SIHONG

KA/KB/KR series

AC servo driver manual

SHANGHAI SIHENG MOTOR CO.,LTD

KA/KB/KR series AC servo driver manual

Safety precautions

The following marks are used in the safety-related contents of this instruction book. The instructions about the safety mark are the main content, please be sure to follow.

Danger	Indicates that when used incorrectly, it can cause danger and death.
Attention	Indicates a danger when used incorrectly, resulting in personal injury and possible damage to equipment.
Forbid	Indicates strictly prohibited behavior, otherwise the device will be damaged or unusable.

1. Usage situation

Danger	⌘ it is forbidden to products used for inflammable and explosive occasions, easy to cause damage or cause a fire. ⌘ Do not use the product in damp, direct sunlight, dust, salt and metal powder places.

2. Wiring

Danger	⌘ do not use drive power access to 380 v, 220 v power supply, otherwise it will cause equipment damage or fire. ⌘ Please ground the grounding terminal reliably，Poor grounding may cause electric shock or fire. ⌘ Do not connect the drive U, V, W motor output terminals to the three-phase power supply, otherwise it will cause casualties or fire. ⌘ The output terminals of drive U, V, W motor and motor wiring terminals U, V, W must be connected one-to-one, otherwise the motor may cause equipment damage and casualties due to overspeed. ⌘ Please refer to wire wiring, otherwise it may cause fire

3. Operation

Attention	⌘ Before starting operation, please confirm whether emergency switch can be activated at any time to stop. ⌘ During the test run, please separate the servo motor from the machine. Install the motor on the machine after confirmation of operation. ⌘ Do not get close to the machine after the servo motor stops and resumes. The machine may suddenly start again. ⌘ Do not switch on or off the power frequently, otherwise it will cause overheating inside the drive.

4. Running

Forbid	⌘ When the motor running, banned parts in contact with any rotation, otherwise it will cause loss of life. ⌘ Equipment runs, untouchable drives and motors, otherwise it will cause electric shock or burns. ⌘ Do not move the connecting cables while the equipment is in operation, otherwise it may cause personal injury or damage to the equipment.

5.Check and Maintenance

Forbid	⌘ Please do not disassemble and repair by yourself ⌘ Do not touch the inside of the drive and its motor, otherwise it will cause electric shock. ⌘ Operations such as wiring, maintenance and overhaul are prohibited under the energized state. Please be sure to power off for more than 30 minutes, after the high voltage warning light off, then carry out the above operation.

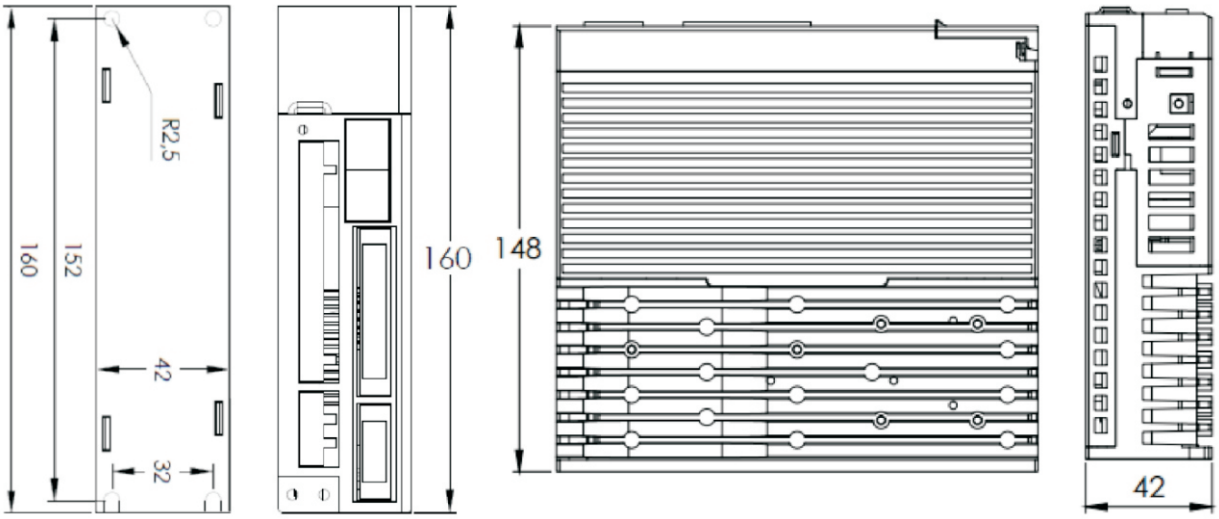
Chapter 1 product introduction

1.1 Servo Drive Technical Specifications

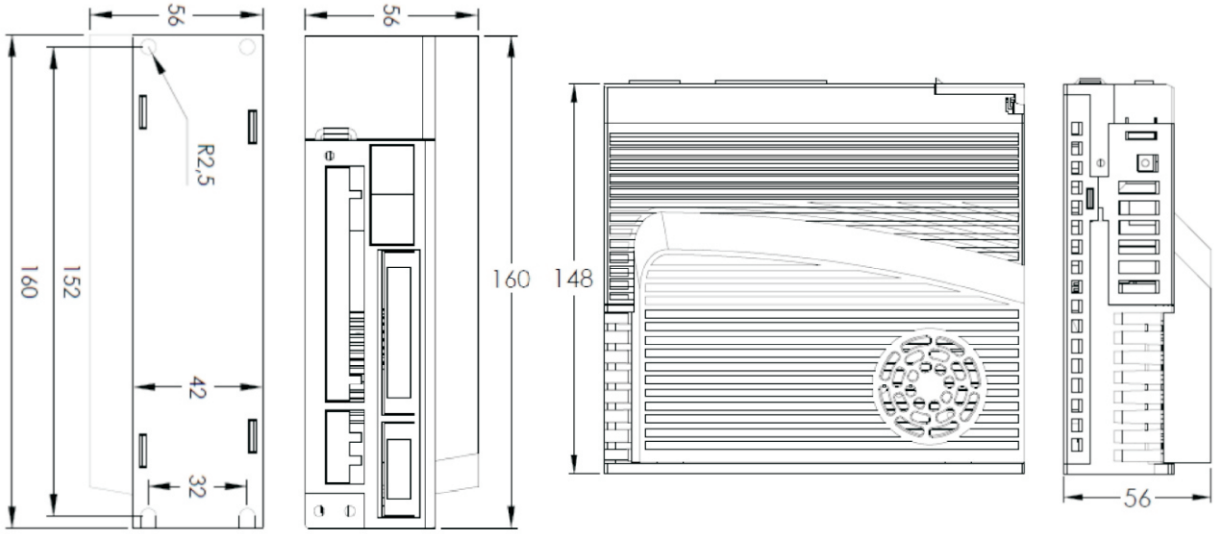
Driver No	KA02	KA03	KA05	KA10	KB05	KB10	KB15	KB20
Power	0.05～0.1 kW	0.2～0.4 kW	0.6～1.0 kW	1.0～2.3 kW	1.0～1.5 kW	2.3～3.0 kW	3.7～5.5 kW	7.5～11 kW
Input power	KASeries drive single-phase or three-phase 220VAC (voltage fluctuation -15% ~ +10%)，50 Hz /60Hz KB Series Driven Three-phase 380VAC (Voltage Fluctuation -15% ~ +10%)，50 Hz /60Hz							
Working Environment	Temperature:Working：0℃～55℃storage：-20℃～+80℃							
	Humidity:Below 90%（non condensing）							
	Vibration:below0.5G（4.9m/s^2），10 Hz～60 Hz(Discontinuous operation)							
Control Method	①Position control ②Speed control ③Torque control ④Communication control							
regenerative brake	Built-in（When the power of the internal brake resistor is not enough, the external high power brake resistor can be connected）							
control characteristic	Velocity frequency response:≥200Hz							
	Speed fluctuation ratio ＜±0.03（Load 0～100%）：＜±0.02×(0.9～1.1）Supply voltage （value corresponds to the rated speed）							
	Speed ratio：1：5000							
	Pulse frequency ≤300kHz							
Control input	① Servo on；②ALM-RST；③CCW FSTP；④CW FSTP； ⑤Deviation counter is zeroed/speed selected 1；⑥Instruction pulse disabling/speed selection 2; ⑦CCW Torque limitation；⑧CW Torque limitation 。							
Control output	① Servo ready for output；②Servo alarm output； ② Position finished output/speed reached output；④Servo brake control signal output；							
Position control	Input mode	① Pulse + Direction； ② A plus B orthogonal impulse。						
		Electronic gear ratio:1～32767 / 1～32767（default 10000 : 1000，1000 pulses per cycle)						
		Feedback pulse: 10000pulse/Cycle						
Speed control	4 internal speeds (switched by SC1 and SC2 input signal combination)							
	Acceleration and deceleration function:Parameters set acceleration and deceleration time1～10000 ms（0 r/min ～ 1000 r/min）							
Monitoring function	Speed, current position, instruction pulse accumulation, position deviation, motor torque, motor current, bus voltage, Absolute rotor position, instruction pulse frequency, operating state, input and output terminal signals, etc							
Protect function	Overspeed, overvoltage and undervoltage of the main power supply, overcurrent, overload, abnormal braking, abnormal encoder, abnormal control power supply, Too bad position, etc							
	Applicable load inertia:Less than 5 times the inertia of the motor rotor							

Chapter 2 Installation

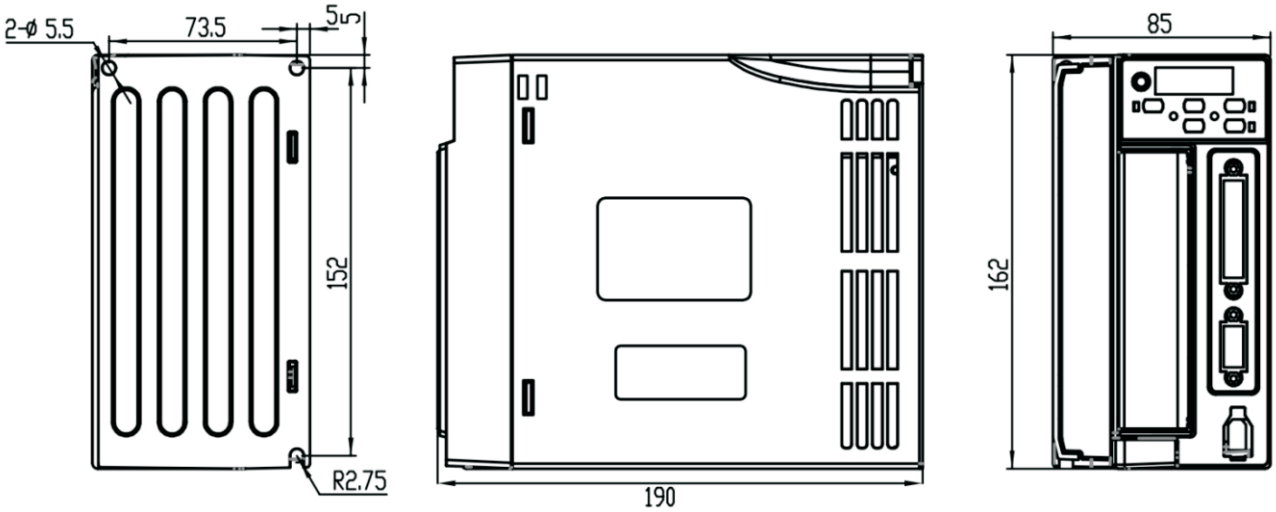
2.1 KA02～KA03（400W and below）Servo drive external size drawing



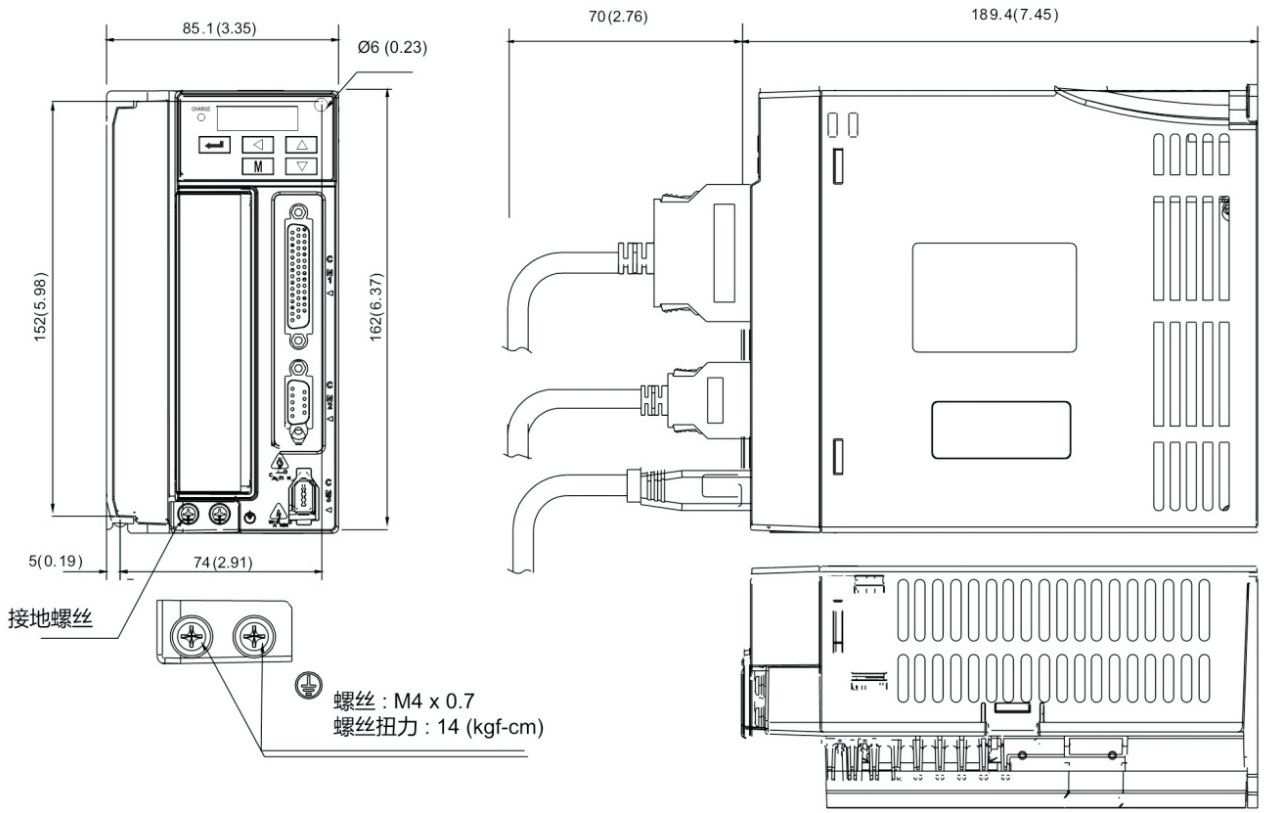
2.2 KA05（0.6 kW～1.0kW）Servo drive external size drawing



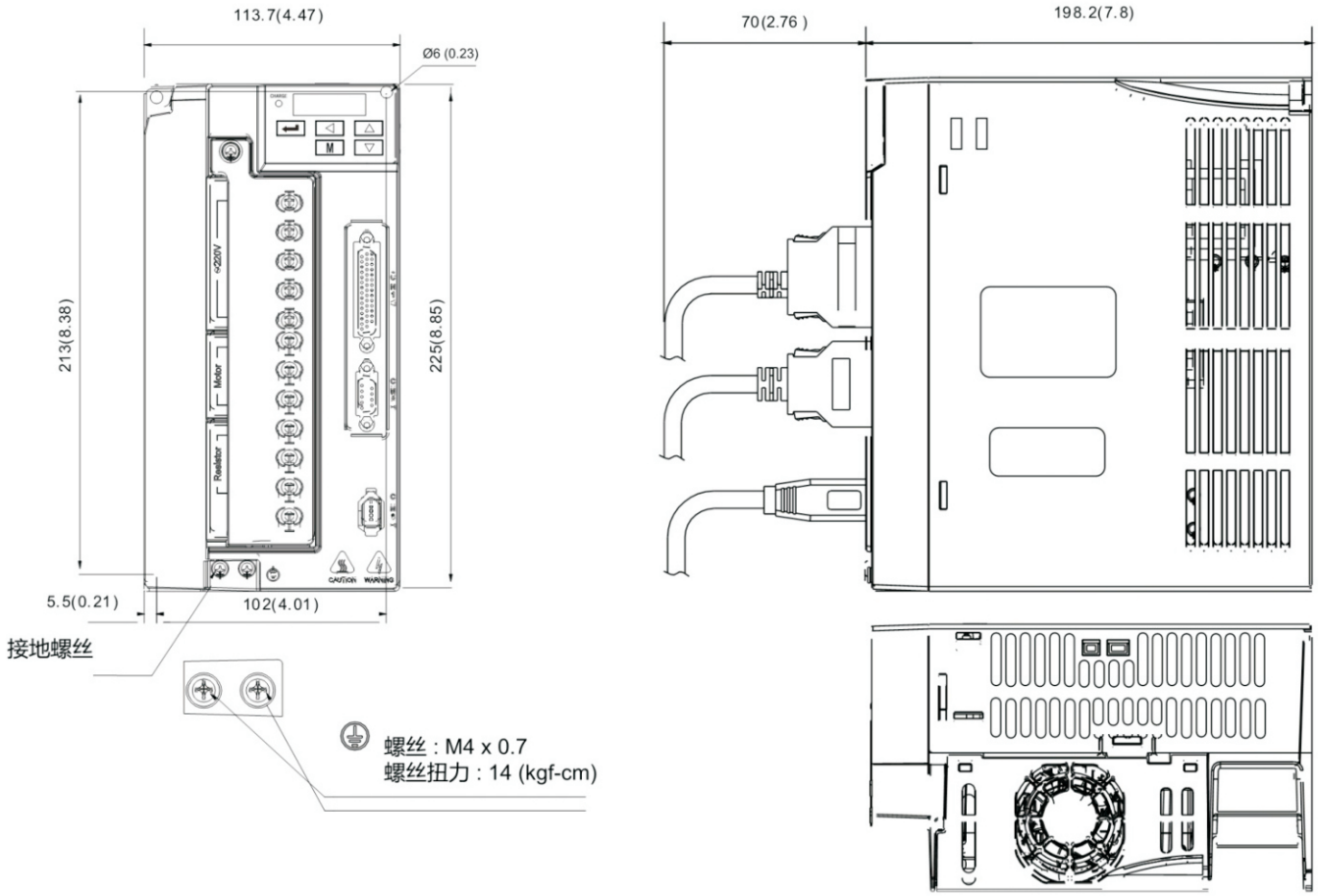
2.3 KA10（1.0 kW～2.6kW）Servo drive external size drawing



2.4 KB05～KB08（1.0kW～3.0kW）Servo drive external size drawing

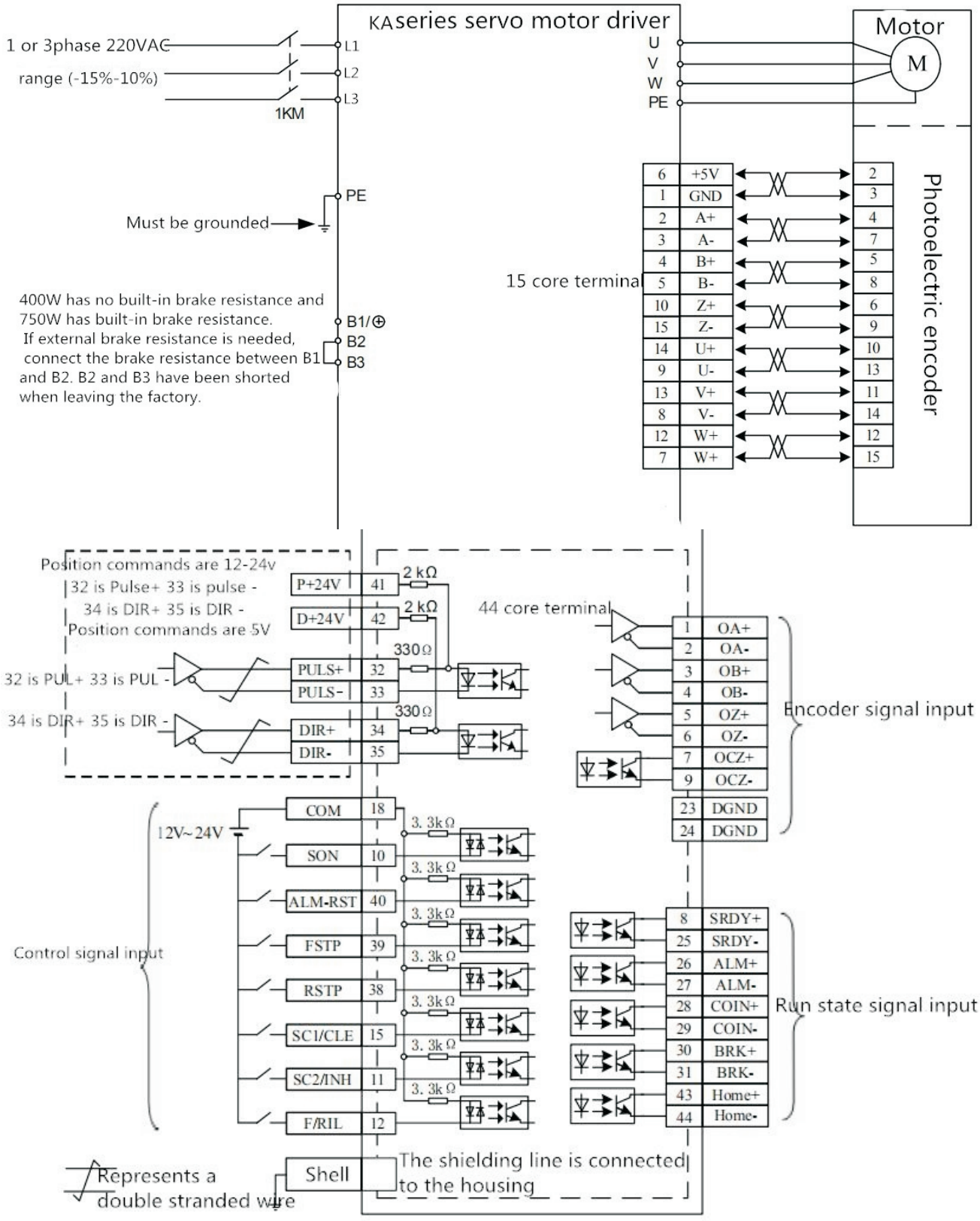


2.5 KB10～KB20（3.7kW～11kW）Servo drive external size drawing



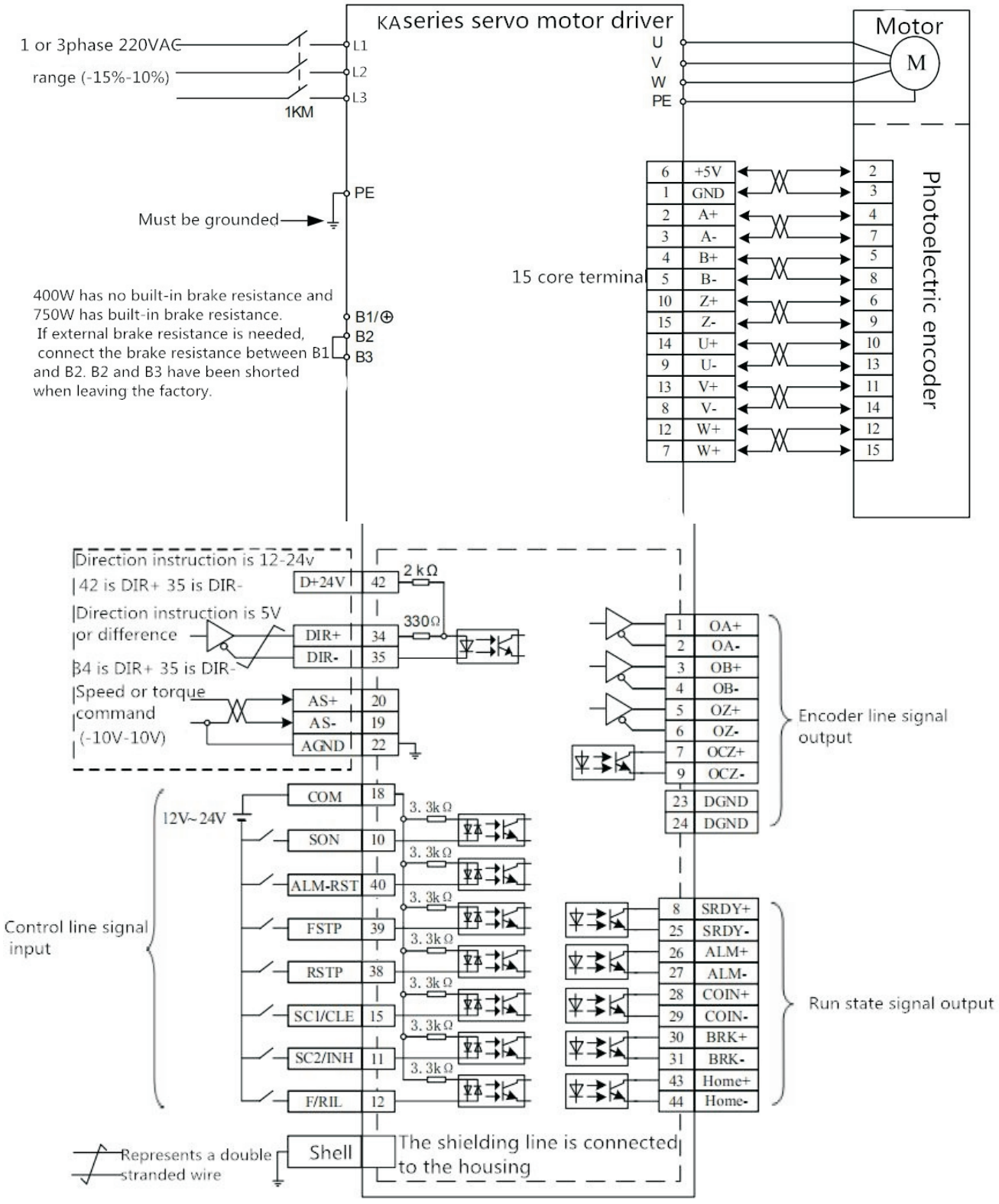
2.6 Standard wiring diagram

2.6.1 Position mode wiring diagram



Position mode wiring diagram

2.6.2 Speed/Torque Mode Wiring Diagram



Speed/Torque Mode Wiring

2.6.3 Control signal input/output terminal (44 core terminal)

Control mode: P stands for position control mode; S stands for speed control mode; T stands for torque control mode.

Pin No	Signal name	Mark	Mode	Function
41	Command pulse 24V positive end	PUL-H	P	① Determine the Angle and speed of the motor. ② Select the corresponding port according to the pulse voltage.
32	Command pulse 5V positive end	PULS+		
33	Instruction pulse input negative end	PULS-		
42	Instruction direction 24V positive end	DIR-H	—	① Determine the rotation direction of the motor. ② It can also be used for directional control when simulating quantitative mode.
34	Command direction 5V positive end	DIR+		
35	Input negative end for instruction direction	DIR-		
18	common end of the input terminal	COM	—	The common end of the input terminal, used to drive the input optocoupler, connected with DC 12 V ~ 24V (positive NPN connection) or 0V (negative PNP connection), current ≥100mA
10	Servo enable input	SON	—	SON ON ：Allow the drive to work； SON OFF：Drive closed, motor in free state. Note 1 The motor must stand still before hitting from SON OFF to SON ON. Note 2: After typing SON ON, wait at least 50ms before entering the command.
40	Alarm clearance input	ALRS	—	ALRS ON ：Clear system alarm; ALRS OFF：Maintain system alarm. Note: Alarms with fault code greater than 8 cannot be removed by this method. They need to be cut off for maintenance and then powered on again.
39	CCW Driver Forbid	FSTP	—	CCW (counterclockwise) driver disallows input terminals FSTP ON：CCW drive allows, motor can rotate counterclockwise; FSTP OFF：CCW drive prohibited, motor prohibited counterclockwise rotation. Note 1: For mechanical overrun, when the switch is OFF, the CCW torque remains at 0. Note 2: this function can be disabled by setting the parameter P01.00 = 1, so that the user does not need to connect to this terminal to enable the CCW driver to allow it.
38	CW Driver Forbid	RSTP	—	CW (clockwise) driver disallows input terminals RSTP ON：CW drive allows, motor can rotate clockwise; RSTP OFF： CW drive is prohibited. The motor is prohibited to rotate clockwise. Note 1: For mechanical overrun, CW torque remains 0 when the switch is OFF. Note 2: this function can be disabled by setting the parameter P01.00 = 1, so that the user does not need to connect to this terminal to enable the CCW driver to allow it.
11	Difference counter zero - clearing input	CLE	P	CLE ON：When position control, position deviation counter clears to zero
	Speed select 1 input	SC1	S	Speed control mode, SC1 and SC2 combinations select different internal speeds SC1 OFF，SC2 OFF：Internal speed 1 (determined by parameter P01.04);

15	Speed select 2input	SC2	S	SC1 ON ，SC2 OFF：Internal speed 2 (determined by parameter P01.05); SC1 OFF，SC2 ON ： Internal speed 3 (determined by parameter P01.06); SC1 ON ，SC2 ON ：Internal speed 4 (as determined by P01.07 parameter).
	Instruction pulse bias is prohibited	INH	P	INH ON ：Instruction pulse input disabled; INH OFF：Instruction pulse input is valid.
12	CCW/CW torque limit CCW is counterclockwise CW is in the clockwise direction	F/RIL	—	F/RIL ON ：CCW torque is limited within the range of parameter P01.12; CW torque is limited within the range of parameter P01.13;F/RIL OFF： CCW torque limit is not limited by parameter P01.12. CW torque limit is not limited by parameter P01.13. Note 1 Whether F/RIL is valid or not, CCW torque is also limited by parameter P01.10 and CW torque is also limited by parameter P01.11. Note 2: In general, parameter P01.10 > parameter P01.12, parameter P01.11 BBB>rameter P01.13.
8	Servo ready for output	SRDY+	—	ON ：power supply is normal, the driver has no alarm, SRDY output ON;; OFF： the main power supply is not on or the driver alarms, the SRDY output is OFF
25		SRDY-		
26	Servo alarm output	ALM+	—	ON ：Servo drive without alarm, output ON, output conduction; OFF：Servo driver has alarm, output OFF, output cutoff.
27		ALM-		
28	To the output	COIN+	P/S/T	Depending on the P03.09 Settings, determine which mode the port uses to reach the output. 0: Default output according to control mode. 1: Use port as the location to reach the output. 2: Use port as speed arrival output. 3: Use the port as the analog quantity torque to reach the output. 4: Use the port as the communication torque given to reach the output.
29		COIN-		
30	Mechanical brake releases output	BRK+	—	When the motor has a mechanical brake (loss of power hold), this port can be used to control the brake. (Note: The BRK function is controlled internally by the driver.) ON ： brake is energized, the brake is invalid, the motor can run; OFF：brake power, the motor is locked by the brake, can not run;
31		BRK-	—	
14	Drive internal 5V	5Vout	—	Used as analog input only, eliminating external power supply in analog mode
20	Analog speed or torque instruction input	AS+	S/T	⌘ Differential mode, the input impedance of 10 k Ω - 10 v ~ + 10 v input range. The direction of rotation/torque can be controlled by DIR signal.
19		AS-	—	
22	AGND	AGND	—	⌘ Simulate the ground of the input
23、24	GND	GND	—	⌘ ground of a digital signal
1	Encoder A phase signal output	OA+	—	⌘ encoder ABZ differential drive signal output (26 ls31 output, RS422); ⌘ Non-isolated output (non-insulated)
2		OA-		
3	Encoder B phase signal output	OB+		
4		OB-		
5	Encoder Z phase signal output	OZ+		
6		OZ-		
7	Encoder Z phase collector open output	OCZ+	—	⌘ In the upper computer, usually Z believe that the number pulse is very narrow, please use a high-speed optoelectronic coupler to receive. (Isolated output, insulation)
9		OCZ-		
Shell	Sheld ground	FG	—	⌘ Shield ground terminals

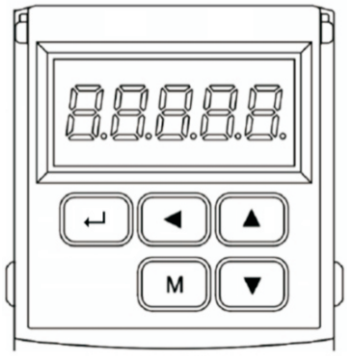
2.6.4 Encoder signal input terminal (15-core terminal)

Pin No	Signal name	Mark	Mode
6	5V Power supply	+5V	Servo motor encoder +5 power supply and common ground; When the cable is longer, multi-line parallel connection is applied to reduce the line voltage drop.
1	Power common	0V	
2	Encoder A+ input	A+	It is connected with the photoelectric encoder A+
3	Encoder A- input	A-	It is connected with the photoelectric encoder A-
4	Encoder B+ input	B+	It is connected with the photoelectric encoder B+
5	Encoder B- input	B-	It is connected with the photoelectric encoder B-
10	Encoder Z+ input	Z+	It is connected with the photoelectric encoderZ+
15	Encoder Z- input	Z-	It is connected with the photoelectric encoder Z-
14	Encoder U+ input	U+	It is connected with the photoelectric encoder U+
9	Encoder U- input	U-	It is connected with the photoelectric encoder U-
13	Encoder V+ input	V+	It is connected with the photoelectric encoder V+
8	Encoder V- input	V-	It is connected with the photoelectric encoder V-
12	Encoder W+ input	W+	It is connected with the photoelectric encoder W+
7	Encoder W- input	W-	It is connected with the photoelectric encoder W-
Shell	Fram Ground	FG	Shield ground terminals

Chapter 3 Display and Panel Operation

ξ 3.1 Description operator panel

The operation interface of the servo driver is composed of 5 LED digital tubes and 5 keys, which can be used for the state display and parameter setting of the servo driver. The interface layout is as follows：

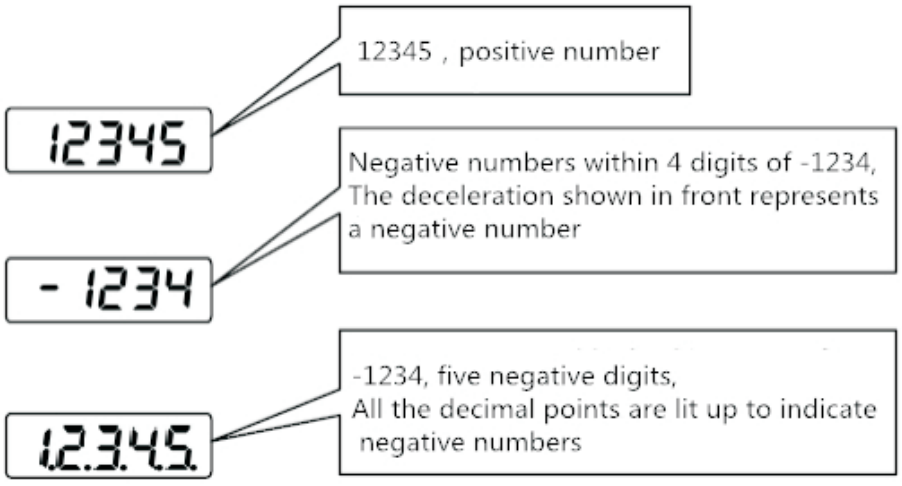


Keys function description

Key	Key name	Function
M	MODE	Switch status monitoring mode/parameter mode/alarm mode to return to the previous menu.
Σ	Increase	Add monitor code, parameter number or set value, long press can increase quickly.
T	Reduce	Reduced monitor code, parameter number or set value, long press can quickly reduce.
Ω	Shift	When setting parameters, press the key to move the selected flicker bit to the left by one.
	Confirm	Go to the next level menu, or save the Settings.

Numerical display description

The numerical value uses 5 digital tube display, the front of the numerical value shows a minus sign to represent the negative number, if it is 5 negative number, all the decimal point lit up to represent the negative number. Some display items have prefix characters in front of them. If the number of digits is too long to occupy the prefix character's position, the prefix character will not be displayed, only the value will be displayed.



3.2 State monitoring

When the servo drive is powered on, the display will continue to display "pr. on" for about one second, and then automatically enter the status monitoring mode

Type. There are 21 kinds of display status. The user uses ▲ and ▼ keys to select the display status needed. You can also modify the value of parameter P00.03 to select the display state after the servo drive is powered on.

Monitor mode operation block diagram

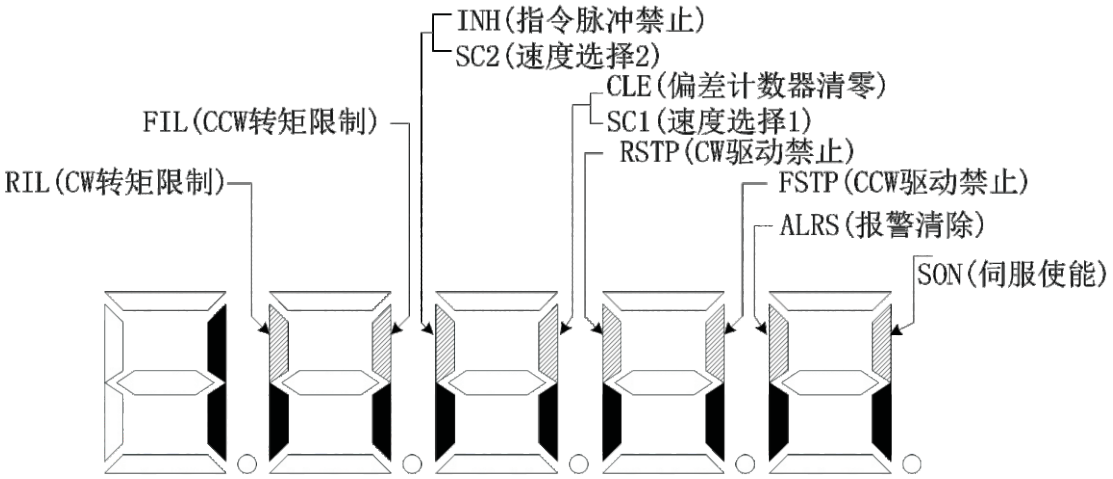
[note 1] r 1000, r is the motor speed code, 1000 means the motor speed is anti-clockwise 1000r/min, if it is clockwise, negative speed -1000 will be displayed. The units are r/min.

[note 2] both position feedback pulse POS and position instruction pulse CPO are values amplified by input electronic gears. The motor encoder feedback position quantity is composed of POS. (high 4 bits) + POS (low 4 bits) :such as: P 12x1000=125806pcs pulse.

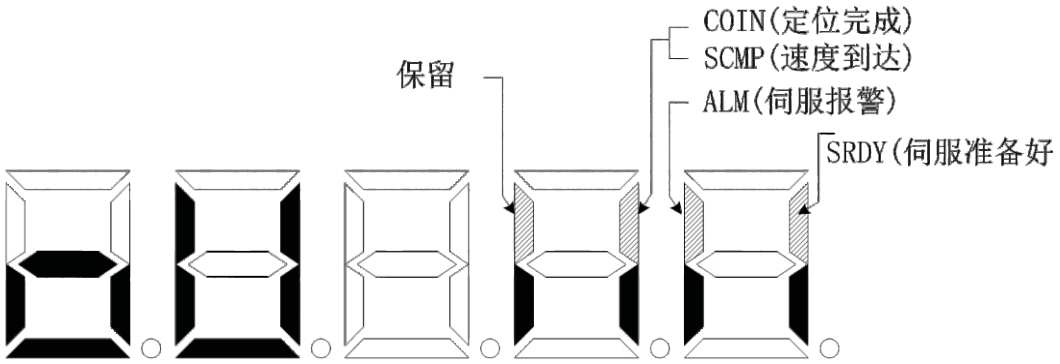
Similarly, the pulse amount of position instruction is also composed of CPO. (high 4 bits) + CPO (low 4 bits),Such as C. 12x10000+C5810=125810pcs pulse

When the encoder is fixed, the Z pulse is fixed as the zero pulse position. D-apo display motor encoder
The pulse value of the output position signal deviating from the zero pulse. If the number of lines of the encoder is 2500, the display range is 0~9999.

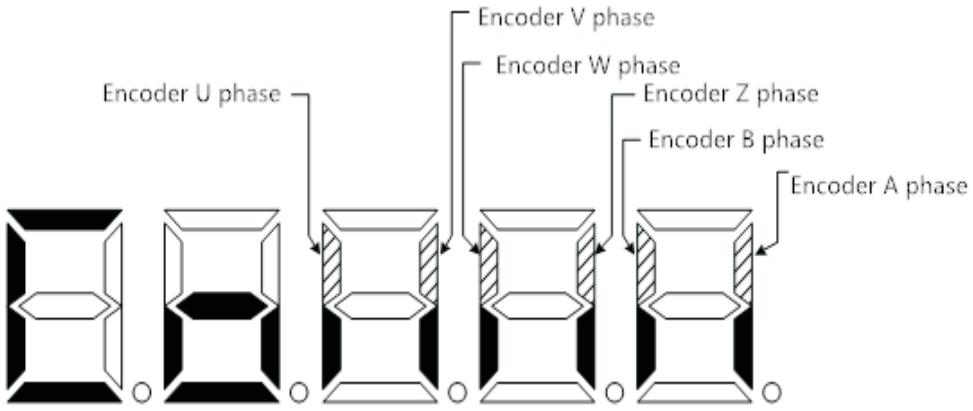
[note 4] the display of input terminal is shown in figure 3-2-2, the display of output terminal is shown in figure 3-2-3, and the display of encoder signal is shown in figure 3-2-1



3-2-1 Input terminal display (ON for stroke, OFF for stroke)



3-2-2 Output terminal display (ON for stroke, OFF for stroke)



3-2-3 Encoder signal display (the stroke is ON, OFF)

【5】Running state is expressed as:

rn- oF：The main circuit is not charged and the servo system is not running.

rn- CH：The main circuit has been charged, the servo system is not running (the servo is not enabled or there is an alarm);

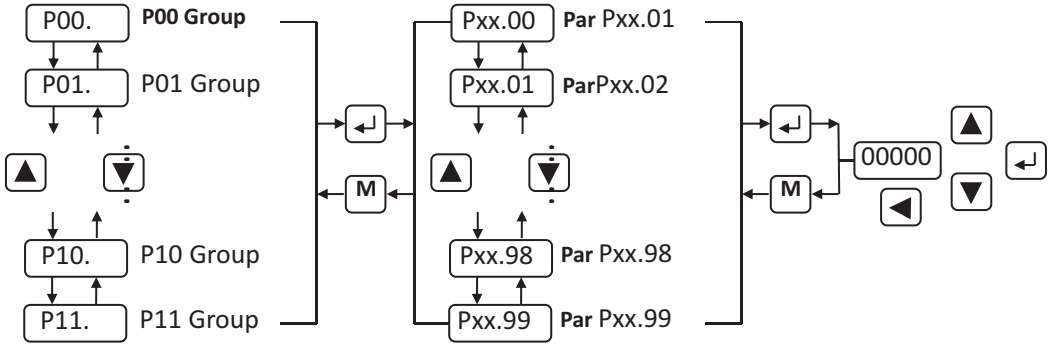
rn- on：The main circuit is charged and the servo system is running.

3.3 parameter setting

Servo drive parameters can be set according to the following steps

1. Press the [M] key in the Layer 1 menu to switch to the "P00." parameter setting mode；
2. Use [▲] and [▼] keys to select different parameter groups P00 ~ P11, press [] key to enter the second layer "parameter number" selection menu；
3. Use 【▲】, 【▼】 key to choose different parameter number. Press [] key to display the value of this parameter, and the lowest value of the parameter flashes. 【 【 【 】 key can move the flicker bit, and 【▲】 and 【 【 【 】 key can modify the parameter value。
4. Press [8] key to save the modified value, and the modified value will be immediately reflected in the control。
5. After that, press [▲] and [▼] keys to continue to modify parameters. After modification, press [M] key to return to the parameter selection menu。

If you are not satisfied with the value being modified, do not press [8] to confirm, but press [M] to cancel, the parameter will be restored to its original value, and return to the parameter selection menu.



3-3-1 Operation block diagram of parameter setting

Chapter 4 Parameter and Function

4.1 List of parameters

The factory values in the table below take the servo driver fitted with 80SFM-E02430 (2.4N•m, 3000r/min) motor as an example.

Note: Parameters with "*" indicate that relevant parameters of drivers matching different motors are different.

4.1.1 P00 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P00.00	Password	0～9999	315	—	P，S
P00.01	Motor Model Code	0～69	07*	—	P，S
P00.02	Software Version (Read Only)	—	*	—	P，S
P00.03	Initial display state	0～20	0	—	P，S
P00.04ξ	Control Strategy Choice	0～10	0	—	P，S
P00.05	Proportional velocity gain	5～2000	300*	Hz	P，S
P00.06	Velocity integral time constant	1～1000	80*	ms	P，S
P00.07	Torque command filter	1～500	30	%	P，S
P00.08	Speed detection low pass filter	1～500	120	%	P，S
P00.09	Position proportional gain	1～1000	100*	1/s	P
P00.10	Position feed forward gain	0～100	0	%	P
P00.11	The cut-off frequency of the position feedforward low-pass filter	1～1200	300	Hz	P
P00.12	Position command pulse frequency dividing molecule	1～32767	10000	—	P
P00.13	Position instruction pulse frequency dividing denominator	1～32767	1000	—	P
P00.14	Position instruction pulse input mode	0～1	0	—	P
P00.15	Reverse the direction of the position instruction pulse	0～1	0	—	P
P00.16	Location completion range	0～30000	20	Pulse	P
P00.17	Position out of tolerance detection range	0～30000	400	×100 Pulse	P
P00.18	Out-of-position errors are invalid	0～1	0	—	P
P00.19	Position command smoothing filter	0～20000	100*	0.1ms	P

4.1.2 P01 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P01.00	Invalid driver disable input	0～1	1	—	P，S
P01.01	JOG running speed	-3000～3000	120	r/min	S
P01.02	Acceleration and deceleration time constants	0～10000	500	ms	S
P01.03	Maximum speed limit	0～6000	3600	r/min	P，S
P01.04	Internal speed 1	-3000～3000	0	r/min	S
P01.05	Internal speed 2	-3000～3000	100	r/min	S
P01.06	Internal speed 3	-3000～3000	300	r/min	S
P01.07	Internal speed 4	-3000～3000	-100	r/min	S
P01.08	On-speed	0～3000	500	r/min	S
P01.09	Retain	—	—	—	—
P01.10	Internal CCW torque limit	0～600	300*	%	P，S
P01.11	Internal CW torque limit	-600～0	-300*	%	P，S
P01.12	External CCW torque limit	0～600	100	%	P，S
P01.13	External CW torque limit	-600～0	-100	%	P，S
P01.14	Speed trial run, torque limit of JOG operation	0～300	100	%	S
P01.15	Retain	—	—	—	—

4.1.3 P02 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P02.00	Analog speed command gain	0～3000	300	（r/min）/ V	S
P02.01	Reverse the direction of the analog speed instruction	0～1	0	—	S
P02.02	Analog speed instruction zero offset compensation	-500～500	0	—	S
P02.03	Analog speed instruction has no control area	-500～500	0	—	S
P02.04	Analog speed command filter	1～1000	300	Hz	S
P02.05	Analog torque command gain	1～300	30	% / V	T
P02.06	Input direction of analog torque instruction is reversed	0～1	0	—	T
P02.07	Analog torque instruction zero offset compensation	-500～500	0	—	T
P02.08	Maximum speed limit for torque control	0～4000	2500	r/min	T
P02.09	Analog torque command filter	1～1000	300	Hz	T
P02.10	Low 4-bit input terminal enforces the ON control word	0～1111	0	—	ALL
P02.11	High 4-bit input terminal enforces the ON control word	0～1111	0	—	ALL
P02.12	Low 4 - bit input terminal takes the reverse control word	0～1111	0	—	ALL
P02.13	High 4 - bit input terminal takes the reverse control word	0～1111	0	—	ALL
P02.14	Output terminal takes the inverse control word	0～1111	0	—	ALL
P02.15	Input terminal to dejitter the time constant	1～1000	16	0.1ms	ALL

4.1.4 P03 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P03.00	Speed trial run	0～1	0	—	S
P03.01	JOG Run	0～1	0	—	S
P03.02	Encoder is zeroed in	0～1	0	—	ALL
P03.03	Open loop run	0～1	0	—	ALL
P03.04	Analog channel zero offset automatic adjustment	0～1	0	—	ALL
P03.05	Retain	—	—	—	—
P03.06	Servo forced enablement	0～1	0	—	ALL
P03.07	System parameter initialization	0～1	0	—	ALL
P03.08	Driver fan switch	0～1	1	—	ALL
P03.09	Reaching output selection	0～4	0	—	ALL
P03.10	Analog speed instruction minimum speed	-500～500	0	r/min	S
P03.11	Mechanical brake release delay	0～30000	100	ms	ALL
P03.12	Servo enable holding time	0～30000	100	ms	ALL
P03.13	Retain	—	—	—	—
P03.14	Servo failure lower axle arm switch	0～1	1	—	ALL

4.1.5 P09 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P09.00 ~ P09.12 are motor communication control parameters that can be read and written					
P09.00	Communication control start and stop	0～1	0	—	ALL
P09.01	4 bits higher operating pulse number (X10000)	-32767～32767	0	pulse	P
P09.02	Run pulse count 4 bits lower	-32767～32767	0	pulse	P
P09.03	Position mode speed	0～3000	0	r/min	P
P09.04	Speed mode speed	-3000～3000	0	r/min	S
P09.05	Torque mode Torque	-300～300	0	%	T
P09.06	Retain	—	—	—	—
P09.07	Retain	—	—	—	—
P09.08	Retain	—	—	—	—
P09.09	Retain	—	—	—	—
P09.10	Retain	—	—	—	—
P09.11	Retain	—	—	—	—
P09.12	EEPROM storage	0-2	0	—	ALL
P09.13 ~ P09.33 are motor running state parameters read only and cannot be written					
P09.13	Current motor speed	—	—	r/min	ALL
P09.14	Current position is 4 digits lower	—	—	Encoder unit	P
P09.15	Current position 4 bits higher (X10000)	—	—	Encoder unit	P
P09.16	Position instruction is 4 bits lower	—	—	Encoder unit	P
P09.17	Position instruction 4 bits high (X10000)	—	—	Encoder unit	P
P09.18	Position deviation is 4 places lower	—	—	Encoder unit	P
P09.19	Position deviation 4 bits higher (X10000)	—	—	Encoder unit	P
P09.20	Current motor torque	—	—	%	T
P09.21	Current motor current	—	—	0.1A	ALL
P09.22	Current bus voltage	—	—	V	ALL
P09.23	Current control mode	—	—	—	ALL
P09.24	Current position instruction pulse frequency	—	—	Pulse	P
P09.25	Current speed instruction	—	—	r/min	ALL
P09.26	Current torque instruction	—	—	%	ALL
P09.27	Absolute position of middle rotor	—	—	Encoder unit	ALL
P09.28ξ	Alarm code	—	—	—	ALL
P09.29	Enter the terminal state SON / ALRS / FSTP / RSTP	—	—	—	ALL
P09.30	Enter the terminal stateCLE / INH / FIL	—	—	—	ALL
P09.31	Output terminal state SDRY / ALM / COIN / SCMP	—	—	—	ALL
P09.32	Encoder input signal ABZ	—	—	—	ALL
P09.33	Encoder input signal WVU	—	—	—	ALL

4.1.6 P11 group list of parameters

No	Name	Setting range	Factory default	Unit	way of application
P11.00	Baud rate	1～6	3	—	ALL
P11.01	Station no.	1～255	1	—	ALL
P11.02	Verify	0～2	0	—	ALL

4.2 Parameter function

4.2.1 P00 group parameters detailed description

No	Name	Function	Parameter range	default
P00.00	Password	① Used to prevent the parameter from being modified by mistake.In general, when you need to set a parameter, first set this parameter to the required password, and then set the parameter.After debugging, finally set this parameter to 0 to ensure that the parameters will not be modified by mistake in the future; ② Password classification, corresponding to user parameters, system parameters and all parameters; ③ To modify the model code parameter (P00.01), the model code password must be used, other passwords cannot modify the parameter; ④ User password is 315;	0～9999	315
P00.01	Motor Model Code	① corresponding to the same series of servo drivers and motors with different power levels; ② Different model codes have different default values of the parameters. When using the function of restoring default parameters, the correctness of the parameters must be guaranteed. ③ When EEPROM alarm (No. 20) occurs, after repair, this parameter must be reset, and then restore the default parameter.Otherwise, it will lead to abnormal operation or damage of the servo drive; ④ When modifying the parameter, set the password before modifying the parameter; ⑤ See this chapter for the detailed meaning of the parameters.	0～69	07*
P00.02	Software version	You can view the software version number, but you cannot modify it.	—	—
P00.03	Initial display state	Select the display state after the servo drive is powered on. 0: Display motor speed; 1: Display the current position is 5 digits lower; 2: Display the current position is 5 bits higher; 3: Display position instruction (instruction pulse accumulation amount) lower 5 bits; 4: Display position instruction (instruction pulse accumulation amount) 5 bits higher; 5: Display position deviation is 5 bits lower; 6: display position deviation is 5 bits higher; 7: Display motor torque; 8: Display bus voltage; 9: Display motor current; 10: Display linear speed; 11: display control mode; 12: Display position instruction pulse frequency; 13: Display speed instruction; 14: Display torque instruction; 15: Display the absolute position of the middle rotor; 16: Display the input terminal status; 17: Display the state of output terminals; 18: Display the input signal of the encoder; 19: Display running status; 20: Display alarm code;	0～20	0
No	Name	Function	Parameter range	default
P00.04	Control Strategy choice	Through this parameter, the control mode of AC servo drive unit can be set: 0: Position control mode; 1: speed control mode; 2: trial operation control mode; 3: JOG control mode; 4: encoder zero adjustment mode; 5: Open loop operation mode (used for testing motor and encoder); 6: External analog speed control mode; 7: External analog torque control mode; 8: Communication location mode 9: Communication speed mode 10: communication torque mode ① Position control mode, position instruction is input from pulse input port; ② Speed control mode, SC1 and SC2 combination to select the internal speed: See P01.04 ~ P01.07 for details. ③ Trial operation control mode, speed instruction from the keyboard input, used for testing AC servo drive unit and motor; ④ Jog point moving mode.After entering JOG, press ↑key and hold, motor runs at JOG speed, release the button, motor stops;Press ↓button and hold, motor reverses according to JOG speed, release the button, motor stops running; ⑤ Encoder zero adjustment mode, used for motor factory to adjust the coding disk zero; ⑥ The external analog mode, with the analog port speed or torque control; ⑦ Communication mode, with 485 ports for communication position, speed, torque control;	0～10	0

P00.05	Proportional velocity gain	① Set the proportional gain of the speed ring regulator; ② The higher the setting value, the higher the gain and the higher the stiffness.Depending on the drive and load conditions.Usually the greater the load inertia, the greater the set value; ③ Under the condition that the system does not produce oscillation, try to set the maximum.	5～2000Hz	300*
P00.06	Velocity integral time constant	① Set the integral time constant of the speed ring regulator; ② The smaller the setting value is, the faster the integration speed is and the greater the stiffness is.Depending on the drive and load conditions.Usually the larger the load inertia, the smaller the set value; ③ Under the condition that the system does not produce oscillation, try to set as small as possible.	1 ～1000ms	80*
P00.07	Torque command filter	① Set the characteristics of the torque command filter.Can suppress the resonance generated by the torque (the motor issued a sharp vibration noise); ② If the motor gives out sharp vibration noise, please reduce this parameter; ③ The smaller the value, the lower the cut-off frequency, the smaller the noise generated by the motor.If the load inertia is large, the set value can be appropriately reduced.The value is too small, resulting in slow response, may cause instability; ④ The higher the value, the higher the cutoff frequency and the faster the response.If higher mechanical rigidity is required, the set point can be increased appropriately.	1～500%	30
P00.08	Speed detection low pass filter	① Set the speed to detect the characteristics of the low-pass filter; ② The smaller the value, the lower the cut-off frequency, the smaller the noise generated by the motor.If the load inertia is large, the set value can be appropriately reduced.The value is too small, resulting in slow response, may cause oscillation; ③ The higher the value is, the higher the cutoff frequency is and the faster the velocity feedback response is.If a higher speed response is required, the setting value can be increased appropriately.	1～500%	120
No	Name	Function	Parameter range	default
P00.09	Position proportional gain	① Set the proportional gain of the position loop regulator; ② The larger the setting value, the higher the gain and stiffness, and the smaller the position lag under the same frequency instruction pulse condition.However, if the value is too large, it may cause oscillation or overshoot. ③ Parameter values are determined according to the specific servo driver model and load conditions.	1～1000 /s	100*
P00.10	Position feed forward gain	① Set the feedforward gain of the position loop; ② When set to 100%, it means that the position lag is always 0 under the instruction pulse of any frequency; ③ With the increase of the feedforward gain of the position loop, the high-speed response characteristics of the control system are improved, but the position loop of the system is unstable and easy to oscillate; ④ Unless a very high response is required, the feedforward gain of the position loop is usually zero.	0～100%	0
P00.11	Cut-off frequency of the position feedforward low-pass filter	① Set the cut-off frequency of the low-pass filter with the position loop feedforward; ② The function of this filter is to increase the stability of compound position control.	1～1200Hz	300
P00.12	Position command pulse frequency dividing molecule	① Set the octave of the position command pulse (electronic gear)； ② In the position control mode, by setting P00.12 parameters and P00.13 parameters, it can be easily matched with various pulse sources to achieve the user's ideal control resolution (that is, Angle/pulse)； ③ P：Number of pulses of input instruction $P \upsilon G \quad N \upsilon C \upsilon 4$； G ： Electronic gear ratio G= frequency division of molecular/Dividing denominator； N：Number of motor turns； C：Photoelectric encoder line number/turn, this systemC = 2500； ④ EX：When the input instruction pulse is 6000, the servo motor rotates 1 turn $G \quad \frac{N \upsilon C \upsilon 4}{P} \quad \frac{1 \upsilon 2500 \upsilon 4}{6000} \quad \frac{5}{3}$ The parameter P00.12 is set to 5, and the parameter P00.13 is set to 3； ⑤The recommended range of electronic gear ratio is 1:50 ≤G ≤50 ;	1～32767	10000
P00.13	Position instruction pulse frequency dividing denominator		1～32767	1000

P00.14	Position instruction pulse input mode	① Set the input form of the position instruction pulse; ② One of the two input methods is set by the parameter: Set to 0: Pulse + direction; Set to 1: A + B orthogonal pulse; ③ CCW is viewed from the axial direction of the motor and turns to the positive direction in the counterclockwise direction; ④ CW is viewed from the axial direction of the motor, clockwise to reverse.	0～1	0
P00.15	Direction of the position instruction is reversed	① Set to 0: Normal; 1: Reverse direction of position instruction pulse.	0～1	0
P00.16	Location completion range	① Set the pulse range under the position control; ② This parameter provides the basis for the servo driver to determine whether the positioning is completed under the position control mode.When the number of remaining pulses in the position deviation counter is less than or equal to the set value of this parameter, the servo driver will consider the positioning completed and the signal will be COIN ON, otherwise COIN OFF. ③ In the position control mode, the output position completes the signal COIN, in the other control mode, the output speed reaches the signal SCMP.	0～30000 Pulse	20
P00.17	Position out of tolerance detection range	① Set the detection range of position out of tolerance alarm; ② In the position control mode, when the value of the position deviation counter exceeds the value of this parameter, the servo driver will give an alarm for the position deviation.	0～30000 ×100Pulse	400
No	Name	Function	Parameter range	default
P00.18	Out-of-position errors are invalid	Set to 0: the position out-of-tolerance alarm detection is effective; Set to 1: The detection of position out of tolerance alarm is invalid, and the detection of position out of tolerance error is stopped.	0～1	0
P00.19	Position command smoothing filter	(1) The instruction pulse is smoothed and filtered with exponential acceleration and deceleration, and the numerical value represents the time constant.When set to 0, the filter does not work. (2) The filter will not lose the input pulse, but it will have the phenomenon of instruction delay; ③ This filter is used for ⌘ l upper controller without deceleration function or low order frequency; ⌘ l electronic gear larger frequency doubling (& gt;10); ⌘ Stepping and jumping and unstable phenomenon appear when the motor is running;	0～30000 ×0.1ms	100*

4.2.2 **P01** group parameters detailed description

No	Name	Function	Parameter range	default
P01.00	Invalid driver disable input	0：CCW、CW Input forbidden valid； When FSTP is ON, CCW driver allows; When FSTP is OFF, the torque in CCW direction remains 0. When the RSTP is ON, the CW driver allows it. When RSTP is OFF, the torque in CW direction remains 0. When both FSTP and RSTP are OFF, a driver ban error alarm will be generated. 1： Cancel CCW, CW input prohibitions; CCW and CW drivers are allowed regardless of FSTP and RSTP switching status. FSTP, RSTP are OFF, there will be no driver prohibited input error alarm.	0~1	1
P01.01	JOG running speed	①Sets the speed of the JOG operation.	-3000~3000	120
P01.02	Speed mode acceleration and deceleration time constant	① The setting value is the acceleration time of the motor from 0 to 1000 r/min; ② Acceleration and deceleration characteristics are linear; ③ Only used for speed control mode, position control mode is invalid; ④ Set to 0 if the servo drive is used in combination with an external position ring.	1～10000ms	500
P01.03	Maximum speed limit	① The maximum speed limit of the servo motor is set, which has nothing to do with the direction of rotation; ② If the setting value exceeds the rated speed, the actual speed limit is the rated speed.	0～6000 r/min	3600
P01.04	Inner speed 1	SC1 OFF ， SC2 OFF ： Inner speed 1；	-3000～3000 r/min	0
P01.05	Inner speed 2	SC1 ON ， SC2 OFF ： Inner speed 2；		100
P01.06	Inner speed 3	SC1 OFF ， SC2 ON ： Inner speed 3；		300
P01.07	Inner speed 4	SC1 ON ， SC2 ON ： Inner speed 4。		-100

P01.08	On-speed	① Set the arrival speed and has nothing to do with the direction of rotation; ② In the non-position control mode, if the motor speed exceeds the set value, then SCMP ON, otherwise SCMP OFF; ③ In the position control mode, this parameter is not used; ④ The comparator has the hysteresis characteristic.	0～3000 r/min	500
P01.10	Internal CCW torque limit	① Set the internal torque limit value of the servo motor in the CCW direction; ② The setting value is the percentage of the rated torque; ③ This restriction is valid at all times; ④ If the setting value exceeds the maximum allowable system overload capacity, the actual torque limit is the maximum allowable system overload capacity.	0～600%	300
No	Name	Function	Parameter range	default
P01.11	Internal CW torque limit	① Set the internal torque limit value of the servo motor in CW direction; ② The setting value is the percentage of the rated torque; ③ This restriction is valid at all times; ④ If the setting value exceeds the maximum allowable system overload capacity, the actual torque limit is the maximum allowable system overload capacity.	-600%～0	-300
P01.12	External CCW torque limit	① Set the external torque limit value of the servo motor in the CCW direction; ② The setting value is the percentage of the rated torque; ③ Only valid when the CCW torque limit input terminal (F/RIL) ON; ④ When the restriction is effective, the actual torque limit is the minimum of the maximum allowable overload capacity of the system, internal CCW torque limit and external CCW torque limit.	0～600%	100
P01.13	External CW torque limit	① Set the external torque limit value in the CW direction of the servo motor; ② The setting value is the percentage of the rated torque; ③ Only valid when CW torque limit input terminal (F/RIL) ON; ④ When the restriction is effective, the actual torque limit is the minimum absolute value of the maximum allowable overload capacity of the system, internal CW torque limit and external CW torque limit.	-600%～0	-100
P01.14	Speed trial run, JOG operating torque limit	① Set the torque limit value in the speed trial run and JOG operation mode; ② Independent of the direction of rotation, two-way effective; ③ The setting value is the percentage of the rated torque, 1 times the rated torque, set to 100; ④ Internal and external torque limits remain in effect.	0～300%	100

4.2.3 **P02** group parameters detailed description

No	Name	Function	Parameter range	default
P02.00	Analog speed command gain	Set the analog speed input voltage and motor speed proportional relationship.	0～3000	300
P02.01	Analog speed instruction The input direction is reversed	Set to 0: when the speed instruction of analog quantity is positive, the speed direction is CCW; Set to 1: When the speed instruction of the analog quantity is positive, the speed direction is CW.	0～1	0
P02.02	Analog speed zero offset compensation	Zero offset compensation for the analog speed input.	-500～500	0
P02.03	The simulated velocity has no action zone	The instruction is 0 when the input voltage of analog speed is located in the uncontrolled action zone.	-500～500	0
P02.04	Analog speed command filter	① Low pass filter for analog velocity input; ② The larger the setting value is, the faster the response speed of the input analog quantity is, and the greater the influence of signal noise is.The smaller the setting value is, the slower the response speed is and the less the influence of signal noise is.	1～1000	300
P02.05	Analog torque command gain	Set the proportional relationship between the analog torque input voltage and the motor torque	10～600	100
P02.06	Input direction of analog torque instruction is reversed	Set to 0: when the analog torque instruction is positive, the torque direction is CCW; Set to 1: When the analog torque instruction is positive, the torque direction is CW.	0～1	0
P02.07	Analog torque instruction zero offset compensation	Zero offset compensation for the analog torque input.	-500～500	0
P02.08	Maximum speed limit for torque control	① In torque control, motor running speed is limited within this parameter; ② It can prevent the phenomenon of overspeed under light load.	0～4000	2500
P02.09	Analog torque command filter	Low pass filter for analog torque input. The larger the setting value is, the faster the response speed to the torque input analog quantity is, and the greater the influence of signal noise is. The smaller the setting value is, the slower the response speed is and the less the influence of signal noise is.	1～1000	300

No	Name	Function	Parameter range	default
P02.10	Low 4-bit input terminal enforces the ON control word	①Set the input terminal internal force ON to be effective.It is represented as a 4-bit binary number, with 0 for non-enforced ON and 1 for enforced ON. Position 0: SON servo enabling; Bit 1: ALRS alarm clearance; Bit 2: FSTP CCW driver disabled; Bit 3: RSTP CW driver disabled.	0000～1111	0
P02.11	High 4-bit input terminal enforces the ON control word	①Set the input terminal internal force ON to be effective.It is represented as a 4-bit binary number, with 0 for non-enforced ON and 1 for enforced ON. Bit 0: CLE/SC1 Deviation Counter Clearing/Speed Selection 1; 1 bit: INH/SC2 instruction pulse disable/speed select 2; 2 bits: FIL CCW torque limit; 3 bits: RIL CW torque limit.	0000～1111	0
P02.12	Low 4 - bit input terminal takes the reverse control word	Sets input terminal inverse.It is represented by a 4-bit binary number, 0 for no inversion and 1 for inversion.The binary number represents the following input terminals: Position 0: SON servo enabling; Bit 1: ALRS alarm clearance; Bit 2: FSTP CCW driver disabled; Bit 3: RSTP CW driver disabled.	0000～1111	0
P02.13	High 4 - bit input terminal takes the reverse control word	Sets input terminal inverse.It is represented by a 4-bit binary number, 0 for no inversion and 1 for inversion.The binary number represents the following input terminals: Bit 0: CLE/SC1 Deviation Counter Clearing/Speed Selection 1; 1 bit: INH/SC2 instruction pulse disable/speed select 2; 2 bits: FIL CCW torque limit; 3 bits: RIL CW torque limit.	0000～1111	0
P02.14	Output terminal takes the inverse control word	It is represented by a 4-bit binary number, 0 for no inversion and 1 for inversion. Position 0: SRDY servo ready; Position 1: ALM servo alarm; 2 bits: Coin positioning completed/speed arrival; Position 3: BRK mechanical brake release.	0000～1111	0
P02.15	Input terminal to dejitter the time constant	The input terminal to jitter filtering time. The smaller the value, the faster the terminal input response; The higher the value, the better the anti-jamming performance of the terminal input, but the slower the response.	1～1000	16

4.2.4 **P03** group parameters detailed description

No	Name	Function	Parameter range	default
P03.00	Speed trial run	Set to 1, and press SET key to enter the speed trial run, the speed is SET by the key.	0～1	0
P03.01	JOG Run	Set to 1, and press SET key to enter JOG operation, the speed is SET by the key.	0～1	0
P03.02	Encoder is zeroed in	The encoder zero adjustment function is used by the motor manufacturer.	0～1	0
P03.03	Open loop run	Open loop operation mode is used by motor manufacturers.	0～1	0
P03.04	Analog channel zero offset automatic adjustment	① Set whether the analog channel automatic adjustment function can be enabled, the driver will automatically correct the zero drift voltage of the analog channel; ② The adjusted zero drift value will be automatically stored in the corresponding function codes (P02.02 and P02.07).	0～1	0
P03.05	Retain	—	—	—
P03.06	Servo forced enablement	Set to 0: SON is determined by IO port input signal; Set to 1: SON will be forced to be ON (independent of the input signal).	0～1	0
No	Name	Function	Parameter range	default
P03.07	System parameter initialization	Set the value to 1 to restore all parameters to their default (factory) values. Because different driver and motor models have different default values, you must ensure that the model code (P00.01) is correct before using the default parameters.	0～1	0
P03.08	Driver fan switch	Set 0, fan off, set 1, fan on. For factory test use.	0～1	1

P03.09	Reaching output selection	Set 0: Default output according to P00.04 control mode. The arrival port is used for position arrival in position mode, speed arrival in speed mode, and torque arrival in torque mode. Set 1: The fixed output position of the port is reached (the positioning completion range is compared with the deviation counter), the deviation value is less than or equal to the positioning completion range, and the port is output ON; Set 2: the fixed output speed of the port is reached (compared with the actual speed set by the arrival speed). The actual speed is within ±10 RPM of the arrival speed set, and the port is output ON; Set 3: When the port fixed output torque reaches (the analog instruction torque is compared with the actual torque), the port outputs ON within ±1% of the actual torque reaches the analog torque instruction; Set 4: the fixed output torque of the port is reached (comparing the given communication torque with the actual torque) and the actual torque is within the communication set torque (P09.05) ±1%, and the port output is ON;	0～4	0
P03.10	Analog speed instruction minimum speed	Used as the minimum speed limit, i.e., take-off speed, for analog speed control. When the analog speed instruction is lower than this speed, the motor will not operate.	-500～500	0
P03.11	Mechanical brake release delay	When enabled, the time set by the motor brake delay is released.	0～30000	100
P03.12	Servo enable holding time	When the enabling is turned off, the motor coil delay time is set and then the power is lost.	0～30000	100
P03.13	Retain	—	—	—
P03.14	Servo failure lower axle arm switch	Manufacturer test, users do not need to change.	0～1	1

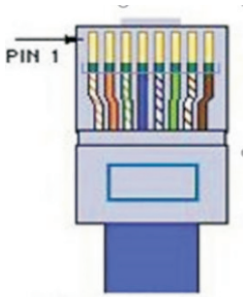
4.2.5 **P09** group parameters detailed description

No	Name	Function	Parameter range	default
P09.00 ~ P09.12 are motor communication control parameters that can be read and written				
P09.00	Communication control start and stop	Set to 1, the communication control mode starts; Set to 0, the communication control mode stops; After all parameters are set, set to 1, which is equivalent to the start button, and set to 0, which is equivalent to the stop button. In communication position mode, when the motor completes the target pulse number will jump to 0.	0～1	0
P09.01	4 bits higher in pulse number of communication operation (X10000)	Set the high number of operating pulses in the communication position mode, and set 1 to represent the number of 10000 pulses. In the communication position mode, set the total pulse =P09.01*10000+P09.02.	-32767～32767	0
P09.02	Pulse number of communication operation is 4 bits lower	Set the low position of operating pulse number in communication position mode, and set 1 to represent 1 pulse number. In communication position mode, set the total pulse =P09.01*10000+P09.02.	-32767～32767	0
P09.03	Communication location mode speed	Set the motor running speed in communication position mode.	0～3000	0
P09.04	Communication speed mode speed	Set the motor running speed in communication speed mode.	-3000～3000	0
P09.05	Communication Torque Mode Torque	Set the motor operating torque in communication torque mode.	-300～300	0
P09.06	Retain	—	—	—
P09.07	Retain	—	—	—
P09.08	Retain	—	—	—
P09.09	Retain	—	—	—
No	Name	Function	Parameter range	default
P09.10	Retain	—	—	—
P09.11	Retain	—	—	—
P09.12	EEPROM storage	Set 1, save the communication setting parameters to the power outage holding area, and the return value 2 is successfully saved.	0～2	
P09.13 ~ P09.33 are motor running state parameters read only and cannot be written				
P09.13	Current motor speed	For user communication to read the current real-time speed of the motor.	-3000～3000	—
P09.14	Current position is 4 digits	For users to read the real-time feedback position of the motor encoder.	-32767～32767	—

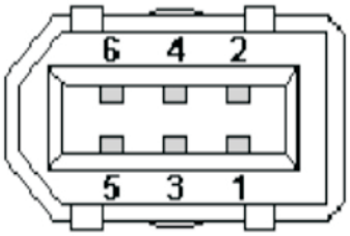
	lower	Position feedback value =P09.15*10000+P09.14 The position feedback value is based on the encoder unit.		
P09.15	Current position is 4 bits higher（X10000）	For users to read real-time motor encoder feedback position high. Position feedback value =P09.15*10000+P09.14 The position feedback value is based on the encoder unit.	-32767～32767	—
P09.16	Position instruction is 4 bits lower	For user communication to read the real-time position instruction received by the driver. Number of position instruction pulses =P09.17*10000+P09.16 The number of position command pulses is based on the amplified value of the electronic gear.	-32767～32767	—
P09.17	Position instruction is 4 bits higher（X10000）	It is used for user communication to read the real-time position instruction high level received by the driver. Number of position instruction pulses =P09.17*10000+P09.16 The number of position command pulses is based on the amplified value of the electronic gear.	-32767～32767	—
P09.18	Position deviation is 4 places lower	For user communication to read driver deviation counter real-time follow the low value of the difference. Position deviation =P09.19*10000+P09.18 The deviation value is based on the encoder unit.	-32767～32767	—
P09.19	Position deviation is 4 places higher（X10000）	For user communication to read driver deviation counter real-time follow the low value of the difference. Position deviation =P09.19*10000+P09.18 The deviation value is based on the encoder unit.	-32767～32767	—
P09.20	Current motor torque	For users to read the real time torque percentage of the motor communication.	-300～300	—
P09.21	Current motor current	For users to communicate and read the real-time current of the motor (unit 0.1A).	0～32767	—
P09.22	Current bus voltage	For users to read real-time bus voltage of the driver communication.	0～32767	—
P09.23	Current control mode	For user communication to read the current control mode of the drive.	0～10	—
P09.24	Current position pulse frequency	Non-effect	—	—
P09.25	Current speed instruction	For user communication to read the current speed instruction value of the driver.	-3000～3000	—
P09.26	Current torque instruction	For user communication to read the current torque instruction value of the driver.	-300～300	—
P09.27	Absolute position of middle rotor	For users to read the absolute position of the rotor in a single turn of the motor.	0～32767	—
P09.28	Alarm code	For user communication to read the current alarm state of the drive. Alarm code meaning refer to the alarm list.	0～32	—
P09.29	Enter the terminal state SON/ALRS/FSTP/RSTP	For user communication to monitor the current input terminal status of the driver. SON（/ALRS/FSTP（CCWDirection is prohibited）/RSTP（CW Direction is prohibited）	0000～1111	—
P09.30	Enter the terminal state CLE / INH / FIL	For user communication to monitor the current input terminal status of the driver. CLE/INH/FIL	0000～0111	—
P09.31	Output terminal state SDRY / ALM / COIN|SCMP	For user communication to monitor the current state of the output terminal of the driver. SDRY/ALM/COIN/ SCMP	0000～1111	—
P09.32	Encoder input signal ABZ	For user communication to monitor the current encoder interface terminal state of the driver.	0000～0111	—
P09.33	Encoder input signal WVU	For user communication to monitor the current encoder interface terminal state of the driver.	0000～0111	—

Chapter 5 Communication Control

5.1 Communication interface



KA02、KA03、KA05



KA10、KB05、KB10、KB15

communication interface	485A send pin	485B send pin	GND Pin
RJ45 net opening	5	6	4
1394 socket	6	5	2
The communication distance of the twisted shielded wire can be up to 500m, and the normal use is recommended within 300m.			

5.2 P11 group communication parameters detailed description

No	Name	Function	Parameter range	default
P11.00	Baud rate	Set 1，2400bps； Set 2，4800bps； Set 3，9600bps； Set 4，19200bps； Set 5，38400bps； Set 6，57600bps； When communicating master-slave control, the baud rate setting of the servo slave station must be consistent with that of the master station.	1～6	3
P11.01	Station No.	In communication master-slave control, the communication station number of the servo slave station is the unique identification to distinguish the control objects.	1～255	1
P11.02	checkout	Set0，None Set1，Odd Set2，Even When communicating with master slave control, the calibration mode of servo slave station must be set in accordance with that of master station.	-32767～32767	0

Note: This product has 8 data bits and 1 stop bit by default. The user controller needs to set 8 data bits and 1 stop bit.

5.3 communication protocol

The servo driver is embedded with the standard Modbus RTU communication protocol, which supports the operation of single or multiple parameters read and write by the Modbus RTU master station. When the controller with Modbus protocol is successfully connected with the servo driver, the controller can directly set the parameters of the servo driver, read the state and other operations.

When the servo driver is in the communication control mode, the controller can modify the operating instruction parameters in real time to change the motor running position, speed, torque, etc. Modbus RTU protocol has a variety of bus commands, and the servo driver supports three of the most commonly used commands. These three commands can satisfy the controller to control the servo driver in all directions. Specific function codes are shown in the following table.

CMD	Function code meaning
03H	Read single or consecutive parameter registers
06H	Write a single parameter register
10H	Write to successive parameter register

In order to facilitate the Modbus controller to read and write the parameters of the driver, the driver corresponds the parameter number to the Modbus address of the corresponding device. The parameter P00.00 of the driver corresponds to the address 40001 in the Modbus, that is, the address of register 0 with the address offset from 40001. The rest will be postponed. For example, parameter P01.03 is the maximum speed limit parameter, then this parameter corresponds to register address No. 103, whose Modbus address is offset from 40001. Operation results of data whose Modbus address is (40001+103) correspond to parameter No. P01.03.

Read single or multiple registers (03H code)

The following request frame reads P09.13 (feedback speed) data from a drive whose address (station number) is 01. Parameter P09.13 address 913 (convert hex 0391H).

Request frame format:

Format	From the station address	Function code	High starting address	Starting address low	Read high number	Read number low	CRC check high position	CRC check low position
	1byte	1byte	2byte		2byte		2byte	
Eg	01H	03H	03H	91H	00H	01H	CRC checkout	

If read successfully, reply frame format: if the feedback speed is 0

Format	From the station address	Function code	Data byte length	High starting address	Starting address low	CRC check high position	CRC check low position
	1byte	1byte	1byte	2byte		2byte	
Eg	01H	03H	02H	00H	00H	CRC checkout	

Write a single register (06H code)

The following request frame indicates that the speed value is written from the address (station number) of 01 to the drive P09.04 (operation speed in communication speed mode). Parameter P09.04 address 904 (convert hexadecimal 0388H). Write speed 500 (convert hexadecimal 01F4H).

Request frame format:

Format	From the station address	Function code	Write address high	Write address low	Write data high	Write data low	CRC check high position	CRC check low position
	1byte	1byte	2byte		2byte		2byte	
Eg	01H	06H	03H	88H	01H	F4H	CRC 校验	

If read successfully, reply frame format:

Format	From the station address	Function code	Is written to address high	Is written to address Low	data is written high	data is written Low	CRC High	CRC Low
	1byte	1byte	2byte		2byte		2byte	
Eg	01H	06H	03H	88H	01H	F4H	CRC 校验码	

Write multiple registers consecutively (10H code)

The following request frame indicates that the operation pulse value is written from the communication address (station number) of 01 to drives P09.01 (X10000, 4 bits higher for the operation pulse number in communication position mode) and P09.02 (4 bits lower for the operation pulse number in communication position mode). Parameter P09.01 address 901 (converted hexadecimal 0385H).

P09.01 write 1 (convert hexadecimal 0001H); P09.02 write 5000 (convert hexadecimal 1388H).

Request frame format:

Format	From the station address	Function code	Write the starting address high	Write the starting addres s low	Write a high number of contiguou s addresses	Writes the low number of contiguous addresses	Numb er of bytes written	starting address data is high	starting address data is low	Start address +1 data high	Start address +1 data Low	CR C high	CRC low
	1byte	1byte	2byte		2byte		1byte	2byte		2byte		2byte	
Eg	01H	10H	03H	85H	00H	02H	04H	00H	01H	13H	88H	CRC	

If the contiguous address is written successfully, reply frame format:

Format	From the station address	Function code	Is written to address high	Is written to address low	High number of contiguous addresses written	Low number of contiguous addresses written	CRC high	CRC low
	1byte	1byte	2byte		2byte		2byte	
Eg	01H	06H	03H	88H	01H	F4H	CRC check code	

5.4.1 Communication position control mode

Workflow Process Definition Language
Modbus_RTU protocol 485 half duplex communication control servo according to the number of pulses and speed positioning operation.

Object Directory

Register address	Name	Parameter range	Unit	factory default
4	Control mode selection	0～10	—	0
900	Start stop	0～1	—	0
901	number of pulses in communication position mode is 4 bits higher	-32767～32767	Pulse（*10000）	0
902	number of pulses in communication position mode is 4 bits lower	-32767～32767	Pulse	0
903	Operation speed of communication position mode	0～3000	r/min	0

For example：

Suppose the control motor performs 11000 pulse positioning controls at the running speed of 100r/min (the total number of pulses in operation is 11000 =1*10000+1000)。

If the total number of pulses is positive, the rotation is positive; if the total number of pulses is negative, the rotation is reversed. Assuming the slave station number is 1, the Modbus_RTU command controls as follows;

※Start and stop (address 900), which should be set to 1 after all parameters are set, is equivalent to the start button, and set to 0 is equivalent to the stop button. In the internal position mode, when the motor completes the target pulse number, the motor stops, and the address 900 is automatically set to 0.

1:Set the operating mode to internal location mode: change P00.04 to 8 on the panel, or write 8 on the address 4。

The host sends data to the servo 01 06 00 04 00 08 C9 CD

2:Set the number of pulses to run: address 901 and 902 write the number of pulses you want to run。

Set the operating pulse count four lower: the host sends data to the servo 01 06 03 86 03 E8 68 D9

Set the operating pulse number four higher: the host sends data to the servo 01 06 03 85 00 01 59 A7

3:Set the running speed: address 903 write speed value 100。

The host sends data to the servo 01 06 03 87 00 64 38 4C 4:Start/stop running: address 900 write 0 stop, write 1 start。

Start location: the host sends data to the servo 01 06 03 84 00 01 08 67

Stop location: the host sends data to the servo 01 06 03 84 00 00 C9 A7

5.4.2 Communication speed control mode

Workflow Process Definition

The user can control the servo at the set speed through MODBUS_RTU protocol 485 half duplex communication.

Object Directory

Register address	Name	Parameter range	Unit	factory default
4	Control mode selection	0～10	—	0
900	Start stop	0～1	—	0
904	Communication speed mode running speed	-3000～3000	r/min	0

For Example

If the control motor runs at 100r/min in positive rotation. (904 running speed is positive, it is positive, the target speed is negative, it is reverse). Assuming that the slave station number is 1, the Modbus 485 command is controlled as shown in the table below；

※Start and stop (address 900) should be set to 1 after all parameters are set, which is equivalent to the start button. Set it to 0, which is equivalent to the stop button. In speed mode, set 1 to run, and set 0 to stop。

1:Set the operating mode to communication speed mode: change P00.04 to 9 on the panel, or write 9 on the address 4。

The host sends data to the servo 01 06 00 04 00 09 08 0D

2:Set communication speed mode running speed: correspondence address 904 write speed value 100。

The host sends data to the servo 01 06 03 88 00 64 08 4F

3:Start/stop running: communication will write address 900 0 to stop, write 1 to start。Start: the host sends data to the servo 01 06 03 84 00 01 08 67

Stop: The host sends data to the servo 01 06 03 84 00 00 C9 A7

5.4.3 Communication torque control mode

Workflow Process Definition

The user can control the servo by modbus_RTU protocol 485 half duplex communication at the set torque operation.

Object Directory

Register address	Name	Parameter range	Unit	factory default
4	Control mode selection	0～10	—	0
900	Start stop	0～1	—	0
905	Communication Torque Mode Operating Torque	-300～300	%	0
208	Maximum speed limit for torque control	0～4000	r/min	2500

For example：

If the control motor runs at 30% of the rated torque, the maximum speed limit is 500. (If 905 operating torque is positive, it is positive; if 905 operating torque is negative, it is reverse). Assuming that the slave station number is 1, the Modbus 485 command is controlled as shown in the table below:

※Start and stop (address 900) should be set to 1 after all parameters are set, which is equivalent to the start button. Set it to 0, which is equivalent to the stop button. In torque mode, set 1 to run and set 0 to stop.

1.Set the operating mode to communication torque mode: change P00.04 to 10 on the panel, or write 10 on the address 4

The host sends data to the servo 01 06 00 04 00 0A 48 0C

2.Set communication torque mode operation torque: communication address 905 write the torque value of 30%

The host sends data to the servo 01 06 03 89 00 1E D8 6C

3.Set the maximum speed of communication torque mode: communication will address 208 write the maximum speed value of 500

The host sends data to the servo 01 06 00 D0 01 F4 88 24

4.Start/stop running: communication will write address 900 0 to stop, write 1 to start

Start：The host sends data to the servo 01 06 03 84 00 01 08 67

Stop：The host sends data to the servo 01 06 03 84 00 00 C9 A7

Chapter 6 Alarm and Handling

6.1 Alarm list

The servo driver has a variety of protection functions. When the fault is detected after power on, the servo driver will stop the motor running, and the alarm code will be displayed on the operation panel**Er-xx**。 You can also go to the D-Err menu，View the current alarm code. Users can refer to the relevant contents of this chapter according to the alarm code to understand the cause of the fault and troubleshoot the fault.

6-1 Alarm list

alarm code	Alarm name	Content
--	Normal	
1	Over speed	servo motor speed exceeds the set value
2	Main circuit over voltage	main circuit supply voltage is too high
3 \	main circuit under voltage	Main circuit power supply voltage is too low
4	Position error	position deviation counter exceeds the set value
5	Motor overheating	Motor temperature is too high
6	Speed amplifier saturation failure	speed regulator saturates for a long time
7	Driver disable exception	CCW and CW drive are OFF
8	Position deviation counter overflow	absolute value of the position deviation counter is greater than 2^30
9	Encoder failed	Encoder signal error
10	Control under voltage of power supply	Control power supply 15V is low
11	IPM module failure	IPM Intelligent module fault
12	Over current	Excessive motor current
13	overload	Ac servo drive unit and motor overload (instantaneous overheating)
14	Braking fault	Brake circuit fault
15	Encoder count error	Encoder count exception
16	Motor thermal overload	Electrical and mechanical heating value exceeds the set value (I2t test)
19	Thermal reduction	system was reset by heat
20	EEPROM error	EEPROM error
23	IU,IV Current sampling anomaly	IU,IV Current sampling anomaly
25	Bus soft startup timeout	Bus soft startup timeout
30	encoder Z pulse is lost	Encoder Z pulse error
31	Encoder UVW signal error	Encoder UVW signal error or mismatch with encoder
32	Illegal encoder UVW signal encoding	UVW signals exist at all high or all low levels

6.2 Alarm processing method

6-2 Alarm processing method

Alarm code	Alarm name	Run status	Reason	Handling method
1	Overspeed	Appears when the control power is switched on	Control board failure	Change driver
			Motor encoder failure	Change motor
		Occurs during motor operation	Input instruction pulse frequency is too high	Correctly set the input instruction pulse
			Acceleration/deceleration time constant is too small	Increase the acceleration/deceleration time constant
			Input electronic gear ratio is too large	Setting up correctly
			Motor encoder failure	Change motor
			Bad encoder cable	Change Encoder cable
			Servo system is unstable, causing overshoot	Reset the relevant gain
		Motor appears when it is just started	Excessive load inertia	①Reduce the load inertia ②Replace high-power drives and motors
			Encoder zero error.	① Replace the servo motor ② Please reset the encoder zero
			① The motor U, V, W leads are connected wrong ② The encoder cable lead is connected wrong	Correct connection
2	Overvoltage of main circuit	Appears when the control power is switched on	Circuit board fault	Change driver
		Appears when the main power is switched on	①The power supply voltage is too high ② The power supply voltage waveform is abnormal	Check the power supply
		Occurs during motor operation	Brake resistance wiring disconnected	rewiring
			Damaged brake transistor or brake resistor	Change driver
			Brake circuit capacity is insufficient	① Reduce the start and stop frequency ② Increase the acceleration/deceleration time constant ③ Reduce the torque limit value and load inertia ④ Replace high-power drives and motors
3 ξ	Main circuit	Appears when the main	⌘ Circuit board failure	Change driver

	undervoltage	power is switched on	⌘ Power supply insurance damage ⌘ Soft start circuit failure ⌘ The rectifier is damaged	
			①Low Ignition Power Supply ②Temporary power outage of more than 20mS	Check the power supply
		Occurs during motor operation	Power supply capacity is not enough, or instantaneous power loss	Check the power supply
			Radiator overheating	Check the load
4	Position error	Appears when the control power is switched on	Circuit board fault	Change driver
		Connect the main power supply and control line, input instruction pulse, motor does not rotate	①The motor U, V, W leads are connected wrong ②The encoder cable lead is connected wrong	Correct connection
			Encoder failed	Change motor
			Set position out of tolerance detection range is too small	Increase the detection range of position out of tolerance
			Position proportional gain is too small	Increase mana gain
			Lack of torque	① Check the torque limit value ② Reduce the load capacity ③ Replace high-power drives and motors
			Command pulse frequency is too high	reducing work frequency
Alarm code	Alarm name	Run status	Reason	Handling method
5	Motor Overheating	Appears when the control power is switched on	Circuit board fault	Change driver
			①Cable bolt ②Temperature relay in motor is damaged	①Check cable ②Check mtoor
		Occurs during motor operation	Motor overloaded.	①Reduce load, reduce start/stop frequency ②Reduced torque limit and associated gain ③Replace high-power drives and motors
			Motor internal failure	Change driver
6	Speed amplifier saturation failure	Occurs during motor operation	Motor was mechanically jammed	Check the mechanical part of the load
			Load is too large	①Reduce the load ②Replace high-power drives and motors

7	FSTP	—	CCW、CW Drivers are forbidden to disconnect	Check the power supply for wiring and input terminals
8	Position deviation counter overflowed	—	①motor was mechanically jammed ②Input instruction pulse is abnormal	①Check the mechanical part of the load ②Check instruction pulse ③Whether the motor is operated by command pulse
9	Encoder Error	—	Encoder wiring error	Check the wiring
			Encoder damaged	Change motor
			Bad encoder cable	Change cable
			Encoder cable is too long, resulting in low power supply voltage of encoder.	① Shorten the cable ②Adopt multi-core parallel power supply
10	Excessive drive temperature	—	①The drive cooling fan does not rotate ②The drives are arranged too tightly ③The ambient temperature of the drive is too high	①Replace the servo driver ② Reasonably set the driver installation spacing ③Reasonable heat dissipation of the cabinet
11	Power module failure	Appears when the control power is switched on	Circuit board fault	Change driver
		Occurs during motor operation	①Low supply voltage ②overheating	①Power on reset ②Reasonable heat dissipation
			Short circuit between drive U, V, W	Check the wiring
			Imperfect earth	Change motor
			Motor insulation damage	Change motor
			Be disturbed	Add line filters, away from the source of interference
12	Over current	—	Short circuit between drive U, V, W	Check the wiring
			Imperfect earth	Correct grounding
			Motor insulation damage	Change motor
			Driver damaged	Change motor
13 ξ	overload	Appears when the control power is switched on	Circuit board fault	Change driver
		Occurs during motor operation	Run over rated torque	①Check the load ②Reduce the start and stop frequency ③Reduce the torque limit value ④ Replace the high-power driver and motor
			Keep the brakes closed	Check holding brake
			Motor oscillates unsteadily	①Adjust the gain ②Increase acceleration/deceleration time ③Reduce load inertia
			①Drives U, V, W are disconnected ②Encoder wiring error	Check the wiring

Alarm code	Alarm name	Run status	Reason	Handling method
14	BRAKING FAULT	Appears when the control power is switched on	Circuit board fault	Change driver
		Occurs during motor operation	Brake resistance wiring disconnected	Rewiring
			Damaged brake transistor or brake resistor	Change driver
			Brake circuit capacity is insufficient	①Reduce the start-stop frequency ②Increase acceleration/deceleration time constant ③Reduce the torque limit value or load inertia ④ Change to a higher-power driver and motor
			Main circuit supply voltage is too high	Check main power supply
15	Encoder counting error	—	Encoder damaged	Change motor
			Encoder wiring error	Check the wiring
			Bad grounding, signal interference	Correct grounding
16	Motor thermal overload	Appears when the control power is switched on	Circuit board fault	Change driver
			Parameter setting error	Set relevant parameters correctly
		Occurs during motor operation	Long-term operation in excess of rated torque	①Check the load ②Reduce the start and stop frequency ③Reduce the torque limit value ④ Replace the high-power driver and motor
			Poor mechanical transmission	Check mechanical parts
19 ξ	Warm Reset	—	Input control power is unstable	Check control power
			Be disturbed	Add line filters, away from the source of interference
20	EEPROM Error	—	Chip or circuit board damage.	① Change driver ② After repair, the motor type code must be reset and the default parameters restored
23	A/D chip error	—	①Chip or circuit board damage ②Current sensor damaged	Change driver
25	Bus soft start timeout	Appears when the main power is switched on	①The main power supply is not connected or the wiring is bad ② Circuit board failure ③Soft start circuit failure ④The rectifier is damaged	Check power wiring （L1、L2、L3 or R、S、T）
30	Encoder Z pulse lost	—	①No Z pulse or encoder damage ②Bad cable or ③The cable shielding or the ground wire connection is poor	①Replace the encoder ②Check the encoder interface circuit

			④The encoder interface circuit is faulty	
31	Encoder UVW signal error	—	①The UVW signal of the encoder is damaged ②No Z pulse or encoder damage ③Bad cable ④Cable shielding or poor grounding connection ⑤The encoder interface circuit is faulty	①Replace the encoder ②Check the encoder interface circuit
32	Encoder UVW signal is illegally encoded	—	①The UVW signal of the encoder is damaged ②Bad cable ③The cable shielding or the ground wire connection is poor ④The encoder interface circuit is faulty	①Replace the encoder ②Check the encoder interface circuit

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