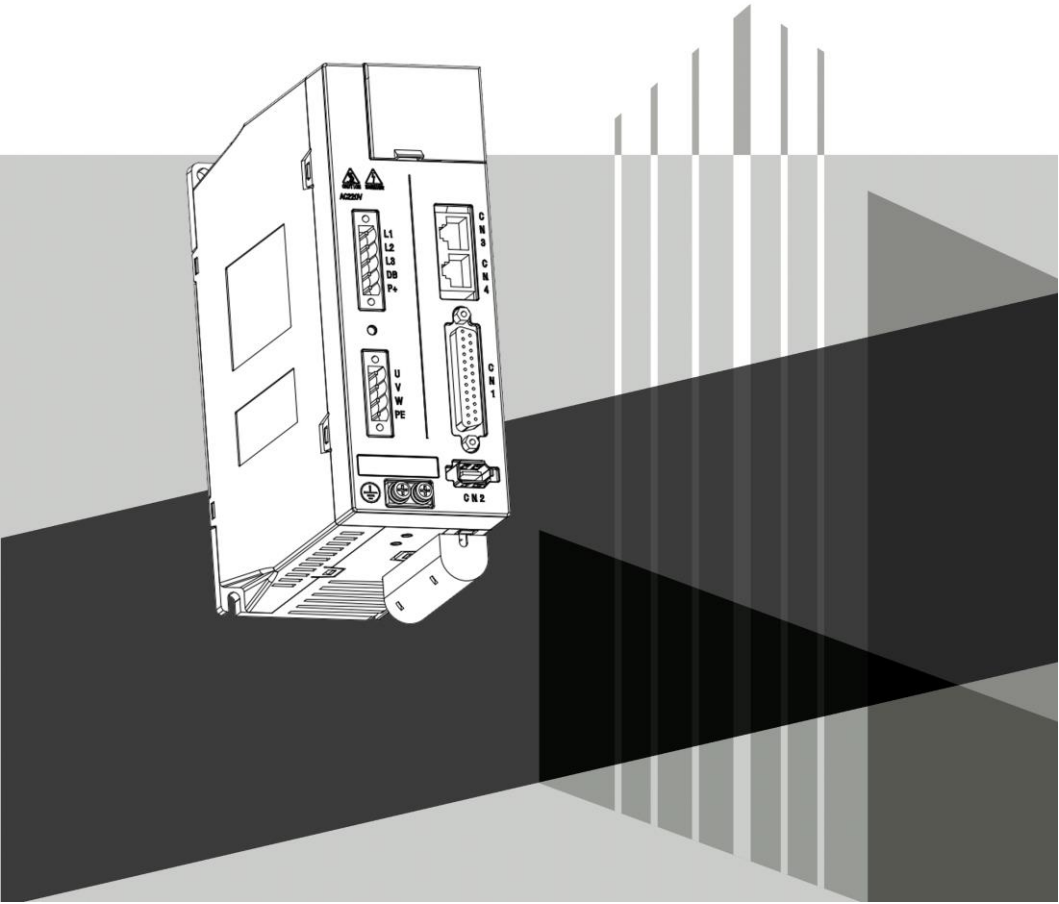
FS-E Series Servo

Simple Operation Manual



Safety Warnings

Security Matters

1. CAUTION	
DANGER	
	1. Never touch the inside of the drive with your hands. Otherwise, electric shock may occur.
	2. The grounding terminals of the servo driver and servo motor must be grounded. Otherwise, electric shock may occur.
	3. Please perform wiring and inspection 5 minutes after the power is turned off. Otherwise, electric shock may occur.
	4. Please do not damage the cable, or apply unnecessary stress, ballast, or pinch to the cable. Otherwise, it may cause malfunction, damage and electric shock.
	5. During operation, please do not touch the rotating part of the motor. Otherwise, it may be injured.
CAUTION	
	1. Please use the motor and driver in the specified combination. Otherwise, fire and malfunction may occur.
	2. Please never use it in a place prone to splashing water, corrosive gas environment, flammable gas environment and combustible materials. Otherwise, fire and malfunction may occur.
	3. The temperature of the drive, motor and peripheral equipment is high, so please keep the distance. Otherwise, it is easy to burn.
	4. During the power-on process and for a period of time after the power is cut off, the heat sink, regenerative resistor, motor, etc. of the drive may be in a high temperature state, so please do not touch it. Otherwise, you may get burned.
	5. If the surface temperature of the motor in the final product exceeds 70°C during operation, please affix a label of “caution hot” on the final product.

2. Wiring Precautions
CAUTION

	The wiring must be correct and connected securely. Otherwise, accidents such as fire, breakdown, and injury 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. Otherwise, fire and malfunction may occur.
	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**
	The ground wire is used to prevent an electric shock accident. For safety reasons, please install a ground wire.

3．Precautions during operation and running	
	**CAUTION**
	1．Excessive adjustments and changes will cause unstable operation, please do not make it arbitrarily. Otherwise, it may be injured.
	2．During the trial operation, fix the servo motor and install it in the equipment after confirming the operation status while it is disconnected from the mechanical equipment. Otherwise, it may be injured.
	3．The self-holding brake is not a stopping device to ensure the safety of the equipment. Please install a safety stop device on the equipment side. Otherwise, accidents such as failure or injury may occur.
	4．When an alarm occurs, remove the cause, and after ensuring safety, reset the alarm before running. Otherwise, it may be injured.
	5．The motor may restart suddenly when the power is turned on after a momentary power failure, so please keep away from the equipment. (Please consider how to ensure personal safety when restarting during mechanical design). Otherwise, it may be injured.
	6．Please confirm that the power supply specifications are normal. Otherwise, it may cause fire, malfunction and injury.

CONTENTS

Chapter 1 Overview

1.1 Servo Drive Model Description

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

1：Indicates the type of controller: FS 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, A: 17-bit multi-turn absolute encoder;

5：T: represents standard; F: With pulse feedback function；

6：Optional communication function, E：EtherCAT communication;

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	AB	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: “A” for 17-bit multi-turn absolute encoder, ”AB” for 23-bit multi-turn absolute encoder,

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

6：Indicates the rated speed of the motor:

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

8：Indicates the type of output shaft:

A for straight shaft with key, key width 6mm.	A for straight shaft with key, key width 6mm.
E for straight shaft with key, key width 10mm.	E for straight shaft with key, key width 10mm.
B for no keys on straight shaft.	B for no keys on straight shaft.

F for straight shaft with key, key width 4mm.	F for straight shaft with key, key width 4mm.

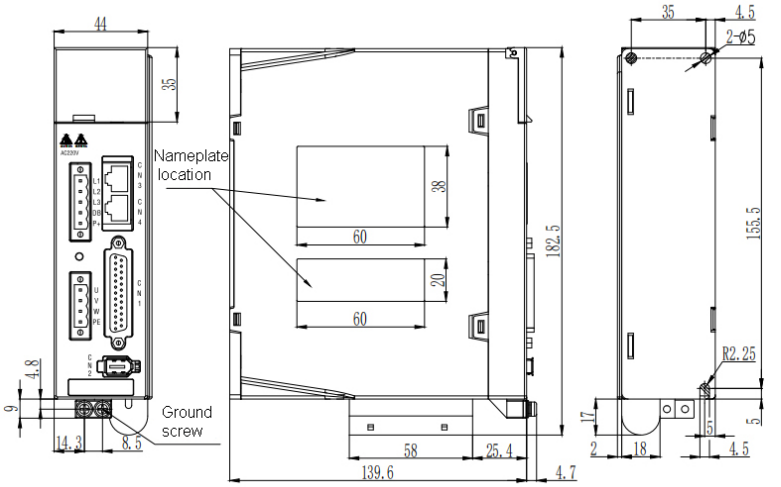
9：Derived number, indicates motor encoder specifications.

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

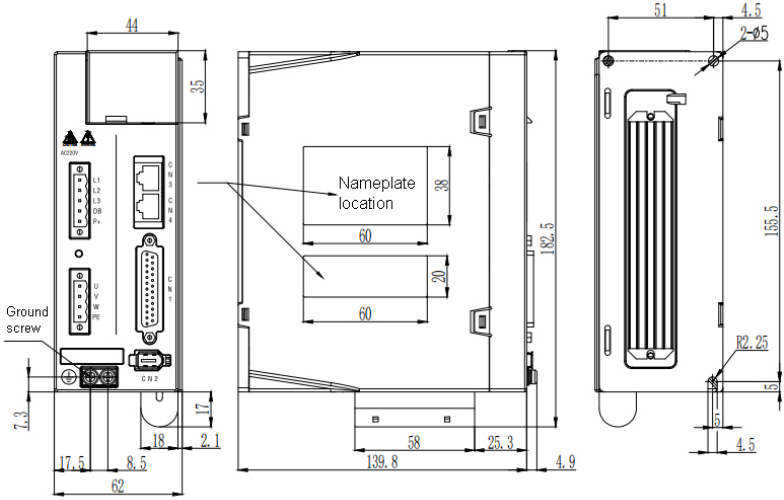
Chapter 2 Controller And Motor Installation

2.1 Servo Controller Installation Dimensions

Unit：mm



FS3202/FS3204 ATE Installation Dimensions



FS3205/FS3206 ATE Installation Dimensions

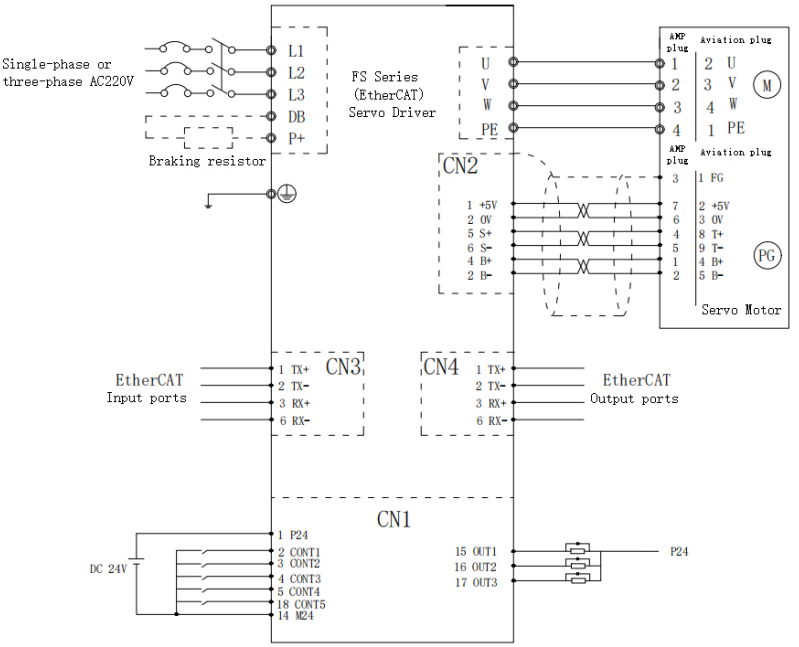
2.2 Power Supply

Supply single-phase AC 220V power supply to the servo drive, frequency: 50/60Hz.

Connect to L1, L2, L3 terminals, range: single-phase 200~230V -10%~+10%.

※ **If the given power voltage exceeds the limit value, the servo drive will be damaged.**

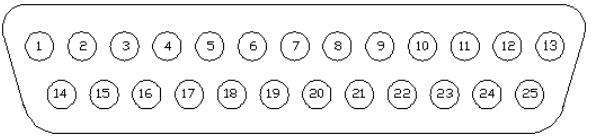
2.3 Wiring Diagram



Chapter 3 Wiring And Detailed Instructions

3.1 Instruction Control Sequence Input And Output (CN1)

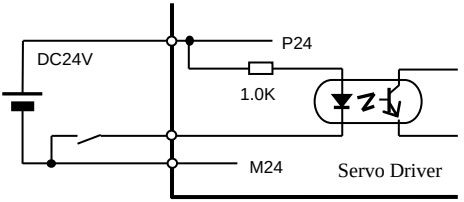
Servo drive control line plug (double row DB25 male) pins:

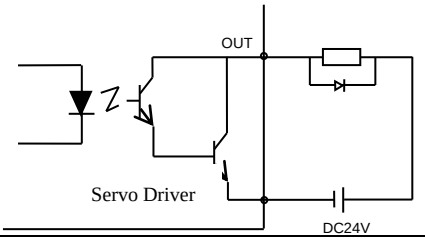


The connector 1 (CN1) of the servo drive is connected to the control signal of the host controller. Each signal is defined in the following table

CODE	CN1 PIN NO.	SIGNAL NAME	FUNCTION AND DEFINITION
P24 M24	1 14	Control signal input and output power supply	Input power supply for control signal input and output signal (DC24V/0.3A)。 P24: 24V input M24: Standard potential 0V input
CONT1 CONT2 CONT3 CONT4 CONT5	2 3 4 5 18	Input command control sequence	Input command control sequence signal. (DC24V/10mA) CONT1: Servo enable (RUN) CONT2: (Unspecified at the factory) CONT3: (Unspecified at the factory) CONT4: (Unspecified at the factory) CONT5: (Unspecified at the factory)
OUT1 OUT2 OUT3	15 16 17	Output command control sequence	Input command control sequence signal. (MAX DC30V/50mA) OUT1 : (Factory default 4) OUT2: (Unspecified at the factory) OUT3: (Unspecified at the factory)

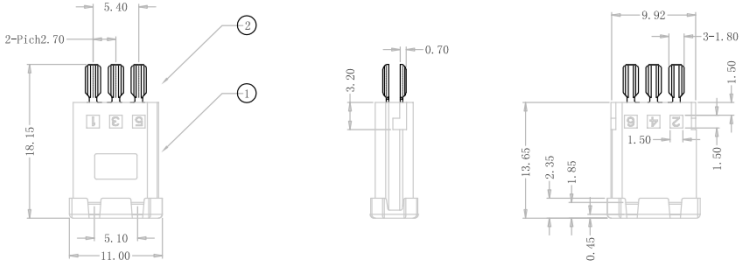
Interface circuit

Signal name	Circuit
Input command control sequence Interface Specifications DC24V/10mA (every 1 point)	

Output command control sequence Interface Specifications DC30V/50mA(MAX)	

3.2 Encoder (CN2)

Servo drive side encoder cable plug pins:



The rear end of the servo motor is equipped with an encoder; the wiring of the encoder is connected to the connector 2 (CN2) of the servo drive.

The maximum wiring length of the encoder is 20m, which is restricted by the wiring cable.

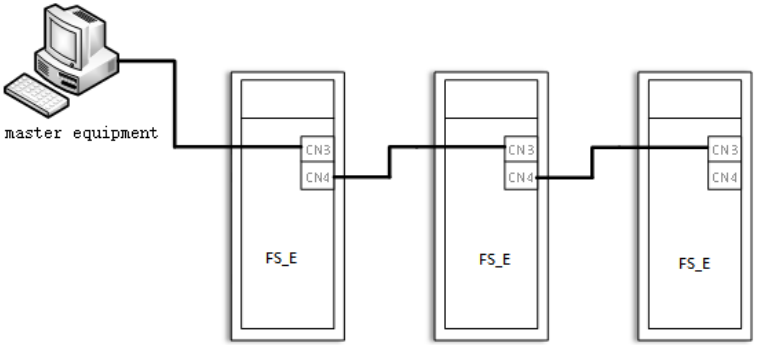
Encoder wire wiring definition:

17-bit or 23-bit bus encoder				
Drive side CN2	**Definition**	**Motor side corresponding pins**		
Encoder socket		9 Pin AMP Plug	15 pin aviation plug	9 pin aviation small plug
1	5V	7	2	2
2	0V	6	3	3
5	S+	4	8	8
6	S-	5	9	9
4	BAT+	1	4	4
2	BAT-	2	5	5
Shell	Shield	3	1	1

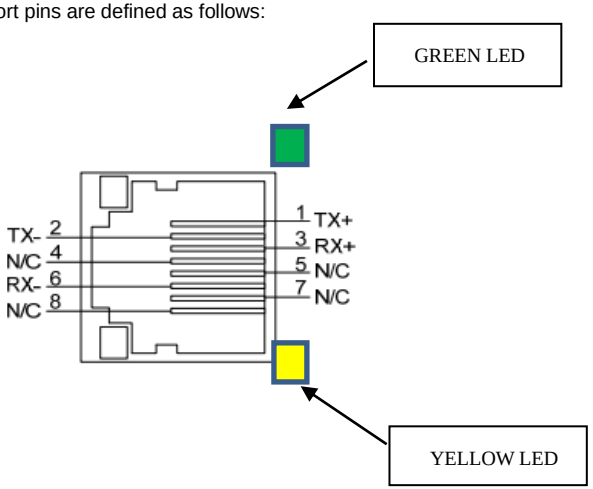
Note: 110-pin and above are 15-pin aviation plugs, and 90-flange and below have two types of plugs: 9Pin AMP plug and 9-pin aviation small plug, which is subject to the actual situation.

3.3 Communication Interface, (CN3, CN4) EtherCAT Port Description

The following figure is a schematic diagram of the connection between the EtherCAT master station and multiple Riding FS (EtherCAT) servos:



The CN3/CN4 port pins are defined as follows:



The CN3 and CN4 interfaces are EtherCAT communication interfaces:

CN3,CN4	Pin Definition	Function Description
1	TX+	Driver data transfer differential + terminal
2	TX-	Driver data transfer differential - terminal
3	RX+	Driver data receiving differential + terminal
6	RX-	Driver data receiving differential - terminal
4、5、7、8	N/C	

CN3 and CN4 ports are standard RJ45 sockets, and it is recommended to use Cat5e network cable or above-grade shielded twisted pair cable for direct connection.

When used as EtherCAT communication interface, the LED meaning of CN3/CN4 port:

CN3	YELLOW LED	EtherCAT RUN LED
	GREEN LED	Port0 Link Active LED
CN4	YELLOW LED	EtherCAT ERR LED
	GREEN LED	Port1 Link Active LED

Chapter 4 Servo Parameter Description

4.1 Parameter Settings

Setting method ：

First, use the MODE ESC key to select the parameter editing mode

Switch to P0-01, use the ∨ ∧ key to select the parameter number, or use the SHIFT ENT key to shift, so as to quickly find the parameters to be set. Press and hold the SHIFT ENT key for more than 1 second to enter the parameter setting.

4.2 List of parameters

NO.	DEFINITION	SETTING RANGE	DEFAULT	CHANGE
P0				
P0-00 P0-01	Electronic gear numerator 0	1-100000000	131072	Always
P0-02 P0-03	Electronic gear denominator 0	1-100000000	10000	Always
P0-04	Command pulse shape	0: pulse+direction 1：AB pulse 2：Positive and negative pulse	0	Outage
P0-05	Rotation direction switch	0:Same as default direction 1:Opposite of default direction	0	Outage
P0-06	Output pulse phase switching during rotation	0. Phase B starts when CCW rotates; 1. Phase A starts when CCW rotates.	0	Outage
P0-07	Forward torque limit	0-300%	250%	Always
P0-08	Reverse torque limit	0-300%	250%	Always
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：CANOPEN mode 12：EtherCAT mode	12	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: Selection of acceleration and deceleration 17: Gain switching 19: Torque limit selection 1 20: Torque limit selection 2 24: Gear ratio selection 1 25: Gear ratio switching 2 26: Pulse input prohibited 27: Command pulse ratio 1 28: Command pulse 2 31: Run pause 32: Position cancel 34: Overheating of external braking resister 37: Position control mode 36: Mode switch 39: Speed control mode 38: Torque control mode 44: Schedule 1 43: Effective schedule 46: Schedule 4 45: Schedule 2 50: Clear position deviation 47: Schedule 8 52: Multi-speed selection 2 51: Multi-speed selection 1 54: Multi-speed selection 4 53: Multi-speed selection 3 65: Point-to-point location selection 1 55: Forced slide stop 67: Point-to-point location selection 3 66: Point-to-point location selection 2 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：Break action 14：Break timing 15：Alarm A contact output 16：Alarm B contact output 20：OT detection 22：Return to origin completed 23：Zero position deviation 24：Zero speed 25：Speed reached 26：Current limit detection 30：Multi-segment location 0 31：Multi-segment location 1 32：Multi-segment location 2 33：Multi-segment location 3 34：Multi-segment location 4 35：Multi-segment location 5 38： +OT detection 39：-OT detection 41：Force stop detection 50：Internal position completion	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	Always
P0-20	Z phase compensation	0~60000（pulse）	0	Always
P0-21 P0-22	Deviation zero range / Positioning ending range	0~100000000（pulse）	100	Always
P0-23	Deviation exceeds detection	0.1~100.0(ring)	15.0	Always
P0-24	Judge time of positioning ending	0.000~1.000 sec(0.001 sec)	0	Always
P0-25	Positioning ending output	0：output form 1 1：output form	0	Outage
P0-26	Minimum OFF time when positioning ended	1~1000（ms）	20	Always

P0-27	Related parameters of insufficient voltage	0x0111 bit0-3 Whether to detect LU alarm, 0 NO 1 YES bit4-7 Motor action when LU, 0 Emergency stop 1 Slide stop bit8-bit11 whether LU needs self-recovery, 0 NO 1 YES	0x0001	Effective after power on
P0-28	No definition	0-1	0	Always
P0-29	Prohibit overwriting of parameters	0: Rewritable 1: Rewrite prohibited	0	Always
P0-30	Power on display interface	0~50	0	Outage
P0-31	Consistent speed range	0.1~6000.0（rpm）	10.0	Always
P0-32	Speed limit selection during torque control	0：Use analog quantity as speed reference 1：Use P0-33 as the speed reference	0	Always
P0-33	Maximum speed for torque control	0.1~6000.0（rpm）	3000.0	Always
P0-34	Maximum speed for position and speed control	0.1~6000.0（rpm）	3000.0	Always
P0-35	Acceleration time 1 (combination test run)	1~10000（ms）	100	Always
P0-36	Deceleration time 1 (combination test run)	1~10000（ms）	100	Always
P0-37	Acceleration time 2	1~10000（ms）	500	Always
P0-38	Deceleration time 2	1~10000（ms）	500	Always
P0-39	Judgment time of torque arrival	0~1000（ms）	3	Outage
P0-40	Position regulator gain 1	1~2000[rad/sec](1 scale)	25	Always
P0-41	Speed regulator gain 1	1~30000[Hz](1 scale)	100	Always
P0-42	Speed regulator integral coefficient 1	0~4096（1 scale）	400	Always
P0-43	S-shaped time constant	0~1000（ms）	100	Always
P0-44	Position loop feed-forward gain 1	0.000~1.200(0.001 scale)	0	Always
P0-45	Feed-forward filter time constant	0.000~2.500[ms](0.001 scale)	0	Always
P0-46	Torque filter time constant	0.00~20.00[ms](0.01 scale)	0.5	Always

P0-47	Speed setting filter	0.00~20.00[ms](0.01 scale)	0	Always
P0-48	Main reason for the gain switch	0：Position deviation (×10)，1：Feedback speed，2：Command speed，3：Switched by input port	1	Always
P0-49	Gain switching level	1~1000（1 scale or %）	50	Always
P0-50	Gain switch time constant	1~100[ms] (1 scale)	10	Always
P0-51	Position regulator gain 2	30~200%（1%）	100	Always
P0-52	Speed regulator gain 2	1~1500（%）	100	Always
P0-53	Speed regulator integral coefficient 2	1~1500（1%）	100	Always
P0-54	Position loop feed-forward gain 2	0~1200（%）(1%)	100	Always
P0-55	Analog filtering	0.00~300.00（ms）	1	Always
P0-56	Deceleration time after disable	0~10000（ms）	100	Always
P0-57	Action sequence when disable	0：emergency stop　　1：free stop	0	Outage
P0-58	OL type, Judge type	To be added	0	Outage
P0-59	OL ratio	0.0000~1.5000	1	Always
P0-60	First-order delay S-shaped time constant	0.0~1000.0（ms）	0	Always
P0-61	Low voltage point setting	150~210V	160	Outage
P0-62	OH alarm temperature setting	40～110 ° C	80	Outage
P0-63	Fan opening temperature	20～70 ° C	40	Always
P0-64	Motor code	0~500	0	Outage
P0-65	Analog input 1 offset	0~4096	2048	Outage
P0-66	Maximum speed corresponding to analog input 1	0.0~P0-34	1000	Always
P0-67	Analog usage configuration	0x0~0x1111　bit0，mode of analog 1 and 2 bit1. 1：Uni-polar 0~10V，0：Bipolar -10~10V bit2. the number of hardware analogs 0.Single analog　1.Double analog bit3. Torque given source 0.Analog 1.Parameter（P2-08 and P2-09）	0x0000	Outage
P0-68	Analog 1 ratio	0.00~3.00	1	Always
P0-69	Analog input 2 offset	0~4096	2048	Outage

P0-70	Highest torque correspond to analog input 2	0~300%	100	Always
P0-71	Reserved	0~1	0	Always
P0-72	Analog 2 ratio	0.00~3.00	1	Always
P0-73	Analog speed zero limit	0.0~P0-34（rpm）	10	Always
P0-74	Analog torque zero limit	0~300%	5%	Always
P0-75	CONT is always valid internally 1	0~78	0	Outage
P0-76	CONT is always valid internally 2		0	Outage
P0-77	CONT is always valid internally 3		0	Outage
P0-78	CONT is always valid internally 4		0	Outage
P0-79	Parity/stop bit selection (for MODBUS)	RTU: 1: 8N2(NONE) 3:8O1(ODD) 5:8E1(EVEN)	1	Outage
P0-80	Communication application configuration	0x0~0x111 bit0. whether communication stores EEPROM, 0 stored, 1 not stored bit1, Action after communication timeout (not implemented), 0 regardless, only display status, 1 decelerate to stop bit2, Communication access 32bit parameter sequence 0: first low then high 1: first high then low	0x000	Outage
P0-81	To be added	0-1	0	Always
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	1	Outage
P0-86	0S alarm ratio	1.10~5.00	1.1	Always
P0-87	Related action after OT	0：Stop with maximum torque；1：Stop according to the set curve；2：Coast to zero speed and then lock	0	Always

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	3~3000(ms)	12	Outage
P0-91	Over-current forecast value	10~500%	350	Always
P0-92	Test speed given Fn-01	0.0~P0-34(rpm)	50	Always
P0-93	Test operation mode	0: Position (to be added) 1：Speed 2：Torque (to be added)	1	Always
P0-94	Test speed given Fn-10	0.0~P0-34(rpm)	200	Always
P0-95	Current loop feed-forward ratio	0~500%	0	Always
P0-96	Differential time of current regulator	0~1.00（ms）	0	Always
P0-97	Cutoff frequency of current regulator	100~3000(Hz)	650	Always
P0-98	Integration time of current regulator	0.0~100.0（ms）	1.8	Always
P0-99	Current loop output filter	0.000~1.000（ms）	0	Always
P1				
P1-00	Indexing function speed/internal position speed1	0.1~P0-34	500	Always
P1-01	Multi-step speed 1/internal position speed 2	0.1~P0-34	500	Always
P1-02	Multi-step speed 2/internal position speed 3	0.1~P0-34	1000	Always
P1-03	Multi-step speed 3/internal position speed 4	0.1~P0-34	1000	Always
P1-04	Multi-step speed 4/internal position speed 5	0.1~P0-34	1000	Always
P1-05	Multi-step speed 5/internal position speed 6	0.1~P0-34	1000	Always

P1-06	Multi-step speed 6/internal position speed 7	0.1~P0-34	1000	Always
P1-07	Multi-step speed 7/internal position speed 8	0.1~P0-34	1000	Always
P1-08	Multi-step speed 8/internal position speed 9	0.1~P0-34	1000	Always
P1-09	Multi-step speed 9/internal position speed 10	0.1~P0-34	1000	Always
P1-10	Multi-step speed 10/internal position speed 11	0.1~P0-34	1000	Always
P1-11	Multi-step speed 11/internal position speed 12	0.1~P0-34	1000	Always
P1-12	Multi-step speed 12/internal position speed 13	0.1~P0-34	1000	Always
P1-13	Multi-step speed 13/internal position speed 14	0.1~P0-34	1000	Always
P1-14	Multi-step speed 14/internal position speed 15	0.1~P0-34	1000	Always
P1-15	Multi-step speed 15/internal position speed 16	0.1~P0-34	1000	Always
P1-16	Output pulse divider numerator (to be added)	0~100000000	1	Outage
P1-17				Outage
P1-18	Output pulse divider denominator (to be added)	0~100000000	16	Outage
P1-19				Outage
P1-20	CONT1~5 signal polarity	0~0xffff，bitn is 1 means the polarity is reversed	0	Outage
P1-21	CONT1 filter time, Ten thousand digit is the filtering form.	0-22000 Ten thousand digit: 0. Bidirectional dly 1. Up-jumping edge dly 2. Down-jumping edge dly	0	Outage
P1-22	CONT2 filter time, Ten thousand digit is the filtering form.	0-22000 Ten thousand digit: 0. Bidirectional dly 1. Up-jumping edge dly 2. Down-jumping edge dly	0	Outage

P1-23	CONT3 filter time, Ten thousand digit is the filtering form.	0-22000 Ten thousand digit: 0. Bidirectional dly 1. Up-jumping edge dly 2. Down-jumping edge dly	0	Outage
P1-24	CONT4 filter time, Ten thousand digit is the filtering form.	0-22000 Ten thousand digit: 0. Bidirectional dly 1. Up-jumping edge dly 2. Down-jumping edge dly	0	Outage
P1-25	CONT5 filter time, Ten thousand digit is the filtering form.	0-22000 Ten thousand digit: 0. Bidirectional dly 1. Up-jumping edge dly 2. Down-jumping edge dly	0	Outage
P1-26	OUT1~3 signal polarity	0~0x3ff, bitn is 1 means the polarity is reversed	0	Outage
P1-27	Electronic gear molecule 1	0~100000000	1	Always
P1-28				Always
P1-29	Electronic gear molecule 2	0~100000000	1	Always
P1-30				Always
P1-31	Electronic gear molecule 3	0~100000000	1	Always
P1-32				Always
P1-33	Command pulse ratio 1	0.01~100.00	1	Always
P1-34	Command pulse ratio 2	0.01~100.00	10	Always
P1-35	Select torque limit	0：CONT input torque limit 0, 1 setting 1：TREF pin voltage	0	Always
P1-36	Second torque limit value	0~300%	300	Always
P1-37	Third torque limit value	0~300%	300	Always
P1-38	Brake action time. Ten thousand digit indicates action	0-10000 ms 0. Delay after enabling 1. Delay after losing enable 2. Delay after enabling and losing enable	0	Always
P1-39	High-speed pulse low-pass filter frequency	0~500（kHz）	0	Outage
P1-40	Brake working failure time	0~10000 ms	0	Always
P1-41	Curve type	0:T-curve， 1:S-curve (regardless of 0-speed rollover) 2:S-curve (considering 0-speed rollover)	0	Outage
P1-42	Adjustment function switch (to be added)	0~1	0	Always
P1-43	Schedule ratio 1	0.00~1.50	0.1	Always
P1-44	Schedule ratio 2	0.00~1.50	0.2	Always

P1-45	Schedule ratio 4	0.00~1.50	0.4	Always
P1-46	Schedule ratio 8	0.00~1.50	0.8	Always
P1-47 P1-48	Number of output pulses per revolution	16~4095	2500	Outage Outage
P1-49	Reserved	0.50~300.00	3.19	Outage
P1-50	Carrier frequency (to be added)	12	12	Outage
P1-51	Dead time (to be added)	2.0~5.0（us）	2.8	Outage
P1-52	Encoder type configuration	0-0x6226 bits0-3. INC/ABS option. 0: Incremental, incremental system. 1: Single-turn, incremental system. 2: Multi-turn, absolute system. 3: Multi-turn, incremental system. 4: Multi-circle type, ignore the multi-circle alarm. 5: Multi-turn, as a single turn (temporarily invalid) bits 4-7. Whether it is a line-saving encoder. 1: ABZ-UVW type wire saving type. 2: PWM type wire-saving type (Raise type) bits8-11. Special handling for the Z signal. 1: Z in half circle form. 2: One z per electrical angle. bit12-bit15 . Set the angle compensation method. 0: no compensation	1	Outage
P1-53	Absolute encoder configuration	0：17-bit，1：20-bit，2：23-bit	0	Outage
P1-54	Incremental encoder lines	180~10000 lines	2500	Outage
P1-55	Encoder error protection time	0~3000(ms)	1500	Outage
P1-56	Motor rated speed	50~6000rpm	2500	Outage
P1-57	Motor rated current	0.01~120.00A	5	Outage
P1-58	Motor rated voltage	110~230V	220	Outage
P1-59	Motor torque coefficient	0.01~15.00	1	Outage
P1-60	Motor pole pairs	1~16	4	Outage
P1-61	Motor stator resistance	0.01~100.00(Ω)	1.84	Outage
P1-62	Motor quadrature inductance	0.05~180.00mH	3.2	Outage
P1-63	Motor direct shaft inductance	0.05~180.00mH	3.2	Outage
P1-64	Motor back EMF	10~1000(v/kRPM)	68	Outage
P1-65	Motor rotor inertia	0.001~30.000(gm^2)	1.06	Outage

P1-66	Motor electrical time constant	0.5~300.00(ms)	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	Always
P2				
P2-00	Moving average S shape time	0~500（ms）	0	Always
P2-01	Convergent integral filtering	0.00~20.00（ms）	0.5	Always
P2-02	Position loop convergence	1.0~1000.0（ms）	1000	Always
P2-03	Position loop differential	0.00~1.00（ms）	0.05	Always
P2-04	End convergence position deviation	0~10000（puls）	20	Always
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	The forward moment given by the panel	0~300%	100	Always
P2-09	The reverse moment given by the panel	0~300%	100	Always
P2-10	Load inertia ratio	0.0~100.0	0	Always
P2-11	Feed-forward coefficient of speed loop	0.000~1.500	0	Always
P2-12	speed feedback mode	0~0x31 bit0-3 0. Encoder feedback 1. Speed observer Bit4-7 Observer gear	0x10	Outage
P2-13	Speed feedback filter time constant	0.00~10.00（ms）	0	Always
P2-14	Speed loop PI regulator	0: normal; 1: PDFF; 2: high beat	0	Outage
P2-15	PDFF-Kf	0.00~2.00	1	Always
P2-16	Reserved	0.0~25.5	0	Outage
P2-17	Static torque limit value	0~150(%)	95	Always
P2-18	Judgment time of static torque	0~10000（ms）	0	Always
P2-19	Reserved	0~200	0	Always

P2-20	Reserved	0~200	0	Always
P2-21	Reserved	0~200	0	Always
P2-22	Virtual In1 (to be added)	Reserved	0	Outage
P2-23	Virtual In2 (to be added)	Reserved	0	Outage
P2-24	Virtual In3 (to be added)	Reserved	0	Outage
P2-25	Virtual In4 (to be added)	Reserved	0	Outage
P2-26	Virtual In5 (to be added)	Reserved	0	Outage
P2-27	Virtual In6 (to be added)	Reserved	0	Outage
P2-28	Virtual In7 (to be added)	Reserved	0	Outage
P2-29	Virtual In8 (to be added)	Reserved	0	Outage
P2-30	Virtual Out1 (to be added)	Reserved	0	Outage
P2-31	Virtual Out2 (to be added)	Reserved	0	Outage
P2-32	Virtual Out3 (to be added)	Reserved	0	Outage
P2-33	Virtual Out4 (to be added)	Reserved	0	Outage
P2-34	Virtual Out5 (to be added)	Reserved	0	Outage
P2-35	Virtual Out6 (to be added)	Reserved	0	Outage
P2-36	Virtual Out7 (to be added)	Reserved	0	Outage
P2-37	Virtual Out8 (to be added)	Reserved	0	Outage
P2-38	Position data decimal point position (to be added)	Reserved	0	Always
P2-39	Return-to-origin speed	0.1~1000.0（rpm）	500	Always
P2-40	Return-to-origin creep speed	0.1・~1000.0（rpm）	50	Always

P2-41	Return-to-origin configuration bits	0x1445 bit0~3. Return to origin mode. 0: Positive direction return (external reference point). 1: Reverse direction return (external reference point). 2: Positive and Positive (mixed reference). 3: Positive and negative (mixed reference). 4: negative and positive. 5: Negative and negative. bit4~7. Origin return trigger mode. 0: Off. 1: Level trigger. 2: Rising edge trigger. 3: Automatically trigger once when power on and level-triggered. 4: Trigger once at power-on and trigger on rising edge. bit8~11. Reference point setting, origin reference signal. 0: External reference. 1: Z signal reference. 2: Hybrid reference. 3: Obtain the reference point from the recorded position, and then go to the origin. 4: Direct position to origin. bit12~15. Whether to allow skipping. 0: Allow to skip the high-speed segment when the external signal is valid. 1: Not allowed.	0	Outage
P2-42	Reserved	0-255	0	Outage
P2-43	Reserved	0-255	0	Outage
P2-44	Origin signal in-position delay	0-5000(ms)	50	Always
P2-45	Origin signal output delay	0-5000(ms)	100	Always
P2-46	Preset position	-2147483647~2147483647	0	Always
P2-47				Always
P2-48	Z-phase bias	-2147483647~2147483647	0	Always
P2-49				
P2-50	Origin LS timing selection	0-1 (to be added)	0	Outage
P2-51	Select return-to-origin OT operation	0-1 (to be added)	0	Outage
P2-52	Positive software OT detection position	-2147483647~2147483647	2000000000	Always
P2-53				Always
P2-54	Negative software OT detection position	-2147483647~2147483647	-2000000000	Always
P2-55				

P2-56	Software OT valid/invalid	0-0x22 bits0-3. How to deal with OT. 0: Do not detect software OT; 1: OT does not treat errors; 2: OT reports software errors. bits 4-7. Whether PN001=1~6 is processed. 0: No processing; 1: Only limited after absolute position is established; 2: Both relative position and absolute position are limited.	0	Outage
P2-57	Position command i form	（若 P0-09=7) 0-1 (to be added)	0	Outage
P2-58	Location data valid/invalid	0-1 (to be added)	0	Always
P2-59	Sequential startup valid/invalid	0~2 (to be added)	0	Always
P2-60	Stop timing decimal point	0~10 (to be added)	10	Always
P2-61	Return to origin acceleration	1~10000（ms）	100	Always
P2-62	Return to origin deceleration	1~10000（ms）	100	Always
P2-63	Forward stroke, must be positive	0~2147483647	2000000000	Always
P2-64				Always
P2-65	Reverse stroke, must be positive	0~2147483647	2000000000	Always
P2-66				
P2-67	EtherCAT communication configuration parameters	0x0111 bits0-3. Position loop smoothing function. 0: off; 1: on. bits 4-7. Position loop command compensation command. 0: off; 1: on.	0x0010	Outage
P2-68	Reserved	0~0xFFFF	0	Outage
P2-69	Ethercat position loop smoothing speed threshold	0~500rpm	60	Always
P2-70	Ethercat data frame loss alarm threshold	2~100	9	Always
P2-71	Reserved	0~0xFFFF	0	Always
P2-72	Reserved	0~0xFFFF	0	Always
P2-73	Reserved	0~0xFFFF	0	Always
P3				

P3-00	Point-to-point control parameters 1	bit0~3. Point-to-point triggering. 0: high level; 1 rising edge. bit4~7. run mode. 0: 1/0 mode, multi-segment position; 1: non-continuous programming mode; 2: continuous programming mode; 3: infinite loop. bit8~11. addressing mode. 0: Normal; 1: Sequential addressing; 2: Reverse order 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 when starting; 1: output when positioning is completed. bit4~7. Combining 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	1~30000	1	Always
P3-05	Reserved	1~30000	1	Outage
P3-06 P3-07	Indexing function single-turn setting	-2147483647~2147483647	10000	Outage
P3-08	Programming mode enables segment/dividing function Single-turn indexing	1~32	16	Always
P3-09	Reserved	0.0~25.5	0	Outage
P3-10 P3-11	Multi-segment position given 0	-2147483647~2147483647	0	Always Always
P3-12 P3-13	Multi-segment position given 1	-2147483647~2147483647	0	Always Always
P3-14 P3-15	Multi-segment position given 2	-2147483647~2147483647	0	Always Always
P3-16 P3-17	Multi-segment position given 3	-2147483647~2147483647	0	Always Always
P3-18	Multi-segment position given 4	-2147483647~2147483647	0	Always

P3-19				Always
P3-20	Multi-segment position given 5	-2147483647~2147483647	0	Always
P3-21				
P3-22	Multi-segment position given 6	-2147483647~2147483647	0	Always
P3-23				Always
P3-24	Multi-segment position given 7	-2147483647~2147483647	0	Always
P3-25				Always
P3-26	Multi-segment position given 8	-2147483647~2147483647	0	Always
P3-27				Always
P3-28	Multi-segment position given 9	-2147483647~2147483647	0	Always
P3-29				Always
P3-30	Multi-segment position given 10	-2147483647~2147483647	0	Always
P3-31				Always
P3-32	Multi-segment position given 11	-2147483647~2147483647	0	Always
P3-33				Always
P3-34	Multi-segment position given 12	-2147483647~2147483647	0	Always
P3-35				Always
P3-36	Multi-segment position given 13	-2147483647~2147483647	0	Always
P3-37				Always
P3-38	Multi-segment position given 14	-2147483647~2147483647	0	Always
P3-39				Always
P3-40	Multi-segment position given 15	-2147483647~2147483647	0	Always
P3-41				Always
P3-42	Delay 1	0~5000(ms)	100	Always
P3-43	Delay 2	0~5000(ms)	100	Always
P3-44	Delay 3	0~5000(ms)	100	Always
P3-45	Delay 4	0~5000(ms)	100	Always
P3-46	Delay 5	0~5000(ms)	100	Always
P3-47	Delay 6	0~5000(ms)	100	Always
P3-48	Delay 7	0~5000(ms)	100	Always
P3-49	Delay 8	0~5000(ms)	100	Always
P3-50	Delay 9	0~5000(ms)	100	Always

P3-51	Delay 10	0~5000(ms)	100	Always
P3-52	Delay 11	0~5000(ms)	100	Always
P3-53	Delay 12	0~5000(ms)	100	Always
P3-54	Delay 13	0~5000(ms)	100	Always
P3-55	Delay 14	0~5000(ms)	100	Always
P3-56	Delay 15	0~5000(ms)	100	Always
P3-57	Delay 16	0~5000(ms)	100	Always
P3-58	Reserved	0.0~25.5	0	Outage
P3-59	Reserved	0-0x01	0	Outage
P3-60	Bleed resistance value	1-1000(Ω)	16	Always
P3-61	Bleed resistance power	0-10000(W)	0	Always
P3-62	Voltage linearity correction factor	0.0001-3.0000	1.0000	Always
P3-63	Voltage linearity correction bias	0．0-1000.0(V)	500.0	Always
P3-64	Reserved	0-0x1111	0x1100	Outage

Always： The modification takes effect immediately;

Outage： After parameter modification, it will take effect after power off and restart;

Conditions are valid： It can only be modified when the servo is not enabled.

Chapter 5 Servo Main Operation Function

5.1 Introduction of Operation Panel

Seven segment display

Keys

MODE ESC	Switch mode(MODE)。 Delet(ESC)。
SHIFT ENT	Shift the set bit to the right (SHIFT). Determine Mode and Value (ENT). To confirm, press and hold this key for more t second.
∨	Select the servo mode. Decrement of the value(−1)。
∧	Select the servo mode. Increment for the value(+1)。

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	Sub-mode Definition	Sub-mode	Examples
Sequential monitoring mode	Sequential mode	Sn-01	P-SOF
	The current alarm	Sn-02	EC
	Alarm record	Sn-03	1-EC
	Display station number	Sn-04	Ad01
	CANopen/EtherCAT state	Sn-05	` 53on
Monitor 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
	Factory reserved	On-13	Factory reserved
	Peak torque	On-14	3
	Pulse sequence input frequency	On-15	10
	Motor code	On-16	6
	Software version number	On-17	
	Factory reserved	On-18～19	Factory reserved
	Number of absolute encoder communication errors	On-20	50
	Factory reserved	On-21～27	Factory 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
	Multiturn encoder value	On-31	1
	EtherCAT invalid frames	On-38	H0001/L0000
	EtherCAT forward errors	On-39	H0001/L0000
	EtherCAT lost link count	On-40	H0001/L0000
	Number of EtherCAT smoothing starts	On-41	0
	Number of dropped frames in	On-42	0
	EtherCAT communication cycle (us)	On-43	2000
	EtherCAT Communication Status	On-44	H0001/L0000
Parameter edit mode	parameter editing	P0-01～P3-64	
Test run mode	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 history	Fn-05	ALRT
	Parameter initialization	Fn-06	PART
	Automatic adjustment compensation	Fn-07	OFFB
	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	

	Absolute encoder coordinate system reset	Fn17	Clr0

5.4 Sequential Monitoring Mode

The sequence monitoring mode can display the current status of servo drive and the alarm detection record. Press the MODE key to display [Sn], press the ENT key to display [Sn-01], then use the ∧ or ∨ key to adjust the sub-mode, and press the ENT key (press for more than 1 second) to display the input content.

SN-01：Sequence mode

SN-02：Current Alarm

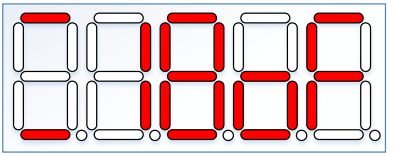
SN-03：Alarm record

SN-04：Display station number

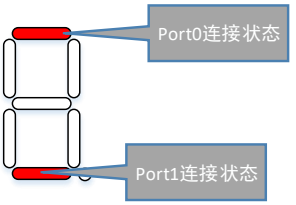
SN-05: CANopen/EtherCAT status

When using the EhterCAT bus, the link status of the EtherCAT physical layer Port0 and Port1, ESM status, working mode and servo running status can be obtained through the operational panel.

Use the four keys to switch the display page to the Sn-05 status page, the following screen will be seen:



1）The first digital tube from the left indicates the connection status of Port0 (CN3) and Port1 (CN4).



（Port0 连接状态： Connection status of Port0

Port1 连接状态： Connection status of Port1）

When this segment is long on, it means that the correspond Port has a communication connection. And when it is long off, it means that there is no communication connection.

2）The second digital tube from left indicates the ESM status.

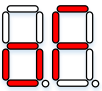
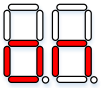
Display	Definition

	1：Indicates that the current ESM state machine is in the Init state.
	2: Indicates that the current ESM state machine is in the Pre-Op state.
	4：Indicates that the current ESM state machine is in the Safe-Op state.
	8：Indicates that the current ESM state machine is in the Op state.
	b: Represents there is an error in the current ESM mode, such as a state transition error or system disconnection.

3）The third digital tube from the left indicates the current working mode of the servo, that is, the value of the object dictionary 6061h.

The possible displays are: number 0-number 10, representing different working modes, for example, if the working mode is set to synchronous position mode (CSP), then this bit will display "8". "0" means that the working mode is not set.

4）The fourth and fifth digital tubes from the left indicate the current running status of the servo.

Display	Definition
	OF: Indicates that the servo is currently disabled
	On: Indicates that the servo is currently enabled

NO.	Name	Remark
On-38	Initially detect invalid frame counter	H：Port1 interface counter L：Port0 interface counter Counts up to 0xFF. Count the number of error frames received by EtherCAT

On-39	Front end error frame counter	H：Port1 interface counter L：Port0 interface counter Counts up to 0xFF. Count the number of front end error frames received by EtherCAT.
On-40	Link loss counter	H：Port1 interface counter L：Port0 interface counter Counts up to 0xFF. Counts only when the port is in Auto or Auto close mode.
On-41	EtherCAT position correction times	This parameter is valid when the bit0-3 parameter of P2-67 is set to 1, that is, the EtherCAT position smoothing function is enabled.
On-42	Packet loss times of EtherCAT in OP mode	This parameter counts the number of packets lost when EtherCAT is running in the OP state. This parameter is only valid when the slave is operating in the OP state.
On-43	Master Sync Cycle	Unit：us
On-44	EtherCAT Communication Status Register	The value of the 0x110 register in the EtherCAT state machine, most of the time, the connection problem can be judged by checking the SN05.

Chapter 6 Servo Alarm

6.1 Alarm Content

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

When multiple alarms are detected at the same time, the touch panel displays in the following priority order.

Error label	Display	Name	Communication alarm code
1	OC1	Over-current 1	1
2	OC2	Over-current 2	2
3	EH	Current sampling loop damaged	8
4	PLD	CPLD error	13
5	EC	Encoder communication error	7
6	OS	Over-speed	3
7	HU	Over-voltage	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 alarm 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 sendingThis error can be cleared by master communication.

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.Corresponding to the EtherCAT mode, the typical situation is that when the servo is enabled, the communication state machine switches from OP to other states. In terms of the restart sequence of the master station, it is best to first use the SDO with the 402 protocol to enable and disable the server and then initialize it. This error can be cleared by master communication.

Annex 1: Servo Drive And Motor Selection Table

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-A001D2H	0.05	0.4	0.16	3000	FS3201-ATE	83
2	40ST-A003D2H	0.1	0.6	0.32	3000	FS3201-ATE	81
3	60ST-A006D2D	0.2	1.2	0.637	3000	FS3201-ATE	4
4	60ST-A013D2D	0.4	2.8	1.27	3000	FS3202-ATE	5
5	60ST-A019D2D	0.6	3.5	1.91	3000	FS3204-ATE	6
6	80ST-A013D2A	0.4	2	1.27	3000	FS3202-ATE	11
7	80ST-A024D2A	0.75	3	2.39	3000	FS3204-ATE	12
8	80ST-A035B2A	0.73	3	3.5	2000	FS3204-ATE	13
9	80ST-A035D2A	1.05	4.5	3.5	3000	FS3205-ATE	17
10	80ST-A040C2A	1.0	4.4	4	2500	FS3205-ATE	14
11	90ST-A024B2D	0.5	3	2.4	2000	FS3204-ATE	21
12	90ST-A024D2D	0.75	3	2.4	3000	FS3204-ATE	22
13	90ST-A035B2D	0.73	3	3.5	2000	FS3204-ATE	23
14	90ST-A040C2D	1.0	4	4	2500	FS3205-ATE	24
15	110ST-A020D2A	0.6	2.5	2	3000	FS3202-ATE	31
16	110ST-A040B2A	0.8	3.5	4	2000	FS3204-ATE	32
17	110ST-A040D2A	1.2	5	4	3000	FS3205-ATE	33
18	110ST-A050D2A	1.5	6	5	3000	FS3206-ATE	34
19	110ST-A060B2A	1.2	4.5	6	2000	FS3205-ATE	35
20	110ST-A060D2A	1.8	6	6	3000	FS3206-ATE	36
21	130ST-A040C2A	1.0	4	4	2500	FS3205-ATE	41
22	130ST-A050C2A	1.3	5	5	2500	FS3205-ATE	42
23	130ST-A060A2A	0.9	4.3	6	1500	FS3205-ATE	43
24	130ST-A060C2A	1.5	6	6	2500	FS3206-ATE	44
25	130ST-A060D2A	1.9	7.5	6	3000	FS3206-ATE	101
26	130ST-A077C2A	2.0	7.5	7.7	2500	FS3206-ATE	45
27	130ST-A100E2A	1.0	4.5	10	1000	FS3205-ATE	46
28	130ST-A100A2A	1.5	6	10	1500	FS3206-ATE	47
29	130ST-A120E2A	1.2	6.5	12	1000	FS3206-ATE	152
30	130ST-A150E2A	1.5	7.3	15	1000	FS3206-ATE	53

31	60SE-A006D2D	0.2	1.4	0.64	3000	FS3202-ATR	171
32	60SE-A013D2D	0.4	2.1	1.27	3000	FS3202-ATR	172
33	80SE-A024D2A	0.75	3.8	2.39	3000	FS3204-ATR	173
34	80SE-A032D2A	1.00	5.7	3.18	3000	FS3206-ATR	174

Annex 2: Motor Code Setting Method

If the motor code is not set, the driver will display the "Nd" alarm after power-on. At this time, the motor code needs to be set.

Set P0-64: motor code, please refer to the manual or the code item on the motor nameplate for the specific motor code.

Note: After the setting is completed, it needs to be powered off and restarted. If the setting is unreasonable, the drive will report "CE" alarm.

Appendix 3: Main Models and Descriptions of FS (EtherCAT Series) Servo

NO.	TYPE	POWER(KW)	Break Resistor	FAN
1	FS3201-ATE	0.2	Optional	No
2	FS3202-ATE	0.4	Optional	No
3	FS3204-ATE	0.75	Optional	Have
4	FS3205-ATE	1.0	built-in 60Ω、80W	Have
5	FS3206-ATE	1.5	built-in 60Ω、80W	Have