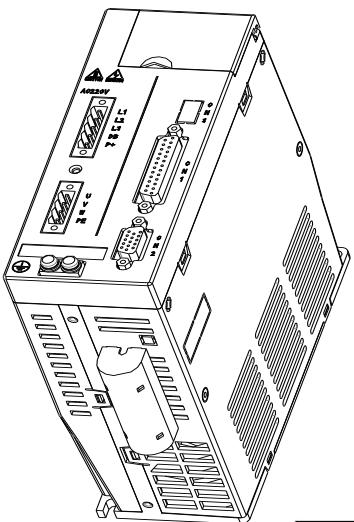
FS

(single axis) series servo

Simple Operation Manual



Safety Warnings

Security Matters

1. CAUTION	
WARNING	
	1. Do not touch inside of the servo drive. Otherwise, you may be electric shocked.
	2. Servo drive and GND terminal of servo motor must be connected to the ground or it may cause electric shock.
	3. Please check wiring at least 5mins later after powered off or it may cause electric shock.
	4. Please do not damage the cable line, or impose unnecessary stress, pressure load objects on it. Otherwise, may result in malfunction, damage and electric shock.
	5. During operation, do not touch the rotating part of the servo motor. Otherwise, you may be injured.
CAUTION	
	1. Operate servo motor and servo drive under specific order. Otherwise, fire and malfunction may occur.
	2. Do not place the facility in environment which has easy access to splashed water, corrosive gas, flammable gas or flammable materials. Otherwise, fire and fault may occur.
	3. Servo drives, servo motors and peripheral equipment are in high temperature when operated, keep distance or you may be burned.
	4. During the power-on process and within a period of time after cutting off the power supply, the servo drive heat radiator, regenerative resistor, servo motor is in a high temperature state. Do not touch it or you may be burned.
	5. During the running of servo motor in final product, if the surface temperature exceeds 70°C, please tag a label to inform high temperature.
2. WIRING CAUTION	
CAUTION	
	·The wiring should be correct and connected firmly. Otherwise, fires, malfunctions, injuries, etc. may occur.

	PROHIBITION
	1. Do not connect servo motor U, V, W terminals with commercial power supply (220V). Otherwise, fire and malfunction may occur.
	2. Please connect the protecting earthing (PE) to the U, V, W terminals of the servo motor side. When wiring, please do not mistake the order of the U, V, W terminals
	3. Please never carry out voltage resistance and resistance test on the encoder terminal to prevent the encoder from being damaged. When testing the withstand voltage and resistance of the U, V, W terminals on the servo motor side, please cut off the connection with the servo driver
	4. Do not take the wrong terminal sequence of the encoder. Otherwise, the encoder and the servo drive may be damaged.
	INSTRUCTION
	·Ground is used to prevent electric shock in case of accidents. For safety reasons, be sure to install the protecting earthing.

3．PDECAUTIONS DURING OPERATION AND OPERATION	
	CAUTION
	1. Excessive adjustments and changes will lead to instability, so do not operate it casually. Otherwise, may get injured.
	2. During the trial operation, the servo motor is fixed, and the machine is cut off from the mechanical equipment. After the operation is confirmed, it is installed in the equipment. Otherwise, may get injured.
	3. Self-protection arrester brake is not a stop equipment to protect facility. Please install safe stop equipment on side of facility. Otherwise, failure, injury and other accidents may occur.
	4. When servo drive alarms, try to find reasons. Reset alarm and run again only after confirming the security. Otherwise, it may be injured.
	5. The motor may restart suddenly when the power is turned off after an instantaneous power failure, so please do not approach the device. (Please consider in the mechanical design, how to ensure personal safety when restarting) Otherwise, it may be injured.
	6. Verify the specifications of power. Otherwise, it may cause fire, failures and injuries.

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CHAPTER 1 OVERVIEW

1.1 Servo drive model description

FS	32	05	-	V	T	*	(***)
1	2	3		4	5	6	7

1: Indicates the type of controller: F series single axis drive;

2: Indicates the power supply voltage level, 32 means three-phase or single-phase 220V;

3: It indicates the rated output current level of this driver; the unit is ampere (A);

4: Indicates the corresponding motor encoder type, V:2500ppr incremental optical or magnetic encoder;

S: 2500ppr line-saving incremental optical encoder or magnetic encoder; A: 17-bit multi-turn absolute encoder;

5：T represents standard;

6: Optional communication function, R: with RS-485 communication, N: with CANopen communication, default means no communication function;

7: The information in parentheses indicates that there are special features in the software and hardware of this drive, and the default indicates that there are no special features

1.2 Servo motor model description

130	ST	-	Z	M	050	C	2	A	-	I	/	**
1	2		3	4	5	6	7	8		9		10

1: Indicates base number, There are currently eight kinds of sizes base. They are 40, 60, 80, 90, 110, 130, 150, 180 (Units: mm).

2: Indicates the code of performance parameters, ST means sine wave-driven permanent magnet synchronous AC motors.

3: ‘Z’ indicates electromagnetic holding brake, ‘Y’ for permanent magnet holding brake, no brakes if the third digit are default.

4: Indicates the feedback type, ‘M’ for 2500ppr incremental optical encoder, ‘S’ for 2500ppr line-saving optical encoder, ‘A’ for 17-bit multi-turn absolute encoder, ‘CC’ for 2500ppr magnetic encoder, ‘CD’ for 2500ppr line-saving magnetic encoder;

5: Indicates the rated output torque, unit is ×0.1 Nm;

6: Indicates rated speed:

A for 1500r/min	**D** for 3000r/min
B for 2000 r/min	**E** for 1000r/min
C for 2500r/min	

7: Indicates the motor operating voltage, '2' for 3-phase AC 220V, '4' for 3-phase AC 380V.

8: Indicates the type of output shaft:

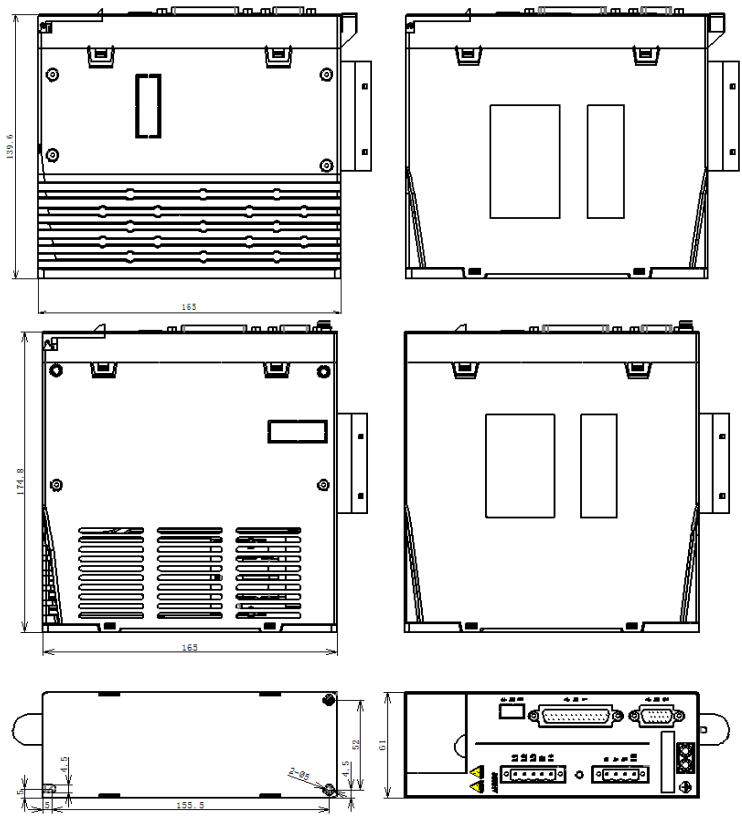
A for straight shaft with key, key width 6mm.	E for straight shaft with key, key width 10mm.
B for no keys on straight shaft.	F for straight shaft with key, key width 4mm.
C for straight shaft with key, key width 8mm.	G for straight shaft with key, key width 12mm.
D for straight shaft with key, key width 5mm.	H for straight shaft with key, key width 3mm.

9: Derived number, indicates motor encoder specifications.

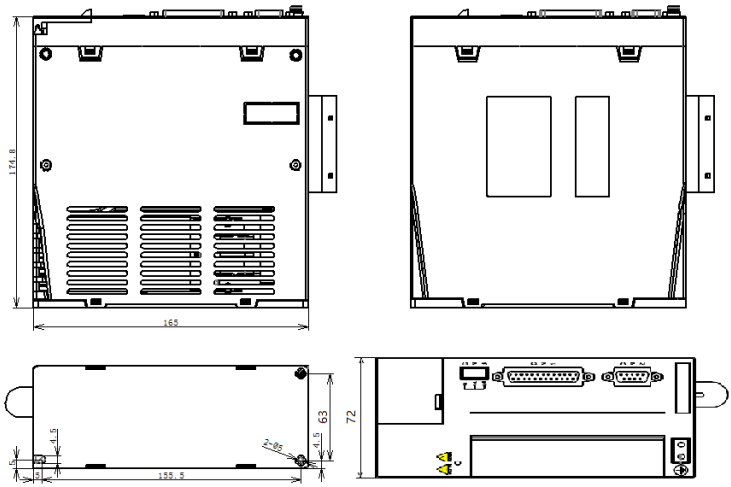
10: Derived number, to distinguish differences in the details, is used when it is a non-standard motor

CHAPTER 2
SERVO DRIVE AND MOTOR INSTALLATION
2.1 Servo drive installation size

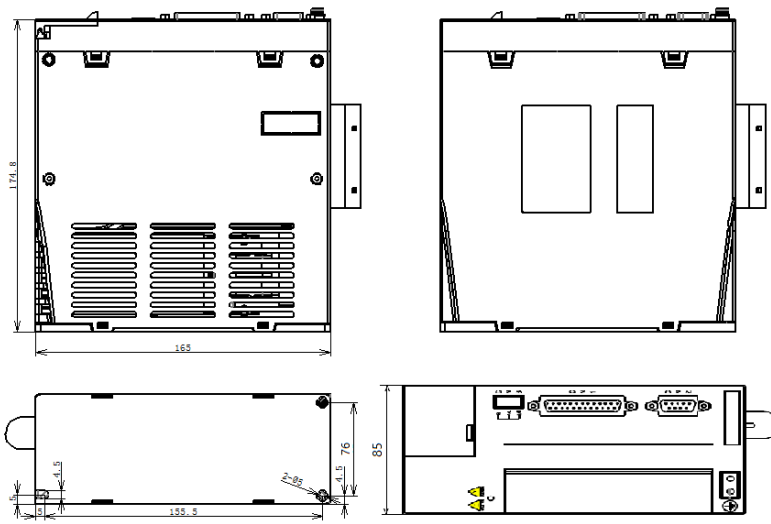
Units: mm



FS3205/FS3206 Installation dimensions



FS3210/FS3215 Installation dimensions



FS3220 Installation dimensions

2.2 Power supply

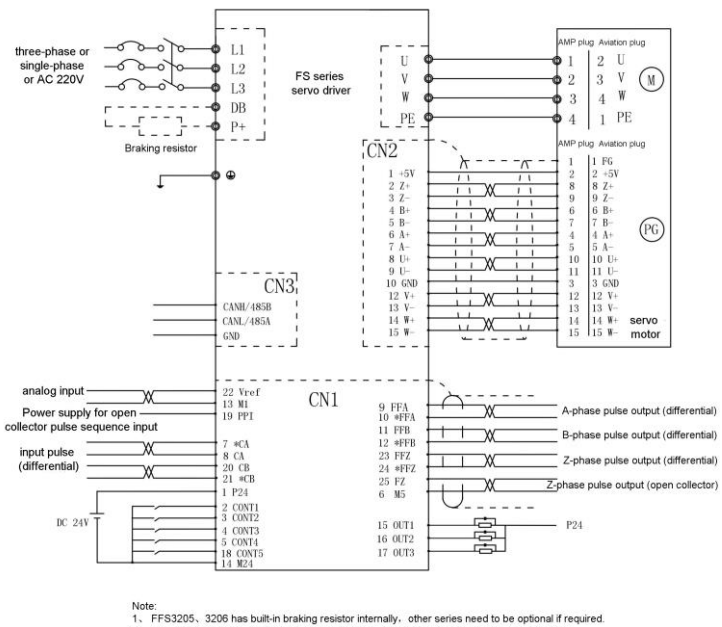
Supply to the servo drives single-phase 220V or three-phase 220V commercial power.，Frequency: 50/60Hz.；

When use single-phase electrics, connect to L1, L3. When use three phase electrics, connect L1, L2 and L3 terminals.

Voltage: Single phase 200 ~ 230V -10% ~ +10%, three-phase 200 ~ 230V -15% ~ +10%

※If the supply voltage exceeds a given limit value, it will damage the servo drives.

2.3 Wiring diagram

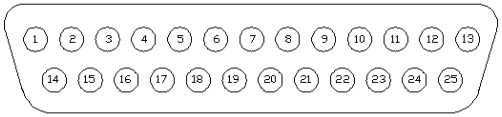


Note:
1、FFS3205、3206 has built-in braking resistor internally，other series need to be optional if required.
2、 CN1 is a double row DB25 female, CN2 is a three row DB15 female, and CN3 is a 3P plug

CHAPTER3
WIRING AND DETAILED INSTRUCTIONS

3.1 The input and output command control sequence (CN1)

Servo drive control connector (double row DB25 male) pins：



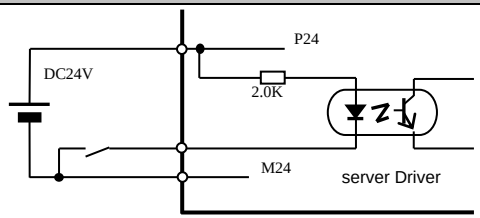
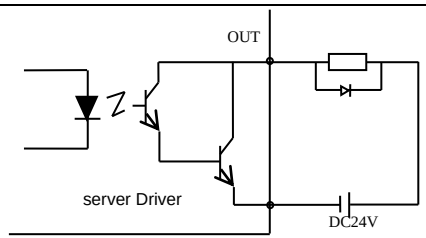
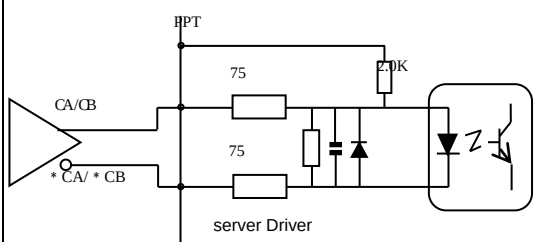
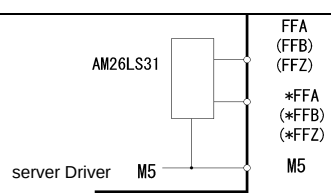
Connect connector 1 (CN1) of the servo drive to the control signal of the host controller. The definition of each signal is as follows:

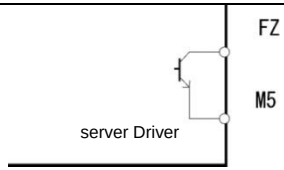
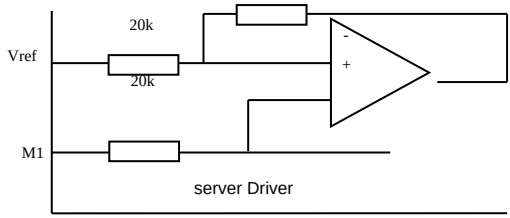
Code	pin number	Signal name	Function and definition
P24 M24	1 14	Control signal input and output power supply	Control signal input and output signals with input power. (DC24V/0.3A)
CONT1 CONT2 CONT3 CONT4 CONT5	2 3 4 5 18	Enter the command control sequence	Enter the command control sequence signal. (DC24V/10mA) CONT1: Servo Enable (RUN) CONT2: (not specified) CONT3: (not specified) CONT4: (not specified) CONT5: (not specified)
OUT1 OUT2 OUT3	15 16 17	Output command control sequence	Output command control sequence Signal (Maximum DC30V/50mA) OUT1: (Default value: 16) OUT2: ((not specified) OUT3: ((not specified)
PPI CA *CA CB *CB	19 8 7 20 21	Input pulse sequence differential input or open collector	PPI: Open collector power input (DC24V +5%/-5%) Differential input: CA, *CA, CB, *CB: Maximum input frequency 500KHz.

		input	Open collector input: *CA, *CB: Maximum input frequency 200KHz. The shape of the pulse sequence has three options: command pulse/symbol, forward/reverse pulse and 90-degree phase difference signal. *CA, *CB connected to negative.
FFA *FFA FFB *FFB FFZ *FFZ	9 10 11 12 23 24	Coded disc division frequency signal output (differential)	The frequency division output terminal. Output is 90-degree phase difference of 2-way signals which is proportional to the rotate volume of servo motor. (Differential mode output) *FFA, *FFB, *FFZ connected to negative.
FZ M5	25 6	Coded disc division frequency signal output (collector)	FZ terminal is open collector output of Z-phase pulse. (Maximum DC30V/50mA) M5: Standard Potential
Vref M1	22 13	Analog input	It is an input terminal for analog voltage. Enter the speed command voltage during speed control and the torque command voltage during torque control. -10~+10v Standard potential is M1 terminal.

※**Terminal symbols M1 do not connect to M5, M24**.

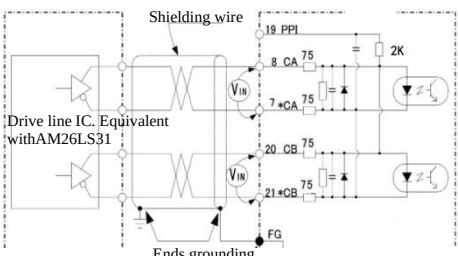
Interface circuit diagram

Signal name	Circuit
Input instructions control sequence Interface specification DC24V/10mA (every point)	
Output instructions control sequence Interface specification DC30V/50mA(max)	
Input pulse sequence Interface specification Differential input (Drive line)	
Input pulse sequence Interface specification Differential input (Drive line)	

Output pulse sequence (Open collector) Interface specification DC30V/50mA (max)	
Analog input Interface specification Input impedance 20kΩ	

Wiring Example of input pulse sequence

① The case of differential output device

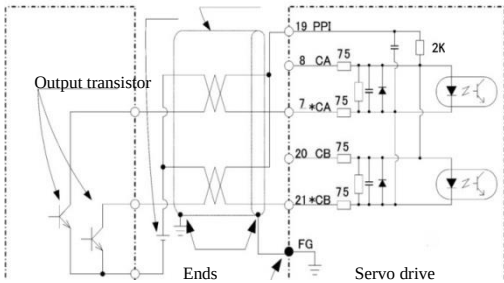


Vin: CA-*CA (CB-*CB) should be between the voltage amplitude Within 2.8V~3.7V. (Over this range, the input pulse may not be accepted sometimes.)

The part of upper pulse

②The case of open collector output device (DC24V input)

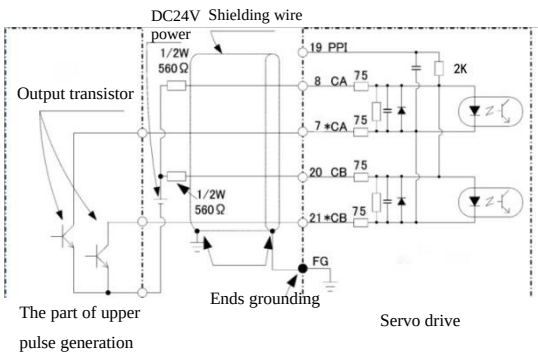
DC24V power Shielding wire



DC24V power supply: power supply voltage range should be within DC24 ± 5% or less.

In addition, the maximum power supply of this circuit is 40mA. Please prepare a sufficient power supply.

③ The case of NPN open collector output device (DC24V input)

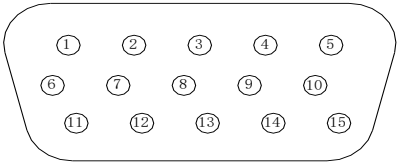


DC12V power supply: power supply voltage range should be within DC12 ± 5% or less.

In addition, the maximum power supply of this circuit is 40mA. Please prepare a sufficient power supply.

3.2 Encoder (CN2)

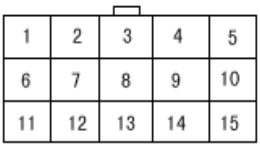
Servo drive encoder connector (DB15 male connector)pins：



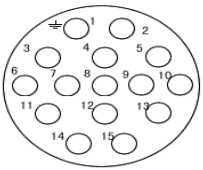
An encoder is installed in the rear end of the servo motor; the wiring of the encoder is connected to the connector 2 (CN2) of the servo drive

The maximum encoder wiring length is 20m, restricted according to electric cables and wiring.

The motor flange (90(include 90) to 110(include 110)) motor encoder (CN2) plug pins definition:



Flange 90 and the below plastic plug



110 flanges and above aviation plug

Drive-side CN2 and motor-side encoder wire pin definitions:

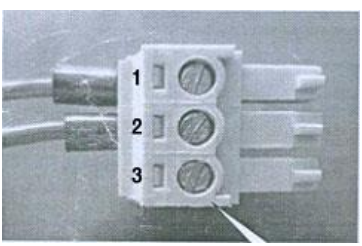
CN2 terminal number (three rows of DB15 pins)	2500-line optical encoder	
	definition	Corresponding pin on the motor side
1	+5V（drive output）	2
2	Z+	8
3	Z-	9
4	B+	6
5	B-	7
6	A+	4
7	A-	5
8	U+	10
9	U-	11
10	GND（drive output）	3
12	V+	12
13	V-	13
14	W+	14

15	W-	15
Shell	Shielding wire	1

17-bit or 23-bit bus optical encoder			
CN2 terminal number	definition	Corresponding pin on the motor side	
Three rows of DB15 pins		9-Pin AMP plug	15-pin aviation plug
1	5V	7	2
10	0V	6	3
2	S+	4	8
3	S-	5	9
11	BAT+	1	4
10	BAT-	2	5
Shell	Shielding wire	3	1

3.3 Communication interface (CN3)

CN3 interface is RS-485 communication or CAN communication interface. This is an optional function and selected if necessary.



Plug Type: PTB350B-06-03-3

pins	RS-485 communication	CANopen communication
1	485B	CAN-H
2	485A	CAN-L
3	GND	GND

CHAPTER 4 SERVO PARAMETER DESCRIPTION

4.1 Parameter settings

Setting method:

Use MODE ESC key to select the parameters edit mode, switch to the PN-01, using ∨ ∧ key to select the parameter number，or using SHIFT ENT key to shift, so as to quickly find the parameters to be set.Press SHIFT ENT key for more than 1 second into the parameter setting.

4.2 Parameter List

No.	Definition	Setting range	Initial value	Change
P0-00	Electronic gear numerator 0	1-100000000	4	All the time
P0-01				
P0-02	Electronic gear denominator 0	1-100000000	1	All the time
P0-03				
P0-04	Command pulse shape	0: Pulse + direction 1：AB Pulse 2：Positive and negative pulse	0	Outage
P0-05	Rotation direction switch	0、1	0	Outage
P0-06	Output pulse phase switching when rotating	0、1	0	Outage
P0-07	Forward torque limit	0-300%	250%	All the time
P0-08	Reverse torque limit	0-300%	250%	All the time

P0-09	Control mode selection	0：position 1：speed 2：Torque 3：position ⇔speed 4：position ⇔Torque 5：speed ⇔Torque 6：Can communication 7：Internal position 8：Internal position ⇔speed 9：Internal position ⇔Torque 10：Pulse speed mode 11：CAnOP mode	0	Outage
P0-10	CONT1 Input signal distribution	0：not specified 1: Servo start [RUN] 2：Manually rotate forward [FWD] 3：Manually rotate reverse [REV] 4：Point-to-point start signal 5：Origin trigger 6：Origin signal 7：Left limit 8：Right limit 9：emergency stop 10：Alarm clear 14：Choice of acceleration and deceleration 17：Gain switching 19：Torque limit selection 1 20：Torque limit selection 2 24：Gear ratio switching 1 25：Gear ratio switching 2 26：Pulse input prohibited 27：Command pulse ratio 1 28：Command pulse ratio 2 31：Run pause 32：Position cancel 34：Overheating of external braking resistor 36：Mode switch 37：Position control mode 38：Torque control mode 39：Speed control mode 43：Effective schedule 44：Schedule 1 45：Schedule 2 46：Schedule 4 47：Schedule 8 50：Clear position deviation 51：Multi-speed selection 1 52：Multi-speed selection 2 53：Multi-speed selection 3 54：Multi-speed selection 4 55：Forced slide stop 65：Point-to-point location selection 1 66：Point-to-point location selection 2 67：Point-to-point location selection 3 68：Point-to-point location selection 4	1	Outage
P0-11	CONT2 Input signal distribution		0	Outage
P0-12	CONT3 Input signal distribution		0	Outage
P0-13	CONT4 Input signal distribution		0	Outage
P0-14	CONT5 Input signal distribution		0	Outage

P0-15	OUT1 Signal distribution	0：not specified 1：Ready 2：Locate finishing 11：Speed limit determination 12：Brake action 14：Brake timing 15：Alarm a contact output 16：Alarm b contact output 20：OT detection 23：Zero position deviation 22：Return to origin completed 25：Speed reached 24：Zero speed 30：Multi-segment location 0 26：Current limit detection 32：Multi-segment location 2 31：Multi-segment location 1 34：Multi-segment location 4 33：Multi-segment location 3 38：OT+ detection 35：Multi-segment location 5 41：Force stop detection 39：OT- detection 50：Internal position completion signal	16	Outage
P0-16	OUT2 Signal distribution		0	Outage
P0-17	OUT3 Signal distribution		0	Outage
P0-18	Reserved		0	Outage
P0-19	Zero speed range	0.1~P0-34（rpm）	50.0	All the time
P0-20	Z phase compensation	0~60000（puls）	0	All the time
P0-21	Deviation zero range/positioning ending range (myriabit) Deviation zero range/positioning ending range (bit)	0~100000000（puls）	100	All the time
P0-22				
P0-23	Deviation exceeds detection value	0.1~100.0(ring)	15.0	Conditions are valid

P0-24	Judge time of positioning ending	0.000~1.000 seconds (0.001 scale)	0	All the time
P0-25	Positioning ending output pattern	0: output form 1 1: output form 2	0	Conditions are valid
P0-26	Minimum OFF time when positioning is ended /1 short circuit ON time	1~1000（msec）	20	All the time
P0-27	Related parameters of insufficient voltage	0x0111 bit0-3 Whether to detect LU alarm 1 detect 0 not detect bit4-7 Motor action when undervoltage 0 Emergency stop 1 Slide stop bit8-bit11 Whether LU alarm needs self-recovery 0 not automatically recover	0x0001	Power on is effective
P0-28	No definition	0-1	0	All the time
P0-29	Prohibit overwriting of parameters	0: rewriteable 1: rewrite prohibited	0	All the time
P0-30	Power on display interface	0~50	0	Outage
P0-31	Consistent speed range	0.1~6000.0（rpm）	10.0	All the time
P0-32	Speed limit selection during torque control	0: Use analog quantity as speed reference 1: Use P0-33 as the speed reference	0	Conditions are valid
P0-33	Maximum speed	0.1~6000.0 (rpm) (for torque control)	3000.0	All the time

P0-34	Maximum speed	0.1~6000.0 (rpm) (for control position and speed)	3000.0	All the time
P0-35	Acceleration time 1 (combination test run)	1~10000（msec）	100	All the time
P0-36	Deceleration time 1 (combination test run)	1~10000（msec）	100	All the time
P0-37	Acceleration time 2	1~10000（msec）	500	All the time
P0-38	Deceleration time 2	1~10000（msec）	500	All the time
P0-39	Reserved	0~10000	500	All the time
P0-40	Position regulator gain 1	1~2000[rad/sec] (1 scale)	25	All the time
P0-41	Speed regulator gain 1	1~30000[Hz] (1 scale)	100	All the time
P0-42	Speed regulator integral coefficient 1	0~4096 (1 scale)	400	All the time
P0-43	S-shaped time constant	0~1000（msec）	100	All the time
P0-44	Position loop feed-forward gain 1	0.000~1.200 (0.001 scale)	0	All the time

P0-45	Feed-forward filter time constant	0.000~2.500[msec] (0.001 scale)	0	All the time
P0-46	Torque filter time constant	0.00~20.00[msec](0.01Scale)	0.5	All the time
P0-47	Speed setting filter	0.00~20.00[msec](0.01Scale)	0	All the time
P0-48	Main reason for the gain switch	0: Position deviation (x10) 1: Feedback speed, 2: Command speed 3: Switched by input port	1	All the time
P0-49	Gain switching level	1~1000（1scale or %）	50	All the time
P0-50	Gain switching time constant	1~100[msec] (1Scale)	10	All the time
P0-51	Position regulator gain 2	30~200%（1Scale）	100	All the time
P0-52	Speed regulator gain 2	1~1500（%）	100	All the time
P0-53	Speed regulator integral coefficient 2	1~1500（%）	100	All the time
P0-54	Position loop feedforward gain 2	0~1200[%] (1%)	100	All the time
P0-55	Analog filtering ms	0.00~300.00	1	All the time
P0-56	Deceleration time after losing enable	0~10000（msec）	100	All the time
P0-57	Action sequence when losing enable	0：emergency stop 1：free stop	0	Outage
P0-58	OL type Judgment type	To be added	0	Conditions are valid
P0-59	OL ratio	0.0000~1.5000	1	All the time

P0-60	First-order delay S-shaped time constant	0.0~1000.0（msec）	0	All the time
P0-61	Low voltage point setting	150~210V	160	Conditions are valid
P0-62	OH alarm temperature selection	40～110 ℃	80	Outage
P0-63	Fan opening temperature	20～70 ℃	40	All the time
P0-64	Motor code	0~500	0	Outage
P0-65	Analog input 1 offset	0~4096	2048	Outage
P0-66	Analog input 1 corresponds to the maximum speed	0.0~P0-34	1000	All the time
P0-67	Analog usage configuration	0x0~0x1111 bit0， Analog 1 and 2 modes bit1, 1: Unipolar 0~10V0: Bipolar -10~10V bit2, the number of hardware analogs 0: Single analog 1: Double analog bit3. Torque given source 0. Analog given 1. Parameter given	0x0000	Outage
P0-68	Analog 1 ratio	0.00~3.00	1	All the time
P0-69	Analog input 2 offset	0~4096	2048	Outage
P0-70	Analog input 2 corresponds to the highest torque	0~300%	300	All the time
P0-71	Reserved	0~1	0	All the time
P0-72	Analog 2 ratio	0.00~3.00	1	All the time
P0-73	Analog 1 zero limit unit speed	0.0~P0-34	10	All the time
P0-74	Analog 2 zero limit unit torque	0.00~300%	5	All the time

P0-75	CONT has always been effective internally1	0~78	0	Outage
P0-76	CONT has always been effective internally2		0	Outage
P0-77	CONT has always been effective internally3		0	Outage
P0-78	CONT has always been effective internally4		0	Outage
P0-79	Parity/stop bit selection (for Modbus)	RTU:1 8n2 3:801 5 8E1	1	Outage
P0-80	Whether communication stores EEOROM	0 stored 1 not stored	0	Outage
P0-81	Action after communication timeout (not implemented)	0: Regardless, only display status 1: Decelerate to stop	0	All the time
P0-82	485 CAN station number	1-127	1	Outage
P0-83	485 baud rate	0=4800，1=9600，2=19200， 3=38400，4=57600，5=115200	1	Outage
P0-84	CAN baud rate	0=125k， 1=250k ，2=500k， 3=1M	3	Outage
P0-85	Compatible with 402 version Speed unit problem	0: Use rpm according to the old version 1: Use PUU/S	0	Outage
P0-86	0S alarm ratio	1.10~5.00	1.1	All the time
P0-87	Related actions after OT	0: Maximum torque stop 2: Lock the original position	0	Conditions are valid
P0-88	Type of deviation detection	0: Exceeding deviation alarm detection 1: Exceeding deviation is not alarmed, and pulse is actively lost	0	Outage
P0-89	Power section selection	0~20	6	Outage

P0-90	EC alarm detection time	3~3000msec	12	Outage
P0-91	Overcurrent forecast value	10~500%	350	All the time
P0-92	Test speed given Fn-01	0.0~P0-34	50	All the time
P0-93	Test operation mode	1: Speed 2: Torque	1	All the time
P0-94	Test speed given Fn-10	0.0~P0-34	200	All the time
P0-95	Current loop feedforward ratio%	0~500%	0	All the time
P0-96	Differential time of current regulator， 0.01ms	0~1.00（0.01ms）	0	All the time
P0-97	Current regulator cutoff frequency	100~3000Hz	650	All the time
P0-98	Current regulator integration time	0.0~100.0（msec）	1.8	All the time
P0-99	Current loop output filter	0.000~1.000（msec）	0	All the time
P1-00	Manual feed speed 1	0.1~P0-34	500	All the time
P1-01	Manual feed speed 2	0.1~P0-34	500	All the time
P1-02	Manual feed speed 3	0.1~P0-34	1000	All the time
P1-03	Manual feed speed 4	0.1~P0-34	1000	All the time
P1-04	Manual feed speed 5	0.1~P0-34	1000	All the time
P1-05	Manual feed speed 6	0.1~P0-34	1000	All the time
P1-06	Manual feed speed 7	0.1~P0-34	1000	All the time
P1-07	Manual feed speed 8	0.1~P0-34	1000	All the time
P1-08	Manual feed speed 9	0.1~P0-34	1000	All the time

P1-09	Manual feed speed 10	0.1~P0-34	1000	All the time
P1-10	Manual feed speed 11	0.1~P0-34	1000	All the time
P1-11	Manual feed speed 12	0.1~P0-34	1000	All the time
P1-12	Manual feed speed 13	0.1~P0-34	1000	All the time
P1-13	Manual feed speed 14	0.1~P0-34	1000	All the time
P1-14	Manual feed speed 15	0.1~P0-34	1000	All the time
P1-15	Manual feed speed 16	0.1~P0-34	1000	All the time
P1-16 P1-17	Output pulse frequency divider (not implemented)	0~100000000	1	Outage
P1-18 P1-19	Output pulse frequency division denominator (not implemented)	0~100000000	16	Outage
P1-20	CONT1~5 signal polarity	0~0xffff bitn is 1 means the polarity is reversed	0	Outage
P1-21	CONT1 filter time. The highest bit is the filter form	0-22000 0. Double edge dly 1. Rising edge dly 2. Falling edge dly	0	All the time
P1-22	CONT2 filter time. The highest bit is the filtering form	0-22000 0. Double edge dly 1. Rising edge dly 2. Falling edge dly	0	All the time
P1-23	CONT3 filter time. The highest bit is the filtering form	0-22000 0. Double edge dly 1. Rising edge dly 2. Falling edge dly	0	All the time
P1-24	CONT4 filter time. The highest bit is the filtering form	0-22000 0. Double edge dly 1. Rising edge dly 2. Falling edge dly	0	All the time
P1-25	CONT5 filter time. The highest bit is the filtering form	0-22000 0. Double edge dly 1. Rising edge dly 2. Falling edge dly	0	All the time
P1-26	OUT1~3 Signal polarity	0~0x3ff, bitn is 1 means the polarity is reversed	0	Outage
P1-27 P1-28	Electronic gear molecule 1	0~100000000	1	All the time

P1-29 P1-30	Electronic gear molecule 2	0~100000000	1	All the time
P1-31 P1-32	Electronic gear molecule 3	0~100000000	1	All the time
P1-33	Command pulse ratio 1	0.01~100.00	1	All the time
P1-34	Command pulse ratio 2	0.01~100.00	10	All the time
P1-35	Select torque limit	0: In emergency stop state, use the third torque to limit stop 1: Always use analog torque limit	0	Conditions are valid
P1-36	Second torque limit	0~300%	300	All the time
P1-37	Third torque limit	0~300%	300	All the time
P1-38	Brake action time MSB indicates the action	0-29999 0. Delay after enabling 1. Delay after losing enable 2. Delay after enabling and losing enable	0	All the time
P1-39	High-speed pulse low-pass filter	0~500（KHZ）	0	Outage
P1-40	Reserved	0~25.5	0	Outage
P1-41	Curve type	0: T-shaped curve, 1. S-shaped curve (not considering 0 speed overturn) 2: S-shaped curve (considering 0 speed overturn)	0	Outage
P1-42	Scheduling function switch (Temporarily unrealized)	0~1	0	All the time
P1-43	Schedule ratio 1	0.00~1.50	0.1	All the time
P1-44	Schedule ratio 2	0.00~1.50	0.2	All the time
P1-45	Schedule ratio 4	0.00~1.50	0.4	All the time
P1-46	Schedule ratio 8	0.00~1.50	0.8	All the time

P1-47 P1-48	Number of output pulses per revolution	16~4095	2500	Outage
P1-49	Reserved	0.50~300.00	3.19	Outage
P1-50	Carrier frequency spare	12	12	Outage
P1-51	Dead time	2.0~5.0 (usec)	2.8	Outage
P1-52	InC/ABS selection	0-0x116 bit0-3 INC/ABS selection 0: incremental, incremental system 1: Single-turn, incremental system 2: Multi-turn, absolute system 3: Multi-turn, incremental system bit4-7 Whether it is a line-saving encoder 1: line saving bit8-11 Special processing for Z signal 1：Z in the form of a half circle	0	Outage
P1-53	Choose an absolute encoder	0: 17-bit，1: 20-bit，2: 23-bit	0	Outage
P1-54	Line number of incremental encoder	180~10000 lines	2500	Outage
P1-55	Encoder error protection time	0~3000(msec)	1500	Outage
P1-56	Motor rated speed	50~6000rpm	2500	Outage
P1-57	Motor rated current	0.10~20.00A	5	Outage
P1-58	Motor rated voltage	110~230V	220	Outage
P1-59	Motor torque coefficient	0.10~5.00	1	Outage
P1-60	Motor pole pairs	1~16	4	Outage
P1-61	Motor stator resistance	0.0·~100.00 Ω	1.84	Outage
P1-62	Motor cross-axis inductance	0.50~80.00mH	3.2	Outage
P1-63	Motor straight shaft inductance	0.50~80.00mH	3.2	Outage

P1-64	Motor Back EMF V/1000rpm	10~1000v/RPM	68	Outage
P1-65	Motor rotor inertia，gm2	0.001~30.000gm^2	3.19	Outage
P1-66	Motor electrical time constant，ms	0.5~300.00ms	3.19	Outage
P1-67	Reserved	0.0~25.5	0	Outage
P1-68	Reserved	0.50~300.00	3.19	Outage
P1-69	Reserved	0.50~300.00	3.19	Outage
P1-70	Reserved	0~3000.0	0	All the time
P2-00	Moving average S shape time	0~500（msec）	0	All the time
P2-01	Convergent integral filtering	0.00~20.00（msec）	0.5	All the time
P2-02	Position loop convergence integration time	1.0~1000.0（msec）	1000	All the time
P2-03	Position loop differential	0.00~1.00（msec）	0.05	All the time
P2-04	End convergence position deviation	0~10000（puls）	20	All the time
P2-05	Reserved	0.0~25.5	0	Outage
P2-06	Reserved	0.0~25.5	0	Outage
P2-07	Reserved	0.0~25.5	0	Outage
P2-08	Forward torque given by panel	0~300%	100	All the time
P2-09	Reverse torque given by panel	0~300%	100	All the time
P2-10	Load inertia ratio	0.0~100.0	0	All the time
P2-11	Speed loop feedforward coefficient	0.000~1.500	0	All the time
P2-12	Speed feedback method	0~31 （Unrealized）	0	Outage
P2-13	Speed feedback filter time constant	0.00~10.00（msec）	0	All the time
P2-14	Speed loop PI regulator	0: normal；1:PDFF； 2: high beat	0	Outage
P2-15	PDFF-Kf	0.00~2.00	1	All the time

P2-16	Reserved	0.0~25.5	0	Outage
P2-17	Reserved	0.0~25.5	0	Outage
P2-18	Reserved	0.0~25.5	0	Outage
P2-19	spare	0~200	0	All the time
P2-20	spare	0~200	0	All the time
P2-21	spare	0~200	0	All the time
P2-22	Virtual In1 (Unrealized)	Reserved	0	All the time
P2-23	Virtual In2 (Unrealized)	Reserved	0	All the time
P2-24	Virtual In3 (Unrealized)	Reserved	0	All the time
P2-25	Virtual In4(Unrealized)	Reserved	0	All the time
P2-26	Virtual In5 (Unrealized)	Reserved	0	All the time
P2-27	Virtual In6 (Unrealized)	Reserved	0	All the time
P2-28	Virtual In7 (Unrealized)	Reserved	0	All the time
P2-29	Virtual In8 (Unrealized)	Reserved	0	All the time
P2-30	Virtual OUT1 (Unrealized)	Reserved	0	All the time
P2-31	Virtual OUT2 (Unrealized)	Reserved	0	All the time
P2-32	Virtual OUT3 (Unrealized)	Reserved	0	All the time
P2-33	Virtual OUT4 (Unrealized)	Reserved	0	All the time
P2-34	Virtual OUT5 (Unrealized)	Reserved	0	All the time
P2-35	Virtual OUT6 (Unrealized)	Reserved	0	All the time

P2-36	Virtual OUT7 (Unrealized)	Reserved	0	All the time
P2-37	Virtual OUT8 (Unrealized)	Reserved	0	All the time
P2-38	Decimal point position of position data (Unrealized)	Reserved	0	All the time
P2-39	origin position return speed	0.1~1000.0（rpm）	500	All the time
P2-40	origin position return crawl speed low speed	0.1·~1000.（rpm）	50	All the time
P2-41	Return to origin configuration bit	0x1245	0	Outage
P2-42	Reserved	0-255	0	Outage
P2-43	Reserved	0-255	0	Outage
P2-44	Origin signal in-position delay ms	0-5000	50	All the time
P2-45	Origin signal output delay ms	0-5000	100	All the time
P2-46 P2-47	Preset position	-2147483647~2147483647	0	All the time
P2-48 P2-49	Z phase offset	-2147483647~2147483647	0	All the time
P2-50	Origin LS timing selection	0-1 （Unrealized）	0	All the time
P2-51	Select origin return to OT operation	0-1 （Unrealized）	0	All the time
P2-52 P2-53	Positive software OT detection position	-2147483647~2147483647	2000000000	All the time

P2-54 P2-55	Negative software OT detection position	-2147483647~2147483647	-200000000	All the time
P2-56	Software OT is valid/invalid (If P0-09=7)	0: Do not detect software OT; 1: OT is not considered an error; 2: OT reported software error	0	Outage
P2-57	Position command i form	（if P0-09=7) 0-1 （Unrealized）	0	Conditions are valid
P2-58	positioning data is valid/invalid	0-1 （Unrealized）	0	All the time
P2-59	Sequential start is valid/invalid	0~2 （Unrealized）	0	All the time
P2-60	Stop timing decimal point position	0~10 （Unrealized）	10	All the time
P2-61	Return to origin acceleration time	1~10000（msec）	100	All the time
P2-62	Return to origin deceleration time	1~10000（msec）	100	All the time
P2-63 P2-64	High byte of forward travel Must be positive	0~2147483647	2000000000	All the time
P2-65 P2-66	High byte of reverse travel Must be positive	0~2147483647	2000000000	All the time
P2-67	Reserved	0.0~25.5	0	Outage
P2-68	Reserved	0.0~25.5	0	Outage
P2-69	Reserved	0.0~25.5	0	Outage
P2-70	Reserved	0.0~25.5	0	Outage
P2-71	Reserved	0~0xFFFF	0	All the time
P2-72	Reserved	0~0xFFFF	0	All the time

P2-73	Reserved	0~0xFFFF	0	All the time
P3-00	Point-to-point control parameters 1	bit0~3 Point to point trigger mode 0：high level， 1 rising edge bit4~7 running mode 0:1/0 mode，Multiple positions； 1：Discontinuous programming mode； 2：Continuous programming mode； 3: Infinite loop bit8~11 Addressing mode 0: normal, 1: sequential addressing, 2: reverse addressing, 3: optimal addressing bit12~15 Coordinate system mode 0: relative position, 1: absolute position	0x1001	Outage
P3-01	Point-to-point control parameters 2	bit0~3 M Code output mode 0：Output on startup 1：Output when positioning is completed bit4~7 Combinatorial code logic： 0 Delta-like combinational logic 1 Delta-like combinational logic	0x0011	Outage
P3-02	Reserved	0~3	0	Outage
P3-03	Reserved	0~1	1	Outage
P3-04	Cycle times with mode 2 and 3	1~30000	1	All the time
P3-05	spare	1~30000	1	Outage
P3-06 P3-07	Single-turn setting of indexing function	-2147483647~2147483647	10000	Outage
P3-08	Programming mode enables segment/index function single-turn indexing	1~32	16	All the time
P3-09	Reserved	0.0~25.5	0	Outage
P3-10 P3-11	Multi - terminal position given 0	-2147483647~2147483647	0	All the time

P3-12 P3-13	Multi - terminal position given 1	-2147483647~2147483647	0	All the time
P3-14 P3-15	Multi - terminal position given 2	-2147483647~2147483647	0	All the time
P3-16 P3-17	Multi - terminal position given 3	-2147483647~2147483647	0	All the time
P3-18 P3-19	Multi - terminal position given 4	-2147483647~2147483647	0	All the time
P3-20 P3-21	Multi - terminal position given 5	-2147483647~2147483647	0	All the time
P3-22 P3-23	Multi - terminal position given 6	-2147483647~2147483647	0	All the time
P3-24 P3-25	Multi - terminal position given 7	-2147483647~2147483647	0	All the time
P3-26 P3-27	Multi - terminal position given 8	-2147483647~2147483647	0	All the time
P3-28 P3-29	Multi - terminal position given 9	-2147483647~2147483647	0	All the time
P3-30 P3-31	Multi - terminal position given 10	-2147483647~2147483647	0	All the time

P3-32 P3-33	Multi - terminal position given 11	-2147483647~2147483647	0	All the time
P3-34 P3-35	Multi - terminal position given 12	-2147483647~2147483647	0	All the time
P3-36 P3-37	Multi - terminal position given 13	-2147483647~2147483647	0	All the time
P3-38 P3-39	Multi - terminal position given 14	-2147483647~2147483647	0	All the time
P3-40 P3-41	Multi - terminal position given 15	-2147483647~2147483647	0	All the time
P3-42	Delay 1 (unit ms)	0~5000	100	All the time
P3-43	Delay 2 (unit ms)	0~5000	100	All the time
P3-44	Delay 3 (unit ms)	0~5000	100	All the time
P3-45	Delay 4 (unit ms)	0~5000	100	All the time
P3-46	Delay 5 (unit ms)	0~5000	100	All the time
P3-47	Delay 6 (unit ms)	0~5000	100	All the time
P3-48	Delay 7 (unit ms)	0~5000	100	All the time
P3-49	Delay 8 (unit ms)	0~5000	100	All the time
P3-50	Delay 9 (unit ms)	0~5000	100	All the time
P3-51	Delay 10 (unit ms)	0~5000	100	All the time
P3-52	Delay 11 (unit ms)	0~5000	100	All the time

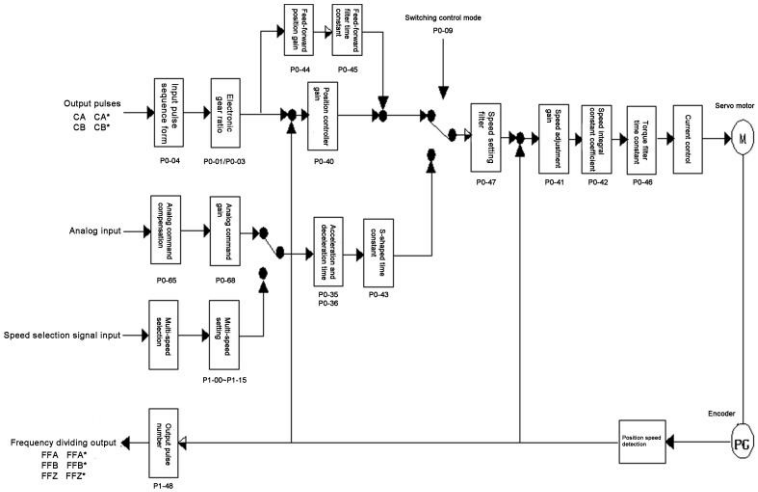
P3-53	Delay 12 (unit ms)	0~5000	100	All the time
P3-54	Delay 13 (unit ms)	0~5000	100	All the time
P3-55	Delay 14 (unit ms)	0~5000	100	All the time
P3-56	Delay 15 (unit ms)	0~5000	100	All the time
P3-57	Delay 16 (unit ms)	0~5000	100	All the time
P3-58	Reserved	0.0~25.5	0	Outage
P3-59	Reserved	0.0~25.5	0	Outage
P3-60	Bleed resistance value	1-1000(Ω)	16	All the time
P3-61	Bleed resistance power	0-10000(W)	0	All the time
P3-62	Reserved	0.0001-3.0000	1.0000	All the time
P3-63	Reserved	0．0-1000.0(V)	500.0	All the time
P3-64	Reserved	0: The display value is not updated from eeprom every time; 1: The display value is updated from eeprom every time	0	Outage

All the time: Effect immediately after modification

Outage：Restart power to take effect after the modification；

Conditions are valid: can only be modified when the servo lose enabled。

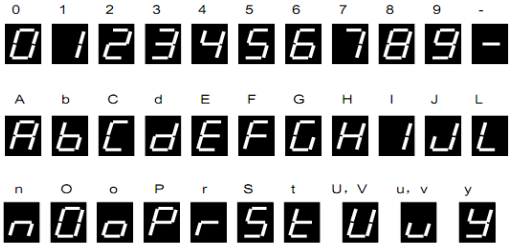
4.3Control block diagram



CHAPTER 5 THE MAIN OPERATION FUNCTIONS OF SERVO

5.1 Touch panel introduction

Seven-Segment Display:



Key:

MODE/ESC Changing mode(MODE)

Delete (ESC)

Choose servo model decrement of value (−1)

Choose Servo mode Increment of value (+1)

Shit the setting to the left (SHIFS)

SHIFT/ENT Confirm the model and numerical (ENT)

Push this button for 1 more than second

when confirming

5.2 Parameter settings

Power on after the wiring properly connected and set parameters if no alarm occurs.

1.First Press MODE/ESC key repeatedly until the panel display: P0; then Press SHIFT/ENT key for 1 second or more, panel displays Pn-01；

2. Press SHIFT/ENT key for 1 second or more, panel displays the parameter value of Pn-01；

3. Press ∨ ∧ key to change the value, press SHIFT/ENT key to shift position. Press SHIFT/ENT key for more than 1 second after changing value，Value is written successfully when Pn-01 is displayed；

4. Press ∧ key，panel display:P0-02, Repeat step 2 to set the second parameter.

5. can use the shift function of SHIFT/ENT key to quickly switch to the parameter number to be set, or quickly set the value to need to be set;；

6. Set other parameters in the same way.

Note：The motor code must be set for the first commissioning；

Be sure to turn off the power after setting all the parameters and then on again

5.3 Function list

Mode	Subschema	Select subschema	Expressions and setting
Sequence monitoring mode	Sequence mode	Sn-01	P-SOF
	The current alarm	Sn-02	EC
	Alarm record	Sn-03	1-EC
	Display station number	Sn-04	Ad01
	CANopen status	Sn-05	` 53on
Monitoring mode	Feedback speed	On-01	1000
	Command speed	On-02	1000
	Average torque	On-03	1
	Feedback current position	On-04	H0001/L5330
	Command current position	On-05	H0001/L5330
	Position deviation	On-06	10000
	DC bus voltage	On-07	100
	Electrical angle	On-08	10
	Drive internal temperature	On-09	25
	Reserved	On-10	
	Input signal	On-11	H0001/L0000
	Output signal	On-12	H000E
		On-13	spare
	Peak torque	On-14	3

	Pulse sequence input frequency	On-15	10
	Motor code	On-16	6
	Software version number	On-17	
	Manufacturer reserved	On-18～19	Manufacturer reserved
	Number of absolute encoder communication errors	On-20	50
	Manufacturer reserved	On-21～23	Manufacturer reserved
	Analog voltage value 1	On-24	5
	Analog voltage value 2	On-25	5
	Manufacturer reserved	On-26～27	Manufacturer reserved
	DE error number	On-28	P 82
	Absolute coordinate system feedback position	On-29	H0001/L0000
	Communication coordinate system feedback position	On-30	H0001/L0000
Parameters edit mode	Parameters editor	P0-01～P3-64	
Trial mode operation	Manual operation	Fn-01	JOG
	Clear the current command and feedback pulse	Fn-02	PRT
	Clear integrating pulse	Fn-03	CPCR
	Alarm reset	Fn-04	RT
	Clear alarm record	Fn-05	ALRT
	Parameters initialization	Fn-06	PART
	Automatic adjustment compensation	Fn-07	OFFS
	Manufacturers reserved	Fn-08、Fn-09	

	Test operation	Fn-10	ESY.1
	Manufacturers reserved	Fn-11，Fn12	
	Zero calibration of absolute encoder	Fn13	
	Absolute encoder clears multiple turns	Fn14	
	Manufacturers reserved	Fn15，Fn16	

CHAPTER 6 SERVO ALARM

6.1 Alarm content

After detection of alarm, the servo drive alarm codes flash automatically on the touch panel.

If there are detections of multiple alarms, the touch panel displays the alarms in the following order of priority

Error label	Display	Display	Communication alarm code
1	OC1	Overcurrent 1	1
2	OC2	Overcurrent 2	2
3	EH	Current sampling loop damaged	8
4	PLD	CPLD error	13
5	EC	Encoder communication error	7
6	OS	Overspeed	3
7	HU	Overvoltage	4
8	EP	Bleed circuit fault	5
9	RH1	Regenerative resistor overheating	14
10	AH	Drive overheating	12
11	DE	Storage error	6
12	OL	Overload	9
13	LU	low voltage	10
14	OF	Deviation exceeded	11
15	CE	Motor code error	17
16	ND	No motor code	18
17	BAT1	Battery alarm 1	19
18	BAT2	Battery error 2	20
19	LOT	Absolute encoder multi-turn alarm	21
20	GOH	Zero return error	22
21	PPOT	Positive software limit alarm	23
22	PNOT	Negative software limit alarm	24
23	PST	Point-to-point location planning error	25
24	FS	FPGA fault	26

25	CO01	402 State machine does not switch normally	27
26	CO02	301 State machine does not switch normally	28

6.2 Alarm explanation and handling

Alarm code	Alarm name	running status	Probable cause	Handling(for reference only)
OS	Over Speed	Appears when the drive is powered on	Drive circuit fault	Replace the drive
			Encoder fault	Replace the servo motor
		Appears when the motor has just started	Excessive load inertia	1.Reduce the load inertia
				2.Replace more powerful drive and servo motor
			Encoder zero error	1.Replace servo motor
				2.Send back to the manufacturers to readjust the encoder zero
			Motor U, V, W phase sequence error	Check the wiring and connect the wiring correctly
			Encoder wiring error	
		Appears during motor operation	The entered command pulse frequency is too high	Upper computer sets inputted command pulse frequency correctly
			Electronic gear ratio is too large	Set the appropriate electronic gear ratio correctly
			Acceleration and deceleration time constant is too small, so that exceed constant speed is overshoot (speed controlling)	1.Increase the acceleration and deceleration time constant
				2. S-shaped time constant (parameter P0-43) is set larger
				3. Speed response during operation (parameter P0-41) is set a little higher
			Encoder fault	Replace servo motor
			Servo system parameters are not adjusted well, causing overshoot	1. Reset the gain related to the regulator
				2.If gain is difficult to set a suitable value, replace the suitable motor

HU	Main circuit overvoltage	Appears when the power is turned on	Drive internal circuit board fault	Replace servo drive
			Power supply voltage is too high	View the drive value of ON-07 is greater than the 380V or not, Check whether the power supply is too large.
		Appears during motor operation	Disconnect the brake resistor wiring	Connection again
			Braking resistor damaged	Under the condition of power off, measure whether the resistance of the braking resistor is consistent with the label. If it is judged to be damaged, replace the braking resistor
			The internal braking transistor of the driver is damaged	Replace servo drive
			The internal brake circuit of the drive is damaged	
			Braking resistor capacity is not enough	1.Reduce the frequency of start and stop
				2.Increase the acceleration / deceleration time constant
				3.Reduce the current limit amplitude
				4.Reduce the load inertia
				5.Reduce speed
				6.External braking resistor with sufficient capacity
			Servo motor inertia is not enough	Replace servo motor with greater inertia
LU	Main circuit under-voltage	Appears when the power is turned on	The main power wire contact badly	Whether the main power indicator light between the drive power terminal block is on, if it is not on, check whether the connection is good.
			Unstable power supply, power supply voltage is low	Check whether the drive On-07 value is less than the set value of P0-61
				determine whether the stability of power supply or not

			Temporary power outage for more than 20ms	Check the power supply
			Drive internal components fault	Replace servo drive
		Appears during motor operation	Power capacity is not enough	Check the power supply
			Power break down instantaneously	
OF	Position deviation exceeds	Appears when the power is turned on	Drive circuit board fault	Replace servo drive
		Appears when the motor starts	Motor U, V, W wiring error	Correct wiring
			Encoder wiring error	
			Position percentage gain is too small	Increase the position percentage gain
			Less output torque	1. Check the torque limit value
				2. Reduce the load capacity
				3. Replace high-power servo drive and servo motor
			Pulse command frequency is too high	Check if On-15 is below 500 during differential input, and check if On-15 is below 200 during open collector input. If not, reduce the pulse frequency
		During motor operating	Drive power circuitry failure	Replace servo drive
			Drive parameters are not adjusted well	Increase the position gain
			Pulse command frequency is too high	Check if On-15 is below 500 during differential input, and check if On-15 is below 200 during open collector input. If not, reduce the pulse frequency
			Input supply voltage is lower	When loading, the voltage drops below the working voltage, choose the correct transformer and install the regulator
AH	Drive overheat	Alarm when the power is turned on, when the ambient temperature is normal	Driver internal circuit failure	Replace servo drive

		Appears during motor operation	Cooling fan does not work	Check the temperature value displayed on On-09. If the fan is not turned on when it exceeds 40℃, replace the servo drive
			High ambient temperature, poor heat dissipation in the working environment	To maximize the ventilated effect in the environment
			Can't consume renewable electricity	Extend the deceleration time
EC	Encoder communication error	Appears when the power is turned on	Encoder cables error	Check whether the wiring of the encoder cable is correct and whether there is a disconnection
			The power-on sequence of the servo does not match the encoder	Check the information of the encoder, set P1-55 to the encoder starts to produce valid output
		Appears during operation	Encoder cable bad contact	Check the encoder cable is contact well or not
			Encoder damaged	Replace servo drive
			Detection drive internal circuit fault	Replace servo motor
EH	Current sampling loop damage	Appears when the power is turned on	The drive internal current sampling circuit damaged	Replace servo drive
DE	Storage error	Appears when the power is turned on	The speed parameter exceeds the maximum speed P0-34	Check the parameters P0-19, P0-66, P0-73, P0-92, P0-94, P1-00~P0-15 and confirm that they are smaller than P0-34, and then restart
			The data exceeds the normal size limit	Check ON28, confirm the parameter causing DE, and then modify this parameter to the normal range
			Storage is damaged or communication changes storage parameters too frequently	Replace the servo driver. If the storage parameters are modified too frequently during communication, please set P0-80=HXXX1 parameters, and do not write the communication parameters to the storage
			Abnormal communication between storage and main chip	

OL	Overload	Appears when the power is turned on	Drive internal circuit board fault	Replace servo drive
		Appears during motor operation	Run over rated torque	1. Check the load
				2. Reduce the start-stop frequency
				3. Replaced by more powerful drive and servo motor
			Driver power line U, V, W wiring is wrong	Check the wiring and confirm U, V, W correct wiring
			Motor operates with oscillation and unstable	1. Increase the gain
				2. Increase the acceleration and deceleration time
				3. Reduce the load inertia
			Servo motor abnormalities	Replace servo motor
OC1	Over-current 1	Appears when the power is turned on	Internal circuit of drive fault	Replace servo drive
		Appears during motor operation	Drive power lines U, V, W short-circuit	Check power line
			Acceleration and increase time too short	Increase the acceleration and deceleration time
			Excessive rigidity of the control loop parameters	Reduce the rigidity, which reduces the position gain, speed gain
			Output current is too large	Reduce the maximum current limit value parameter P0-07/08
			Poorly grounded, external interference	Correctly grounding
			Drive internal circuit damage, lack phase, and so on	Replace servo drive
OC2	Over-current 2	Appears during motor operation	Drive fault	Replace servo drive
ND	No motor code	Appears on power up	Set corresponding motor code before using drive	Motor code setting method：

				Set P0-64: motor code, please check the code item on the instruction manual or motor nameplate。
CE	Motor code error	Appears after modifying the motor code	The setting motor code not match drive	Reconfirm motor code
PLD	CPLD communication error	Appears on power up	CPLD and DSP communication error	Replace servo drive
RH1	Overheating of bleed resistor	Running	Mismatch between bleed resistance and operating conditions	1 Check whether the parameters P3-60 and P3-61 are consistent with the actual discharge resistance 2. Replace the bleed resistor with higher power
BAT1	Battery alarm 1	Running	The battery voltage starts to drop	Replace the battery when the drive is powered on
BAT2	Battery alarm 2	Running	The battery voltage has dropped to a low level and the recording position has been lost	1. Replace the battery when the drive is powered on 2. Since the position data has been lost, it must be reset to zero
LOT	Absolute encoder multi-turn alarm	The motor runs in one direction for a period of time	In the absolute value system, it turned more than 32767 times in one direction, and the position record was sent incorrectly	1 Check the application type Set the appropriate P1-52 2 After doing FN14 near the working range, find the origin again
GOH	Back to zero error	After a period of time back to zero	Can't find the origin after hitting the left and right limit switches	1. Check whether the origin switch signal is normal 2. Check whether the correct homing setting is correct
PPOT	Positive software limit alarm	Run for a period of time in the forward direction of the motor	Run to the software's positive OT limit point	Confirm the direction and size of the given command
PNOT	Negative software limit alarm	Run in the reverse direction of the motor for a period of time	Run to the software negative OT limit point	Confirm the direction and size of the given command
CO01	402 State machine does not switch normally	The server is running in canopen mode	Canopen and the like directly request to be enabled without setting the operating mode	Check whether there is a running mode set on the host computer sending
CO02	301 state machine does not switch normally	The server runs in canopen mode and is enabled	Restarted the 301 state machine when the 402 state machine has been switched to enabled	Check whether the host computer has this illegal operation. It is best to use SDO to determine whether the state is before switching the 301 state machine.

Annex 1: Servo drive and motor selection table（AC 220V)

No.	Servo motor					Corresponding driver	
	Type	Rated power (KW)	Rated current (A)	Rated torque (N.m)	Rated speed (r/min)	Type	Motor code
1	40ST-M001D2H	0.05	0.4	0.16	3000	FS3202-VT	83
2	40ST-M003D2H	0.1	0.6	0.32	3000	FS3202-VT	81
3	60ST-M006D2D	0.2	1.2	0.637	3000	FS3202-VT	4
4	60ST-M013D2D	0.4	2.8	1.27	3000	FS3202-VT	5
5	60ST-M019D2D	0.6	3.5	1.91	3000	FS3204-VT	6
6	80ST-M013D2A	0.4	2	1.27	3000	FS3202-VT	11
7	80ST-M024D2A	0.75	3	2.39	3000	FS3204-VT	12
8	80ST-M035B2A	0.73	3	3.5	2000	FS3204-VT	13
9	80ST-M035D2A	1.05	4.5	3.5	3000	FS3205-VT	17
10	80ST-M040C2A	1.0	4.4	4	2500	FS3205-VT	14
11	90ST-M024B2D	0.5	3	2.4	2000	FS3204-VT	21
12	90ST-M024D2D	0.75	3	2.4	3000	FS3204-VT	22
13	90ST-M035B2D	0.73	3	3.5	2000	FS3204-VT	23
14	90ST-M040C2D	1.0	4	4	2500	FS3205-VT	24
15	110ST-M020D2A	0.6	2.5	2	3000	FS3202-VT	31
16	110ST-M040B2A	0.8	3.5	4	2000	FS3205-VT	32
17	110ST-M040D2A	1.2	5	4	3000	FS3205-VT	33
18	110ST-M050D2A	1.5	6	5	3000	FS3206-VT	34
19	110ST-M060B2A	1.2	4.5	6	2000	FS3205-VT	35
20	110ST-M060D2A	1.8	6	6	3000	FS3206-VT	36
21	130ST-M040C2A	1.0	4	4	2500	FS3205-VT	41
22	130ST-M050C2A	1.3	5	5	2500	FS3205-VT	42
23	130ST-M060A2A	0.9	4.3	6	1500	FS3205-VT	43
24	130ST-M060C2A	1.5	6	6	2500	FS3206-VT	44
25	130ST-M060D2A	1.9	7.5	6	3000	FS3206-VT	101
26	130ST-M077C2A	2.0	7.5	7.7	2500	FS3206-VT	45
27	130ST-M100E2A	1.0	4.5	10	1000	FS3205-VT	46
28	130ST-M100A2A	1.5	6	10	1500	FS3206-VT	47
29	130ST-M100C2A	2.6	10	10	2500	FS3210-VT	48
30	130ST-M100D2A	3.0	14	10	3000	FS3215-VT	142

31	130ST-M120A2A	1.9	7	12	1500	FS3210-VT	37
32	130ST-M120C2A	3.1	12	12	2500	FS3210-VT	79
33	130ST-M150E2A	1.5	7.3	15	1000	FS3206-VT	53
34	130ST-M150A2A	2.3	9.5	15	1500	FS3210-VT	49
35	130ST-M150C2A	3.8	13.5	15	2500	FS3215-VT	50
36	130ST-M170B2A	3.5	14	17	2000	FS3215-VT	51
37	130ST-M230B2A	4.8	16.5	23	2000	FS3215-VT	52
38	150ST-M150B2C	3	14	15	2000	FS3215-VT	96
39	150ST-M180B2C	3.6	17	18	2000	FS3215-VT	95
40	150ST-M230B2C	4.7	21	23	2000	FS3220-VT	90
41	150ST-M270B2C	5.5	24	27	2000	FS3220-VT	72
42	180ST-M172A2E	2.7	10.5	17.2	1500	FS3210-VT	61
43	180ST-M190A2E	3.0	12	19	1500	FS3210-VT	62
44	180ST-M215B2E	4.5	16	21.5	2000	FS3215-VT	63
45	180ST-M270E2E	2.9	12	27	1000	FS3210-VT	64
46	180ST-M270A2E	4.3	16	27	1500	FS3215-VT	65
47	180ST-M350E2E	3.7	16	35	1000	FS3215-VT	66
48	180ST-M350A2E	5.5	24	35	1500	FS3220-VT	67

Annex 2: Motor code setting method

If the motor code is not set, the drive will be displayed "Nd" alarm after power on, then need to set the motor code：

set Pn-64：motor code，Specific motor code need to check instructions or code item on motor nameplate.

Note: After the setting is completed, power off and restart is required. If the setting is not reasonable, the driver will report "CE" alarm

Appendix 3: Main model and description of FS (single axis) servo

No.	type	power（KW)	brake resistor	fan
1	FS3201-VT*	0.2	Optional, external	no
2	FS3202-VT*	0.4	Optional, external	no
3	FS3204-VT*	0.75	Optional, external	Have
4	FS3205-VT*	1.0	internal 60Ω、80W	Have
5	FS3206-VT*	1.5	internal 60Ω、80W	Have
6	FS3210-VT*	2.0	Optional, external 50Ω、150W	Have
7	FS3215-VT*	3.0	Optional, external 50Ω、150W	Have
8	FS3220-VT*	4.0	Optional, external 30Ω、300W	Have
Remarks:	‘*’ means optional; ‘N’ means equipped with CANopen communication; ‘R’ means equipped with RS-485 communication, Default means no communication function。			

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