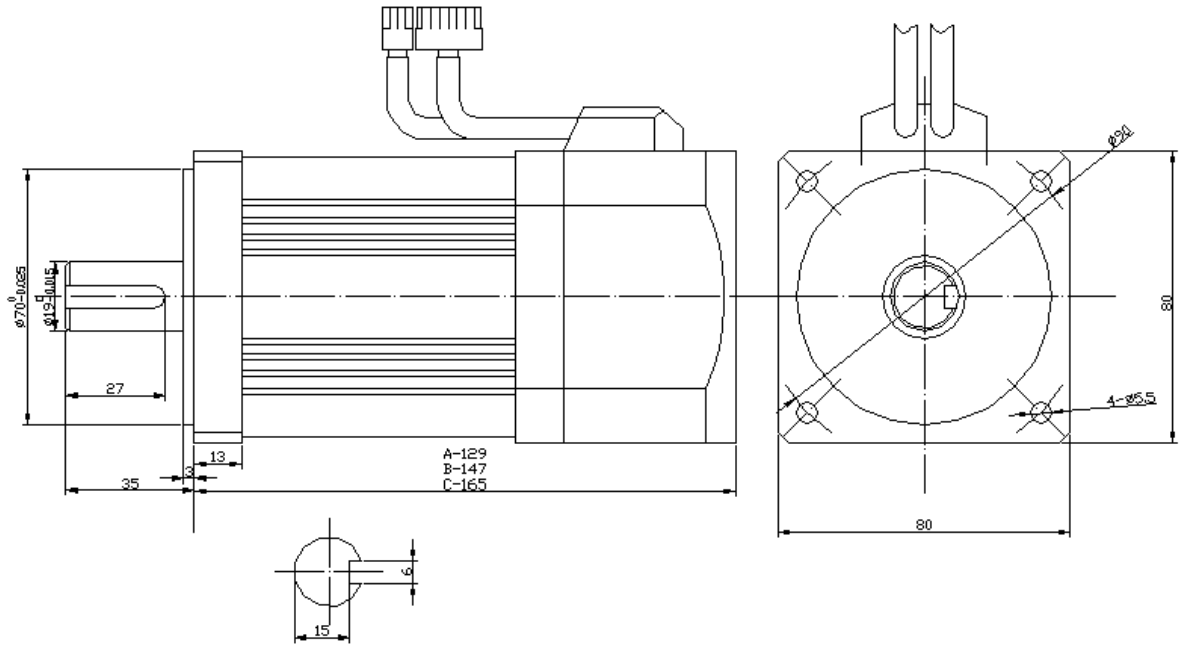
Motor wiring CN1			Braking resistor wiring CN2			Power supply CN3	
Motor wires	Driver side		B2	Connect a resistor of 50W / 100 Ω between terminal P and B1,		Driver side	AC
Red	U					r	Single phase 220VAC
Blue	V		B1			s	
Yellow	W					R	Single phase or Three phase 220VAC
Green/Yellow	FG		P			S	
						T	

PSTD II (50PIN)				
Pin No.	Name	Meaning	Wire colour	
32	DP	Direction positive	**Grey**	Twisted pair in the a wire
33	DG	Direction negative	**Blue**	
30	PP	Pulse positive	**Red**	Twisted pair in the a wire
31	PG	Pulse negative	**black**	
46	A12V	Provide a 12Vpower positive	Connect 46 、 13 inside	
13	DI_COM+	The common positive for digital input		
47	DI_COM-	Provide a 12Vpower negative	**Yellow**	Twisted pair in the a wire
36	S_ON	Servo on	**Green**	
7	POSERR-CLR	clear position error	**grass green**	Twisted pair in the a wire
37	Err_Clr	clear alarm input	**French grey**	
8	SelSp1	Speed choose 1		
34	SelSp3	Speed choose 3		
9	SelSp2	Speed choose 2		
27	Zout	Z phae encoder collector output	**azure**	Twisted pair in the a wire
26	GND	encoder collector output common negative	**canary**	
48	FG	shield wires		
Digital input signal				
40	Y1-E	Alarm output -	**purple**	Twisted pair in the a wire
41	Y1	Alarm output	**orange**	
25	Y4-E	Detent output -	**reseda**	Twisted pair in the a wire
23	Y4	Detent output	**pink**	
38	Y0-E	Position finish output -	**Brown**	Twisted pair in the a wire
39	Y0	Position finish output	**white**	
Simulation input signal				
49	-7.5V	Simulation -7.5V		
50	+7.5V	Simulation +7.5V		
45	AGND	Simulation 0V		
14	SP	Simulation speed		

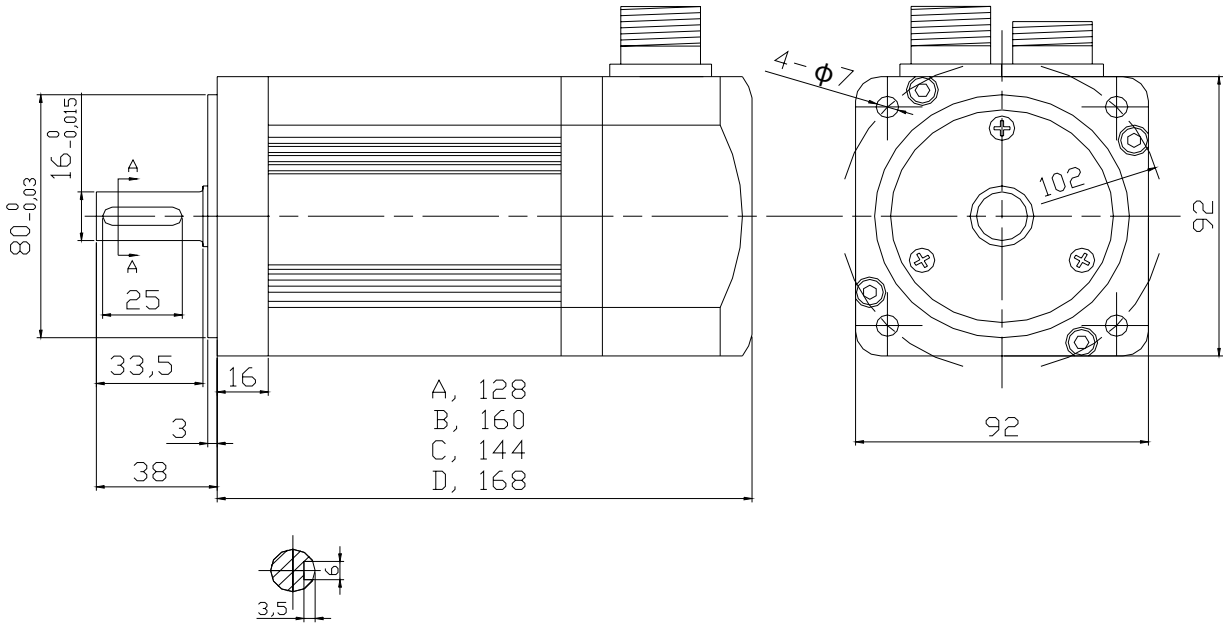
Dimensions of 60 Series motor



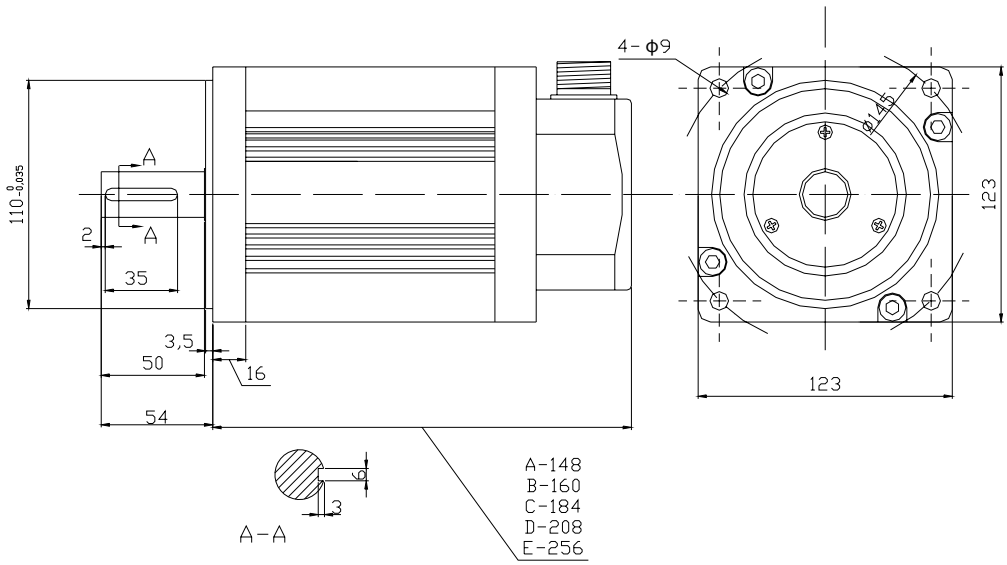
Dimensions of 80 Series motor

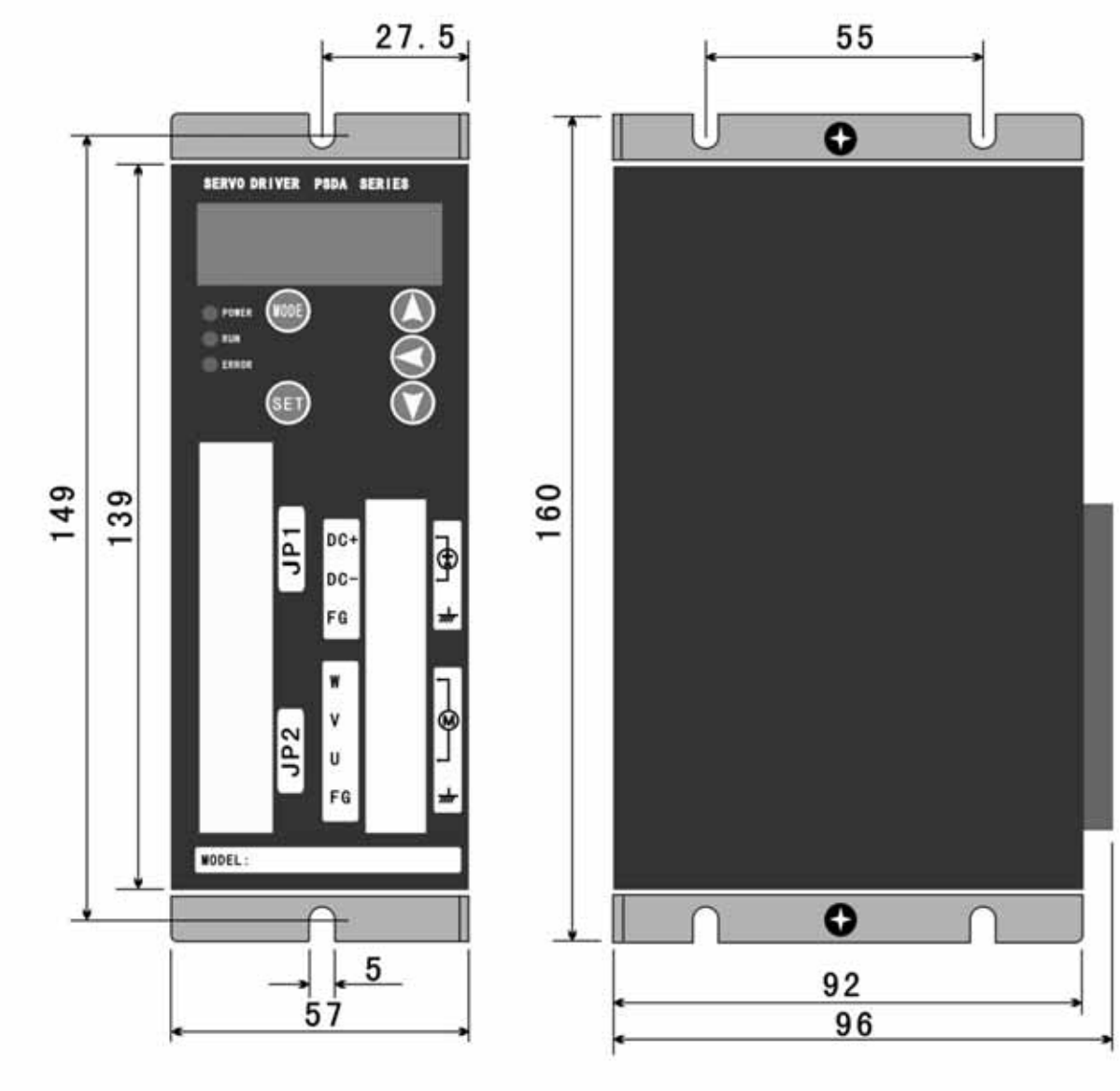


Dimensions of 92 Series motor

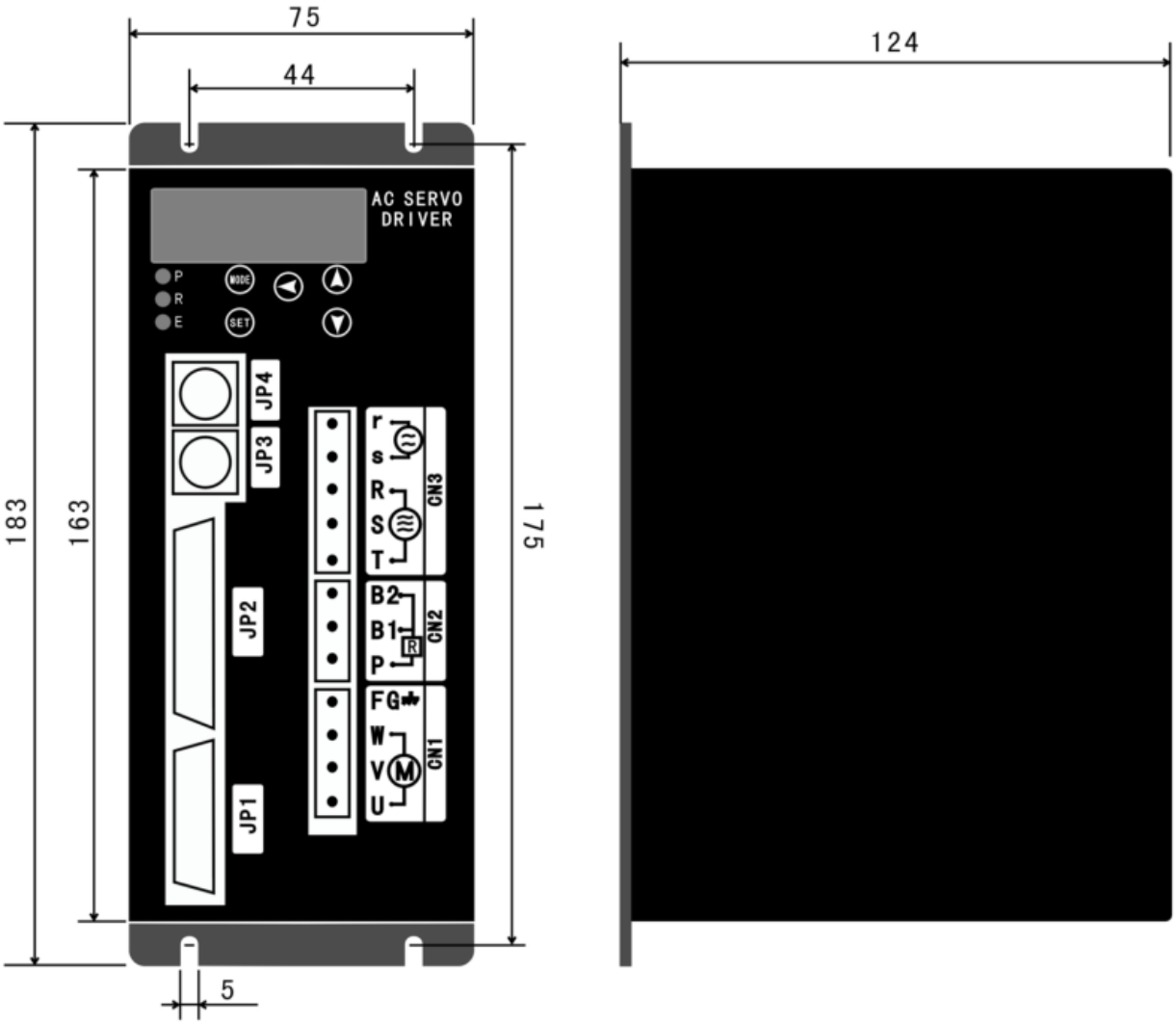


Dimensions of 123 Series motor

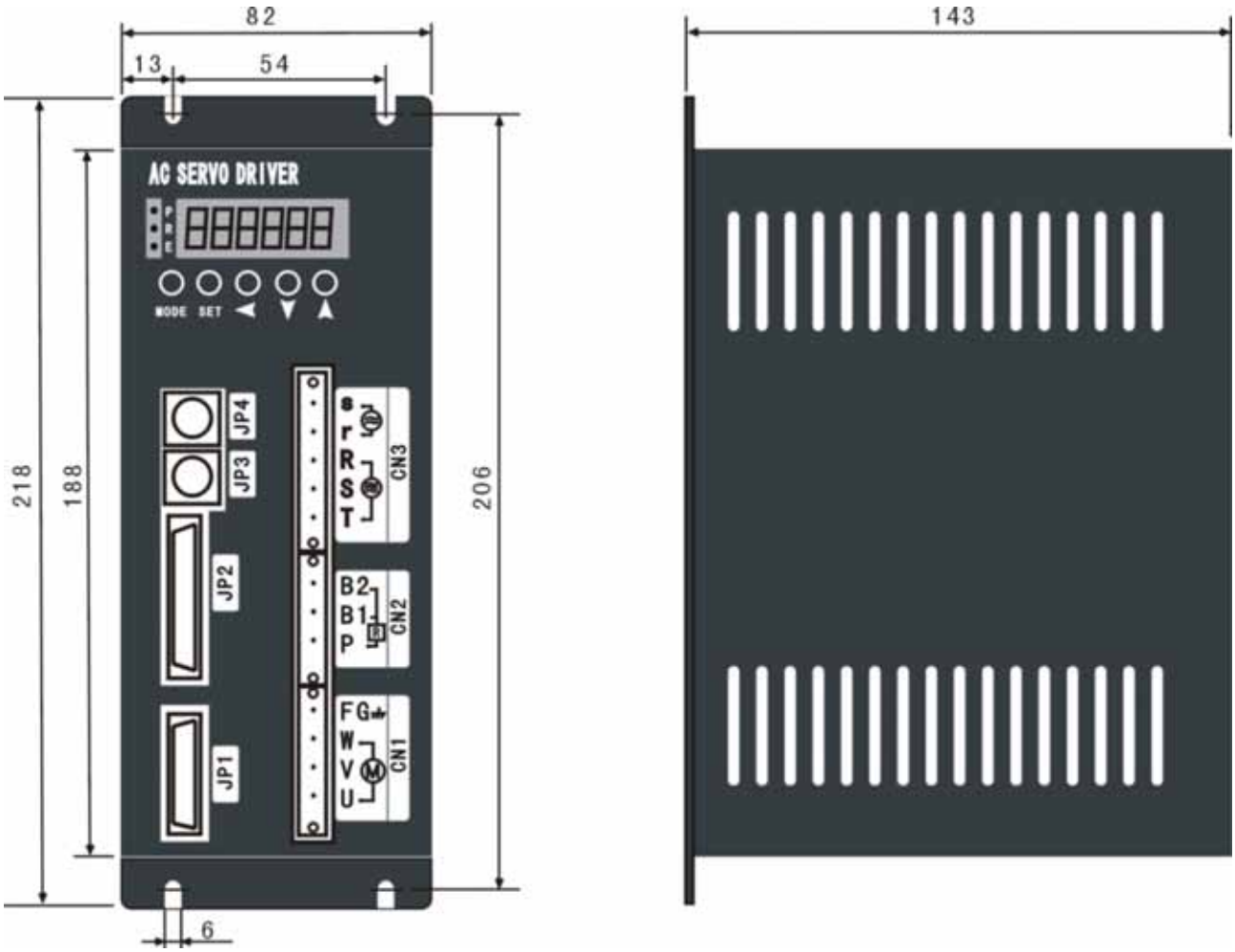




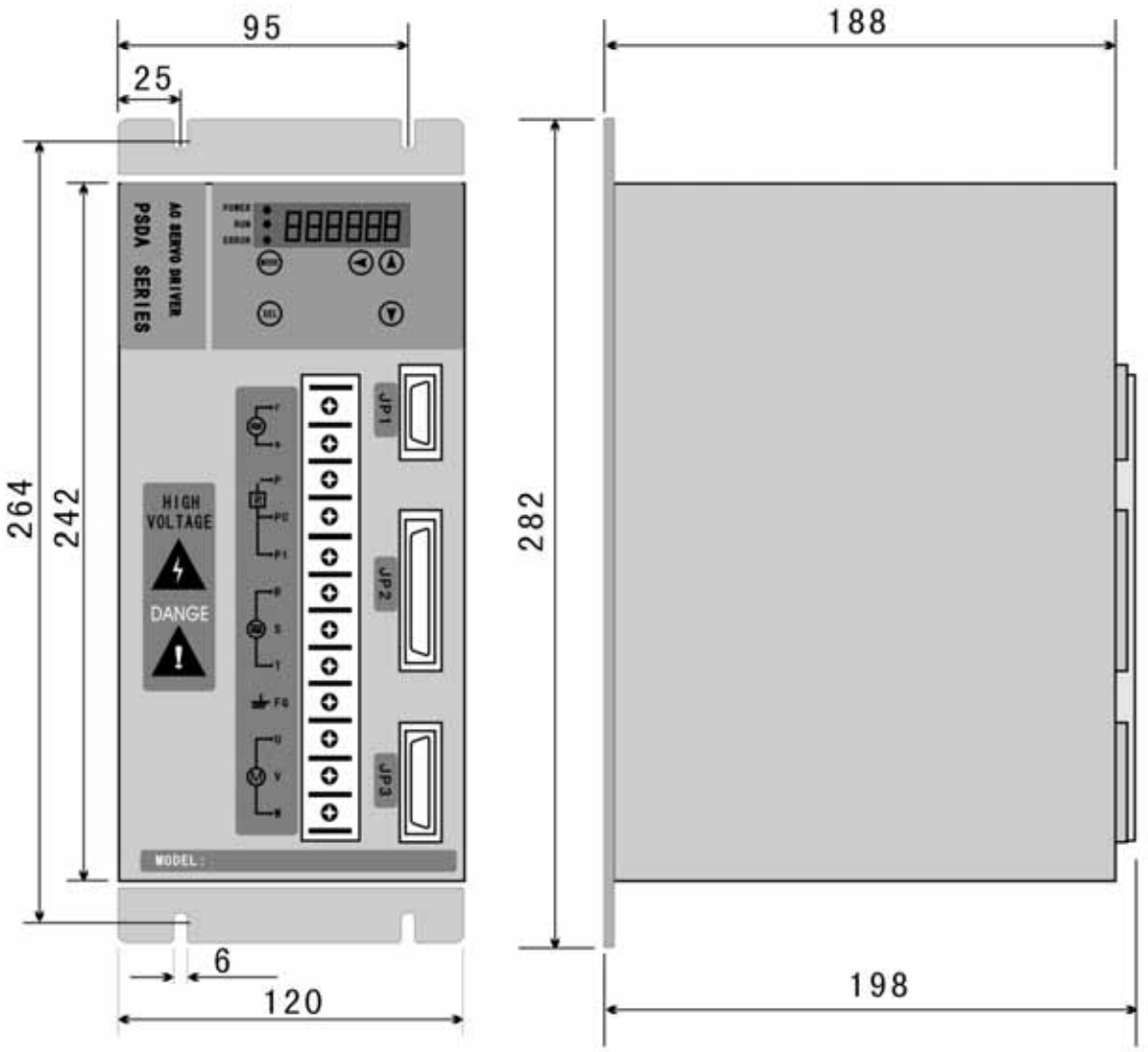
Dimensions of PSDA0113



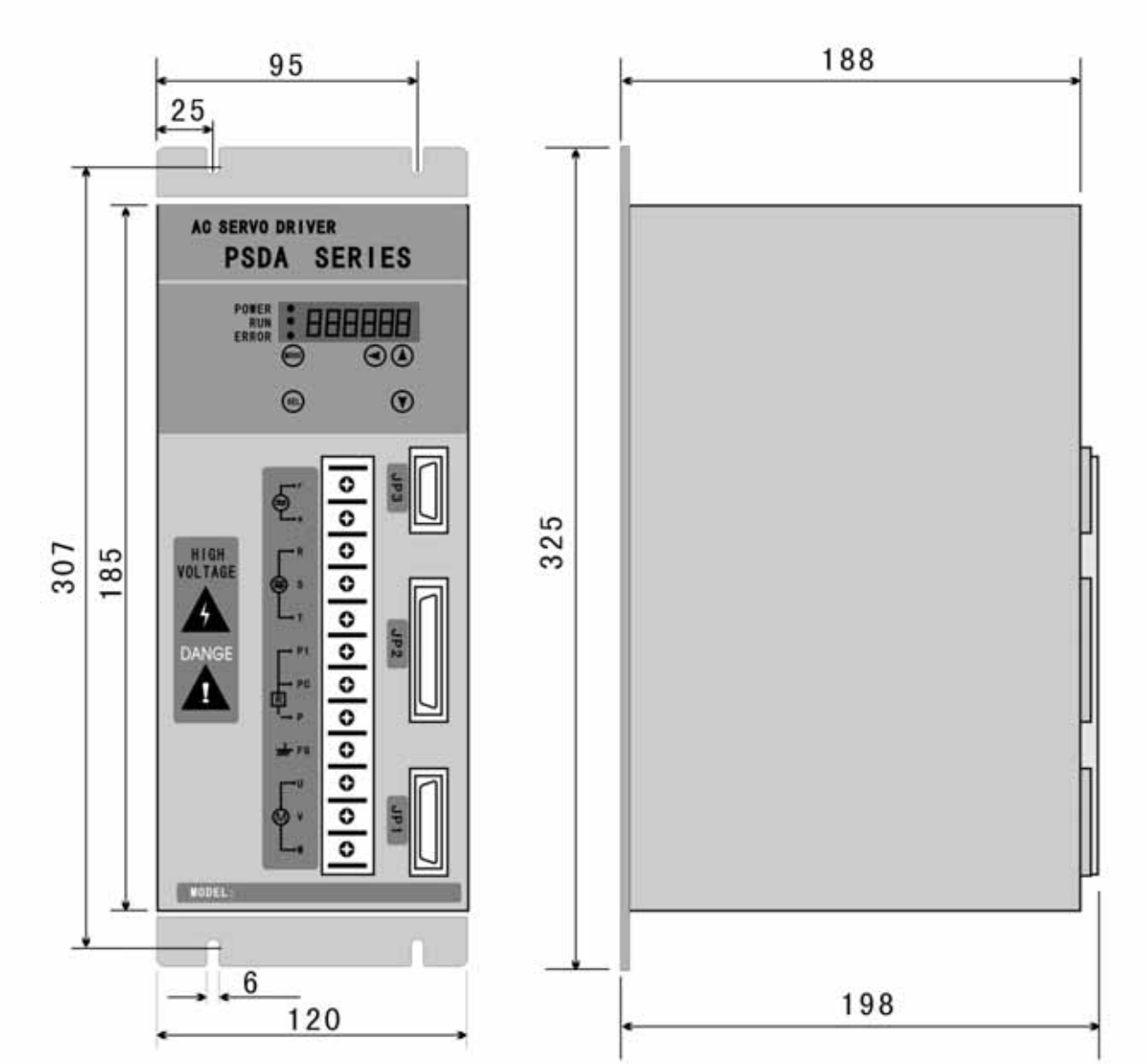
Dimensions of PSDA0233~PSDA0433



Dimensions of PSDA0833~ PSDA1533



Dimensions of PSDA2033



Dimensions of PSDA4033