WINDCNC

LS Series EtherCAT AC servo drive

Convenient user manual

NanJing WindCNC Technology Co.,Ltd

Version: V 1.03

Version management records

order number	version number	Revised date	Revised overview
1	V1.00	2021-06-18	Version generation
2	V1.01	2021-07-28	Add the EtherCAT communication alarm description
3	V1.02	2022-02-28	Add the size description and electrical interface description of each type
4	V1.03	2023-02-08	Motor model code table was updated

CONTENTS

1: Installation and Dimensions

1.1 Servo-drive installation environment requirements

- temperature:0~55℃;
- Ambient humidity: not higher than 90% RH (non-condensation);
- The altitude shall not exceed 1000m;
- Vibration limit of 4.9 m/s^2;
- Impact limit 19.6m/s^2;
- Other installation precautions:

• Install in the control cabinet

The size of the control cabinet, the placement mode of the servo drive and the cooling mode should be considered to ensure that the ambient temperature of the servo drive is lower than 55℃. For specific operation details, be described in the relevant sections of 1.2.2;

• Install near the heat source

It is necessary to control the radiation of the heat source and the temperature rise due to the convection to ensure that the ambient temperature of the servo driver is lower than 55℃;

• Installed near the vibration source

The vibration isolation device needs to be installed to avoid the vibration transmission to the servo driver;

• Installation is exposed to corrosive gas

Take the necessary measures to prevent exposure to corrosive gases. Corrosion gas may not immediately affect the servo driver, but it will obviously lead to the failure of electronic components and contactor related components;

• et al

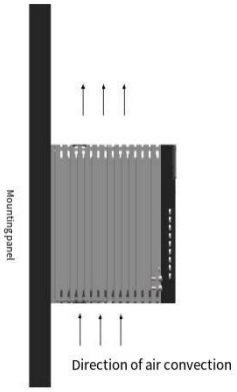
Do not place drives such as high temperature, humidity, dew, oil splash, dust, iron, or radiation;

Note: When the power supply is closed, please place the drive in the following environment: -20~85℃, not higher than 90% RH (non-exposed)

1.2 Servo drive installation

1.2.1 Directionality

Servo drives can be installed in many ways, but anyway, they must be installed in the vertical direction.



1.2.2 Installation standards

• Servo installation direction

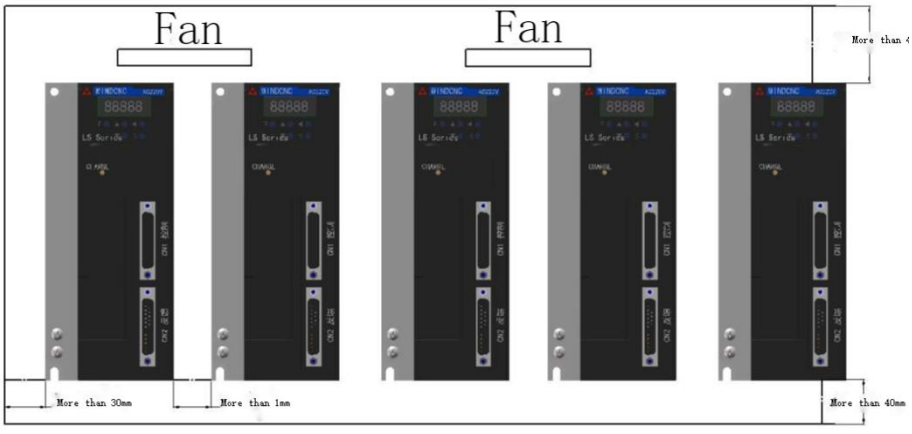
Install the servo vertically on the wall and face the operation panel out;

• heat radiation

Refer to the schematic diagram and leave sufficient space for the heat dissipation of the fan and air convection;

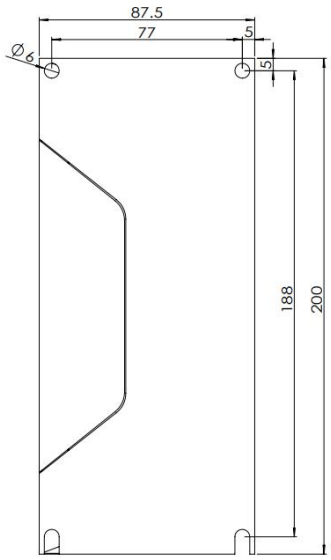
• Install the servo drive side by side on the mounting panel

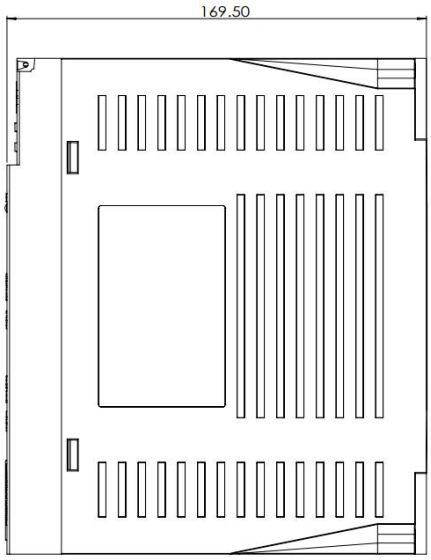
• Installation in electric cabinet

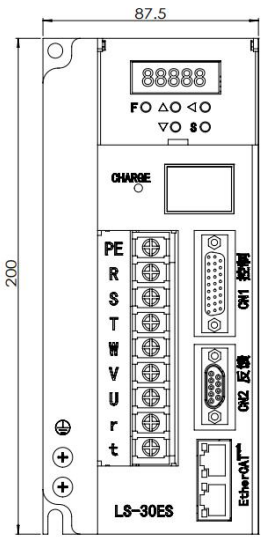


1.3 Dimensional Drawings

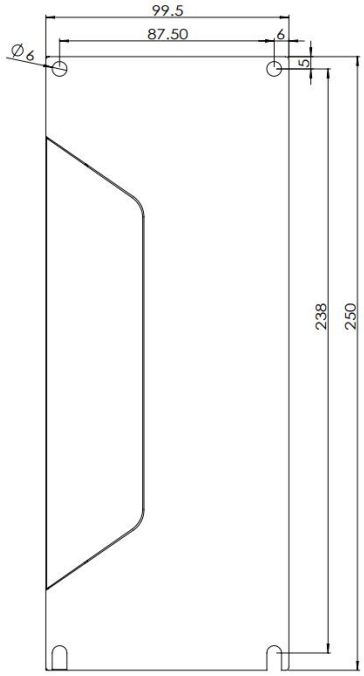
1.3.1 LS -30ES

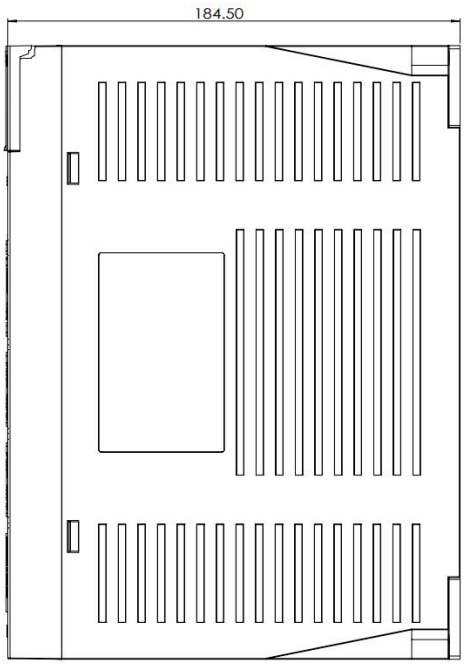


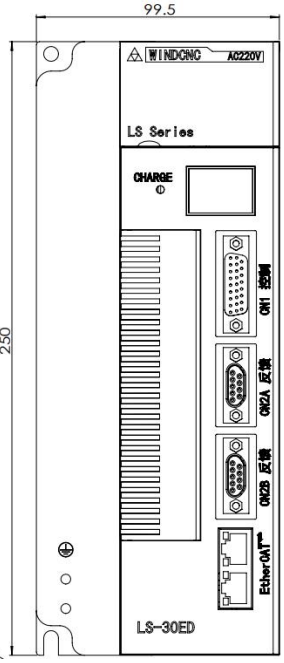




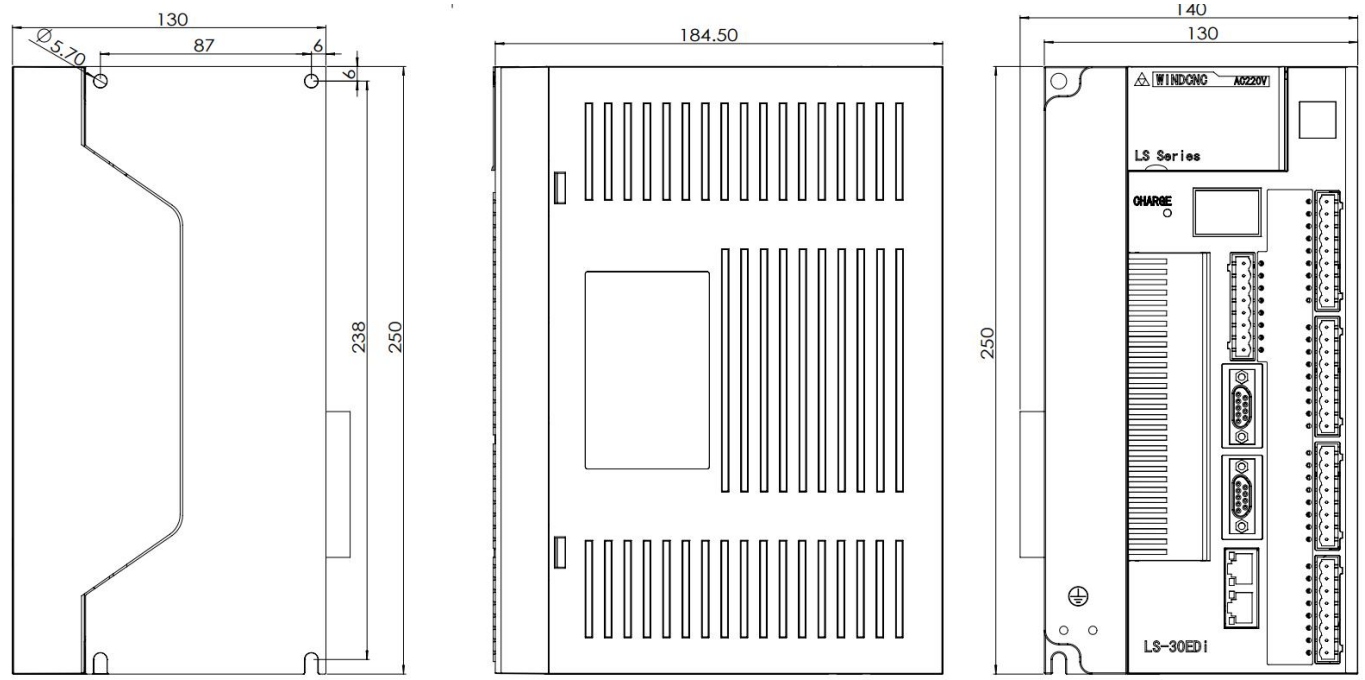
1.3.2 LS -30ED/LS -50ES/LS -75ES



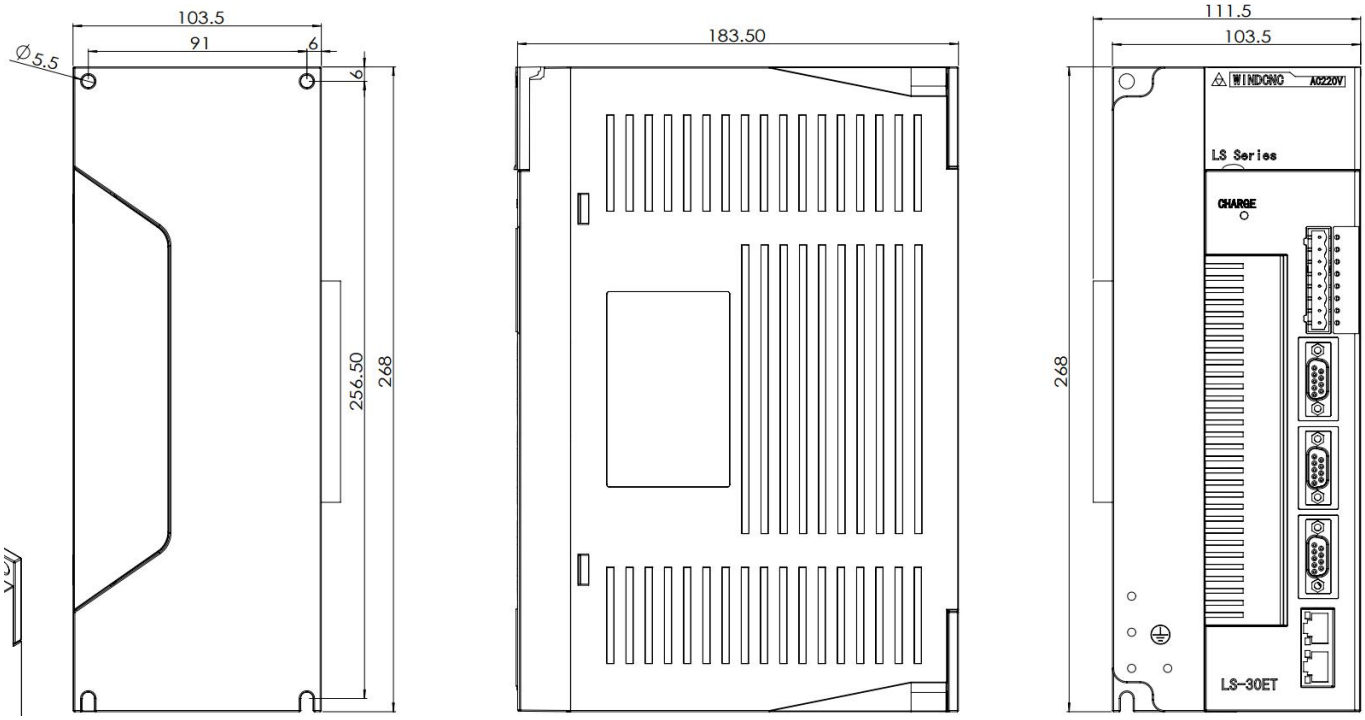




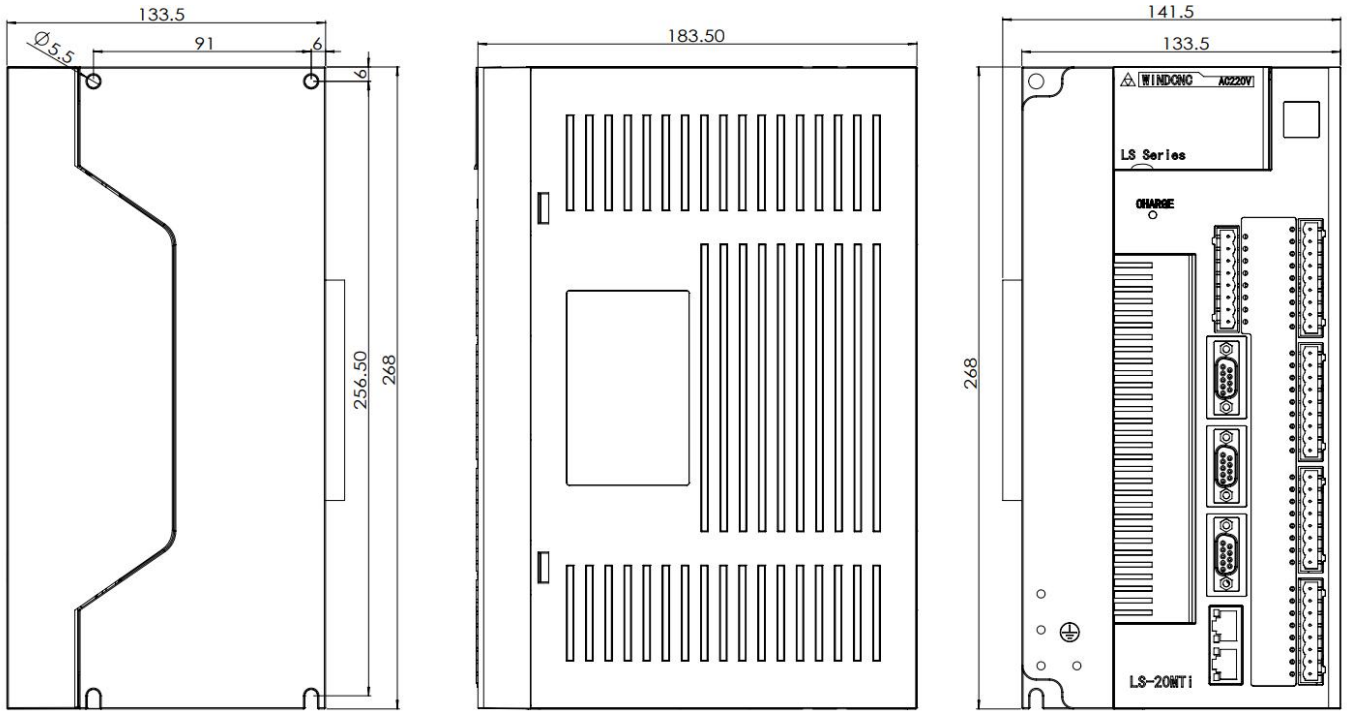
1.3.3 LS-20EDi/LS-30EDi



1.3.4 LS-20ET/LS -30ET



1.3.5 LS-20ETi/LS -30ETi



2: Functional Overview

2.1 EtherCAT, series of servo model description

Model Definition Rule LS-XX Y Z i

LS	XX		Y		Z		i
	symbol	specifications	symbol	specifications	symbol	specifications	
Dafeng servo LS series	20	Module current of 20A	P	Pulse type	S	single channel	With letter i indicates equipped with extended IO module
	30	Module current of 30A	M	MII mould	D	binary channels	
	50	Module current of 50A	E	Type EtherCAT	T	three channels	
	75	Module current of 75A					

Example: Model LS-30 ES is the wind servo EtherCAT bus protocol 30A module single channel drive
Model LS-30E D is the wind servo EtherCAT bus protocol 30A module dual channel drive
Model LS-50 ES is the wind servo EtherCAT bus protocol 50A module single channel drive
Model LS-75 ES is the wind servo EtherCAT bus protocol 75A module single channel drive
Model LS-30ET is the wind servo EtherCAT bus protocol 30A module three-channel drive

2.2 Basic functions of servo

specifications		
control model		Position control, JOG, operation, speed contacts, etc
Encoder feedback		17 bit / 23bit absolute value encoder
service condition	**Use the ambient**	Use ring / boundary temperature: 0~ + 50℃, and storage temperature: -20~ + 85℃
	Ambient humidity /	Below 90% RH (no freezing or condensation)
	Resistance to vibration	4.9m/s^2 / 19.6m/s^2
structure		Base installation type
function	**speed control range**	1:10000 (lower limit of speed control range is smooth running without crawling at rated load)
	Speed response	1K Hz
	Speed Volatility (load	0~100% on load: below ± 0.01% (at rated speed)
	Volatility (voltage	Rated voltage ± 10%: 0% (at rated speed)
	Volatility (temperature	25 ± 25℃: below ± 0.1% (at rated speed)
Simulation speed Instructio	**Command voltage**	DC±10V
	input impedence	About 20K Ω
	Circuit time parameter	47μs
Simulation torque Instructio	**Command voltage**	DC±10V
	input impedence	About 20K Ω
	Circuit time parameter	47μs
Flow control input signal	**check the number**	Eight o'clock
	Function (allocable)	Servo ON (/ S-ON), P action (/ P-CON), no-forward side drive (P-OT), no reverse side drive (N-OT), alarm reset (/ ALM-RST), forward torque limit (/ P-CL), reverse side torque limit (/ N-CL), position deviation clearance (/ CLR), internal setting speed switching, etc The assignment of the above signals and changes in the positive / negative logic can be performed
Flow control output signal	**check the number**	Six o'clock
	Function (allocable)	Servo alarm (ALM), positioning completed (/ COIN), speed consistent detection (/ V-CMP), servo motor rotation detection (/ TGON), servo readiness (/ S-RDY), torque limit detection (/ CLT), brake (/ BK), encoder zero output (PGC) The assignment of the above signals and changes in the positive / negative logic can be performed
Division pulse output of encoder		Phase A, B and C: linear drive output; number of frequency pulse: can be set
Display function		CHARGE Indicator light, 7 section digital pipe 5 bits
retexture		Built-in regenerative resistor or external regenerative resistor (optional)
Override (OT) prevention function		Dynamic brake (DB) stop, deceleration stop, or free run stop during P-OT, N-OT input action
defencive function		Over current, over voltage, under voltage, overload, overspeed, regeneration fault, encoder feedback error, etc.
Monitoring function		Speed, current position, command pulse accumulation, position deviation, motor current, operating state, input and output signal, etc
additional function		Gain adjustment, alarm record, JOG, operation, origin search, inertia detection, etc
Intelligent function		Built-in gain automatic tuning function
Load inertia is applicable		Less than 5 times of the motor inertia
position control	**feedforward**	0~100% (Set Unit 1%)
	bus protocol	EtherCAT Bus protocol

3: Wiring

3.1 Wiring of the main circuit

● When conducting wiring or maintenance work, the power supply must be disconnected first. Because of the large capacity electrolytic capacitor inside the drive, the internal circuit still has high voltage. To prevent electric shock, do not touch the power terminal for 5 minutes.

After the discharge, the CHARGE indicator light goes off. Connect and check after confirming that the CHARGE indicator is off.

● Drive output terminals U, V, W and motor U, V, and W must be correctly corresponding. Note that you can not use the method of changing the three-phase terminal to reverse the motor, otherwise there will be the motor can not start, abnormal operation and other unexpected situations.

● Do not pass the power cord and the signal cord from the same set of pipes, and do not tie them together. When wiring, the power line and the signal line are above 30cm.

● Signal cable and encoder cable please use double stranded wire and multi-core double stranded shielding cable.

● The maximum wiring length of the cable for the input and output signal is 3m, and the maximum wiring length of the encoder cable is 20m.

3.1.1 Name and functions of the main circuit terminals

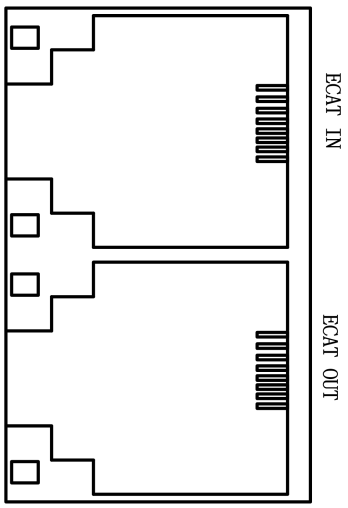
Terminal symbol	name	function
R, S, T	Main circuit power supply input terminal	Three-phase 200~230VAC + 10% -15% (50 / 60Hz)
r, t	Control loop power supply input terminal	Single-phase 200~230VAC + 10% -15% (50 / 60Hz)
U, V, W	Motor connection terminal	Servo-motor connection.(Single drive)
UA, VA, WA	A-axis motor connection terminals	Connect to the A-axis servo motor.(Double drive)
UB, VB, WB	B-axis motor connection terminals	Connect to the B-axis servo motor.(Double drive)
Uc ,Vc , Wc	C-shaft motor connection terminals	Connect to the C-axis servo motor.(Three-drive)
PE	earth terminal	Connect to the power supply grounding terminal and the motor grounding terminal for grounding treatment.

3.2 Communication interface

3.2.1 Definition of the EtherCAT data cable (ECAT IN / ECAT OUT) signal

Connecthe to the Ethernet twisted pair cable.

Electrical characteristics: according to the IEEE802.3 standard.



3.3 Reference block diagram for servo wiring

3.3.1 LS-20EDi/LS-30EDi

1. Wiring reference schematic diagram

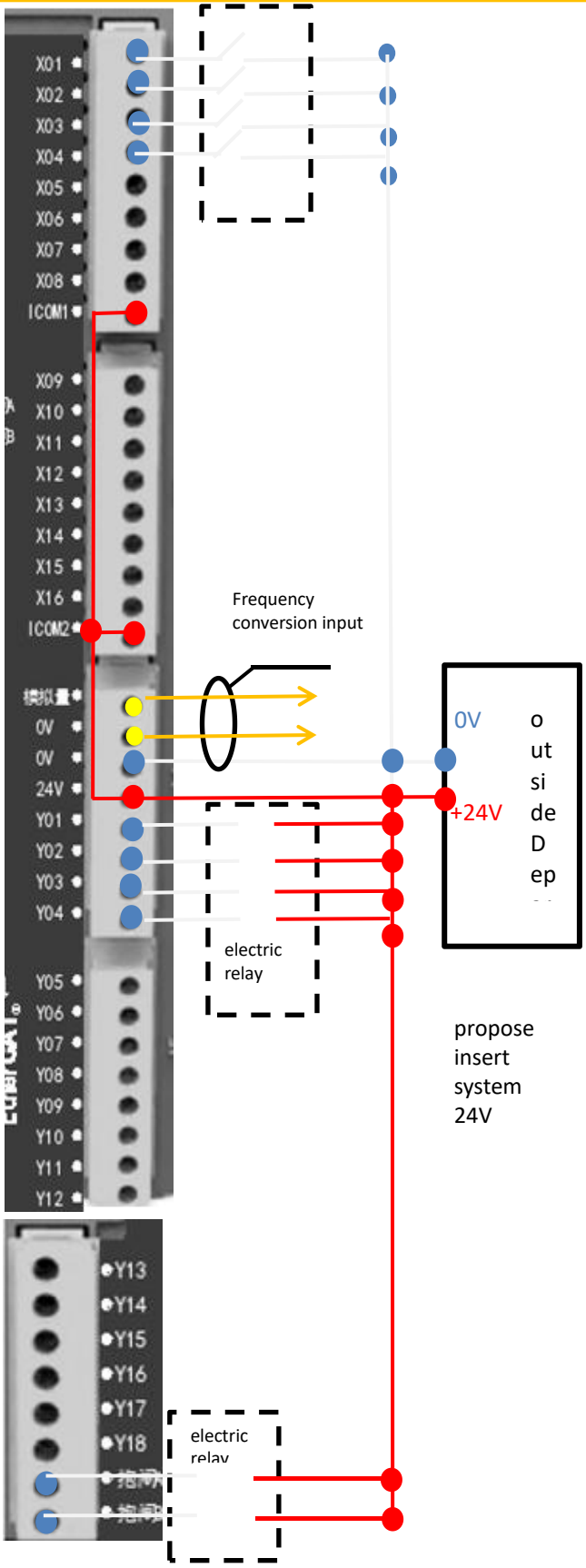
terminal	function	description
X01	T01	The knife position 1
X02	T02	The knife position 2
X03	T03	The knife position 3
X04	T04	The knife position 4
X05	user-defined	
X06	user-defined	
X07	user-defined	
X08	user-defined	
ICOM1	common port	+24V

X09	user-defined
X10	user-defined
X11	user-defined
X12	user-defined
X13	user-defined
X14	user-defined
X15	user-defined
X16	user-defined
ICOM 2	common port +24V

analog quantity	0~10V	Analog output
0V	GND	Simulation
0V	**External power supply input is 0V**	
24V	**External power supply input is + 24V**	
Y01	M03	The spindle is turning
Y02	M04	Spindle reversal
Y03	M10	Card output
Y04	M08	Pump output

Y05	TL+	The knife frame is turning
Y06	TL-	The knife frame reversal
Y07	M78	Tail seat output
Y08	STM	green light
Y09	M30	yellow light
Y10	WAR	red lantern
Y11	M32	lubricating
Y12	user-defined	

Y13	user-defined
Y14	user-defined
Y15	user-defined
Y16	user-defined
Y17	user-defined
Y18	user-defined
band-type brake A	Control motor A holds switch relay
band-type brake B	Control motor B holds the switch relay



3.3.2 LS-20ETi/LS-30ETi

1. Wiring reference schematic diagram

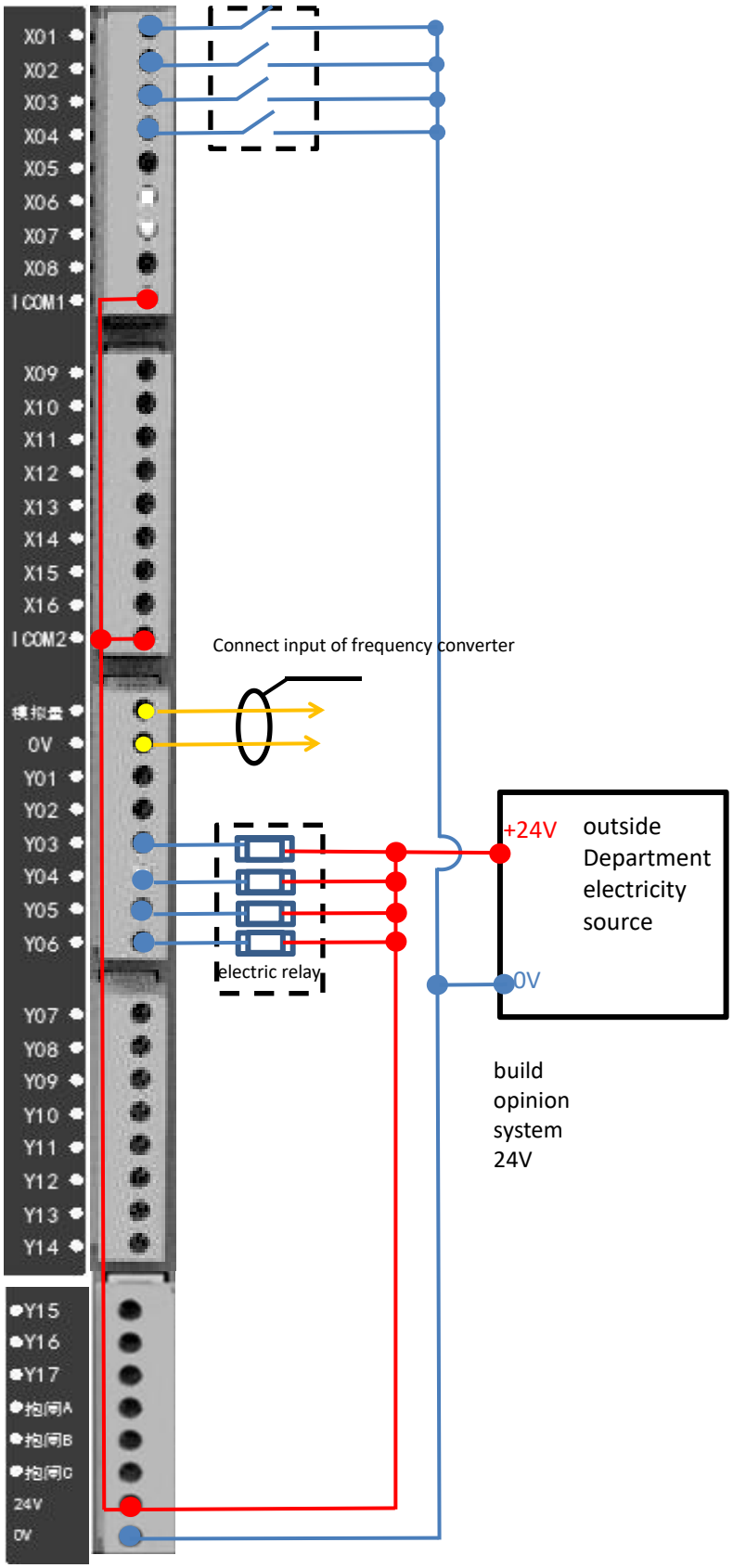
terminal	function	description
X01	T01	The knife position 1
X02	T02	The knife position 2
X03	T03	The knife position 3
X04	T04	The knife position 4
X05	user-defined	
X06	user-defined	
X07	user-defined	
X08	user-defined	
ICOM1	common port	+24V

X09	user-defined	
X10	user-defined	
X11	user-defined	
X12	user-defined	
X13	user-defined	
X14	user-defined	
X15	user-defined	
X16	user-defined	
ICOM 2	common port	+24V

analog quantity	0~10V	Analog output
0V	GND	Simulation
Y01	M03	The spindle is turning
Y02	M04	Spindle reversal
Y03	M10	Card output
Y04	M08	Pump output
Y05	TL+	The knife frame is turning
Y06	TL-	The knife frame reversal

Y07	M78	Tail seat output
Y08	STM	green light
Y09	M30	yellow light
Y10	WAR	red lantern
Y11	M32	lubricating
Y12	user-defined	
Y13	user-defined	
Y14	user-defined	

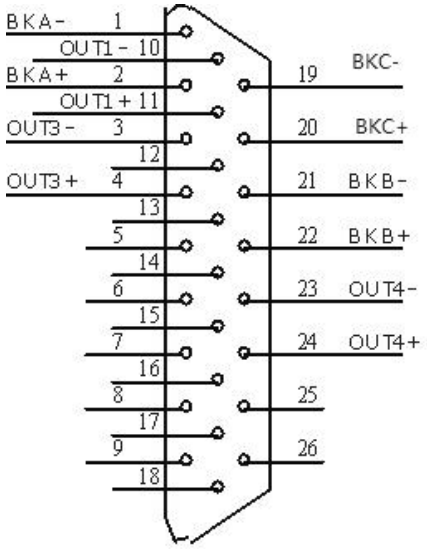
Y15	user-defined
Y16	user-defined
Y17	user-defined
band-type brake A	Control motor A holds switch relay
band-type brake B	Control motor B holds the switch relay
band-type brake C	Control motor C holds the lock relay
24V	**External power supply input is + 24V**
0V	**External power supply input is 0V**



3.4 IO input and output interface

3.4.1 Input / Output CN1 (LS-20 ES / LS-30 ES / LS-20ED / LS-30ED)

CN1 terminal is DB26-hole socket, plug should be equipped with DB26 pin;



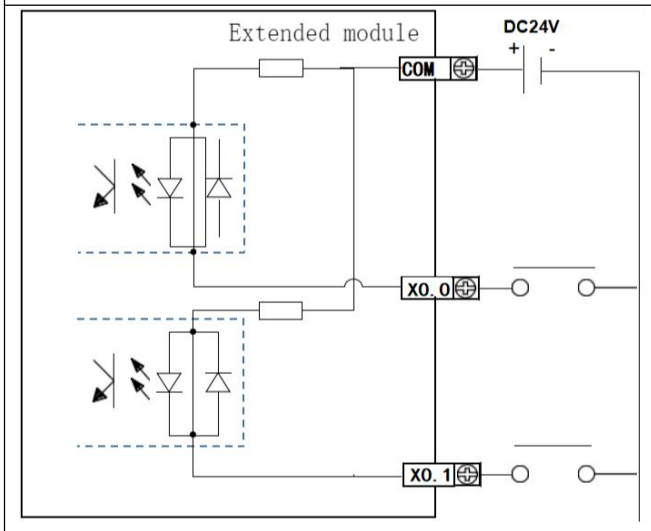
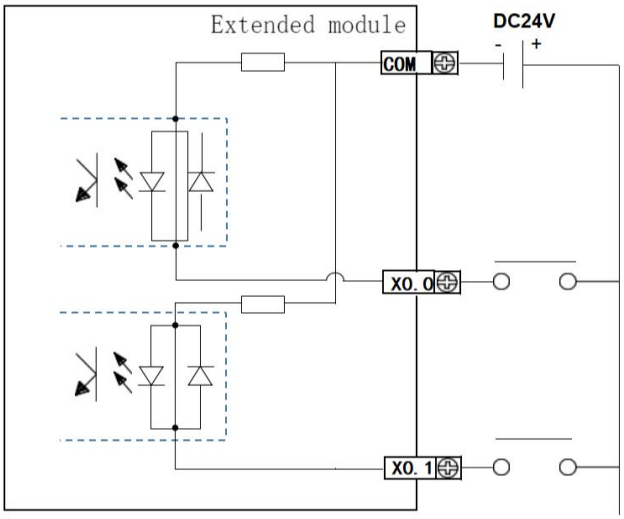
pin	identification number	Signal name	functional description
1	BKA-	The gate A-	Channel A switch output, negative end, generally switch negative control of the power supply (0V) DF30MS / DF50MS / DF75MS drive switch output negative terminal DF30MD Drive A channel switch output negative end
2	BKA+	Check-in A +	Channel A switch output, positive end, generally connect the switch to control the control end of the relay coil Main output end of DF30MS / DF50MS / DF75MS drive DF30MD Drive the switch output positive end of channel A
21	BKB-	The gate B-	B channel switch output, negative end, generally switch control negative electrode of the power supply (0V) DF30MS / DF50MS / DF75MS drive switch output negative terminal DF30MD Drive B channel switch output negative terminal
22	BKB+	Check-in B +	B channel switch output, positive end, generally connect the switch to control the control end of the relay coil Main output end of DF30MS / DF50MS / DF75MS drive DF30MD The switch output positive end of the drive B channel
10	OUT1-	Output 1-	Negative end of output port 1
11	OUT1+	Output 1 +	Main end of output port # 1
3	OUT3-	Output port 3-	Negative end of output port # 3
4	OUT3+	Output port 3 +	Main end of output port # 3
23	OUT4-	Output port 4-	Negative end of the number 4 output port
24	OUT4+	Output port 4 +	Main end of output port # 4
19	BKC -	The gate C- -	C channel switch output, negative end, generally switch control negative electrode of the power supply (0V) Ls _ 30 MT drive switch output minus end
20	BKC +	C +	Channel C switch output, positive end, generally switch control end of the relay coil Ls _ 30 MT, the main end of the drive switch output

(pour) 1. Do not use the vacant terminals.

2. Please connect the shielding cable of the input and output signal to the connector housing.

3.4.2 Switch quantity input (LS-20 EDi / LS-30 EDi / LS-20 ETi / LS-30 ETi)

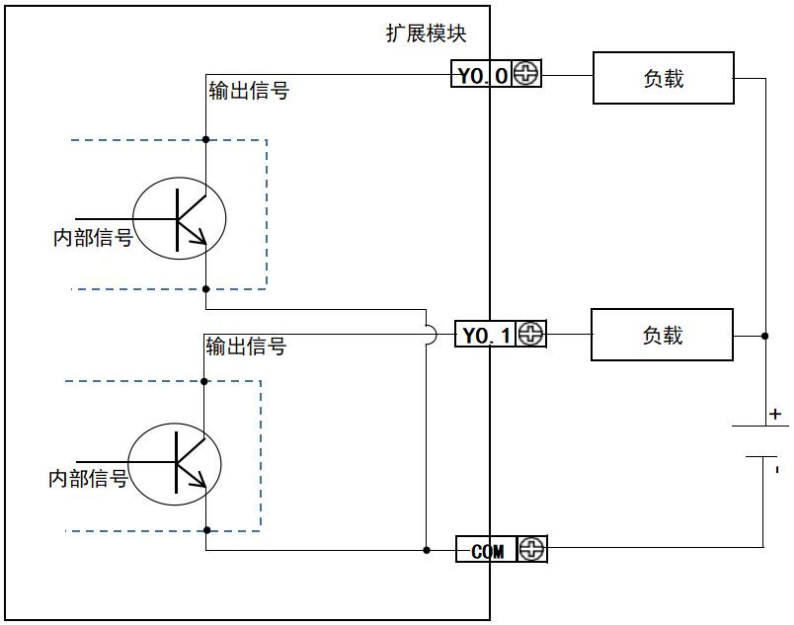
Electrical specification of each channel input port	
enter point	At 16 o'clock
Enter the form	High level (PNP), low level (NPN)
input voltage	DC 12V~24V
Maximum isolation voltage	2500VRMS
reaction time **off → on** **on → off**	<10ms
Filter time	Set by the upper computer

NPN mode of connection	PNP mode of connection
	

3.4.3 Switch Volume Output (LS-20 EDi / LS-30 EDi / LS-20 ETi / LS-30 ETi)

Electrical specification of each output port		
Output point	LS-20 / 30EDi 18 road	LS-20 / 30ETi 17 road
output form	The NPN-type transistor	
output	Maximum load current is 0.3A	
output voltage	DC 24V ±10%	
reaction time **off → on** **on → off**	<10ms	

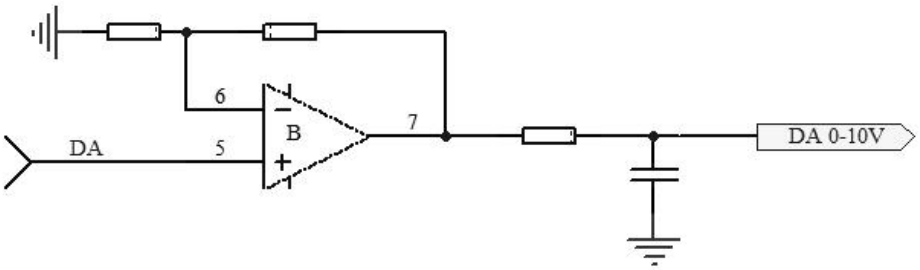
NPN mode of connection



3.4.4 Analog Output (LS-20 EDi / LS-30 EDi / LS-20 ETi / LS-30 ETi)

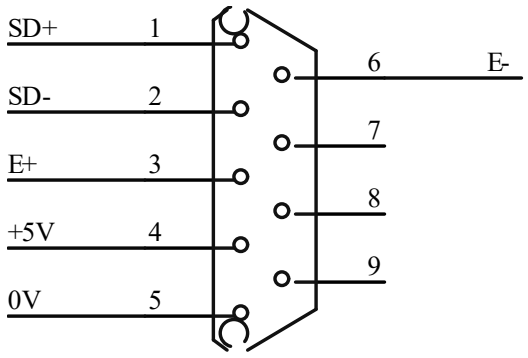
Analog volume of electrical specifications	
analog quantity DA	1-road, 0~10V

Working schematic:



3.5 Motor encoder interface

CN2 terminal is a DB9-hole socket, the plug should be equipped with DB9 pin;



pin	identification number	Signal name	functional description
4	+5V	5V power supply	Servo motor encoder + 5V power supply; when the cable is long, multiple core wires should be used in parallel to reduce the line pressure drop
5	0V	Power public end	
1	SD+	transmission signal +	Connect to the servo motor encoder SD +
2	SD-	transmission signal-	Connect to the servo-motor encoder SD-
3	E+	External battery +	Connected to the servo-motor encoder battery E +
6	E-	External Battery-	Connected to the servo-motor encoder battery E-

4. The panel operation

4.1 Basic operation

4.1.1 Functions

The panel operator can switch A axis and B axis display and operation, set various parameters, execution of JOG operation instructions and status display, etc.

The following summarizes the names and functions of each key.

bond picture	name	function
F	function key	Switch the basic mode: status display, auxiliary function, parameter setting, monitoring Long press to switch A axis and B axis display and operation
▲	UP key	Press the UP key to increase the setpoint Acting as a forward start key in accessibility mode JOG
▼	DOWN key	Press the DOWN key to reduce the setpoint Acting as a reverse start key in the accessibility mode JOG run
◀	shift key	Press this key to move the selected bit (the decimal point of that bit) to the left
S	Set the key	Press this key to display the setting and setting value of each parameter, and enter the parameter setting state and clear the alarm

4.1.2 Clear alarm

In the state display mode, press the SET key to clear the alarm; also can clear the alarm input signal / ALMRST to clear the alarm.

Note: When an alarm occurs, please eliminate the alarm cause first, and then clear the alarm.

4.1.3 Selection and operation of the basic mode

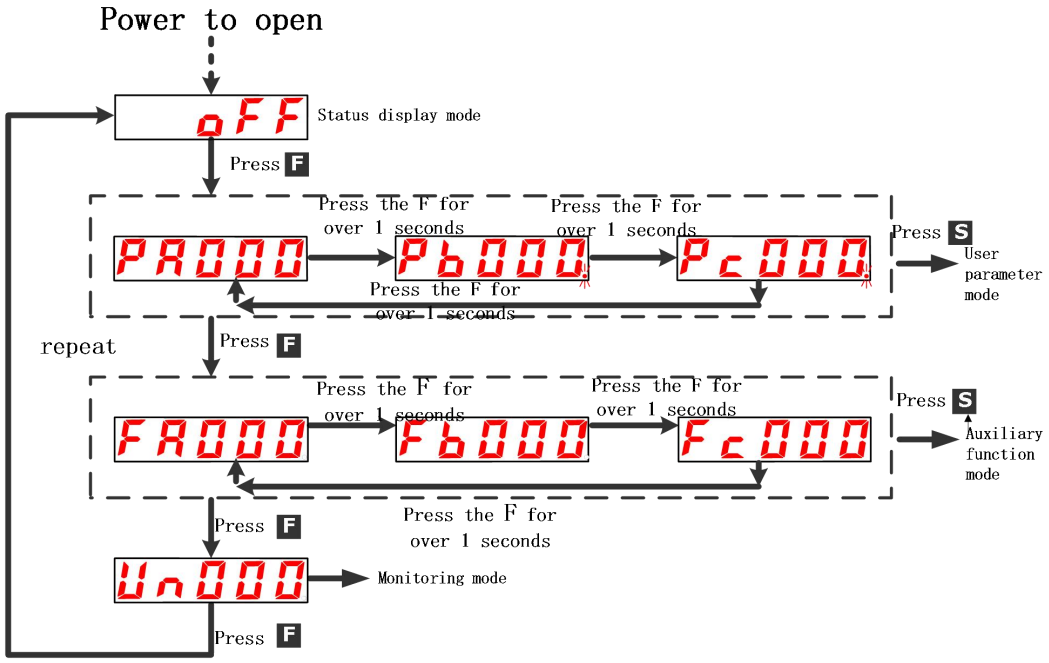
By switching the basic mode of the panel operator, the display of running status, parameter setting and operation instructions can be performed.

The basic mode includes state display mode, parameter setting mode, monitoring mode and auxiliary function mode. After pressing F, each mode switches in the order shown in the following below.

(1) Basic mode selection and operation of single drive and dual drive

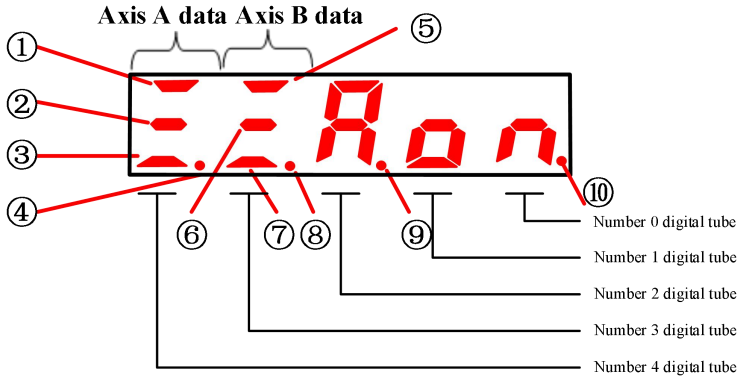
Press the F for over 1 seconds

（2）Three-drive mode selection and operation



4.1.4 Status display mode

（1）Single drive, dual drive state display mode

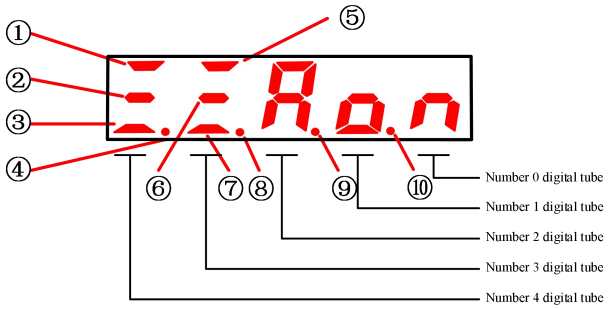


■ Display content of the bit data

project	Speed, and torque control mode		Position control mode	
	Bitus data	Display content	Bitus data	Display content
①⑤	Running	Light up in the servo ON state (Motor is energized)	Running	Servo ON status (Motor is energized)
②⑥	The same speed （/V-CMP）	The difference between the speed of the motor and the command speed is lower than the specified value Specified value: PA503 (Set at 10rpm)	Positioning completed （/COIN）	Light up when the offset of the actual motor position and position command is less than the specified value Specified value: PA500 (Set to 10 pulse at delivery value)
③④	LINK state	Output port physical layer connection status and action status	LINK state	Output port physical layer connection status and action status
④⑧	Positive reversal is prohibited	When the servo is in the limit position: The light-up indicates the positive turn-forbidden state The out indicates the reversal prohibited state The flicker indicates the positive / reverse forbidden state	Positive reversal is prohibited	When the servo is in the limit position: The light-up indicates the positive turn-forbidden state The out indicates the reversal prohibited state The flicker indicates the positive /

				reverse forbidden state
⑨	main power source be all set	The main circuit is switched on when the power supply is normal Off when the main circuit power supply is disconnected	main power source be all set	The main circuit is switched on when the power supply is normal Off when the main circuit power supply is disconnected
⑩	RUN Indicator	ESM state	RUN Indicator	ESM state

（2）Three-drive state display mode

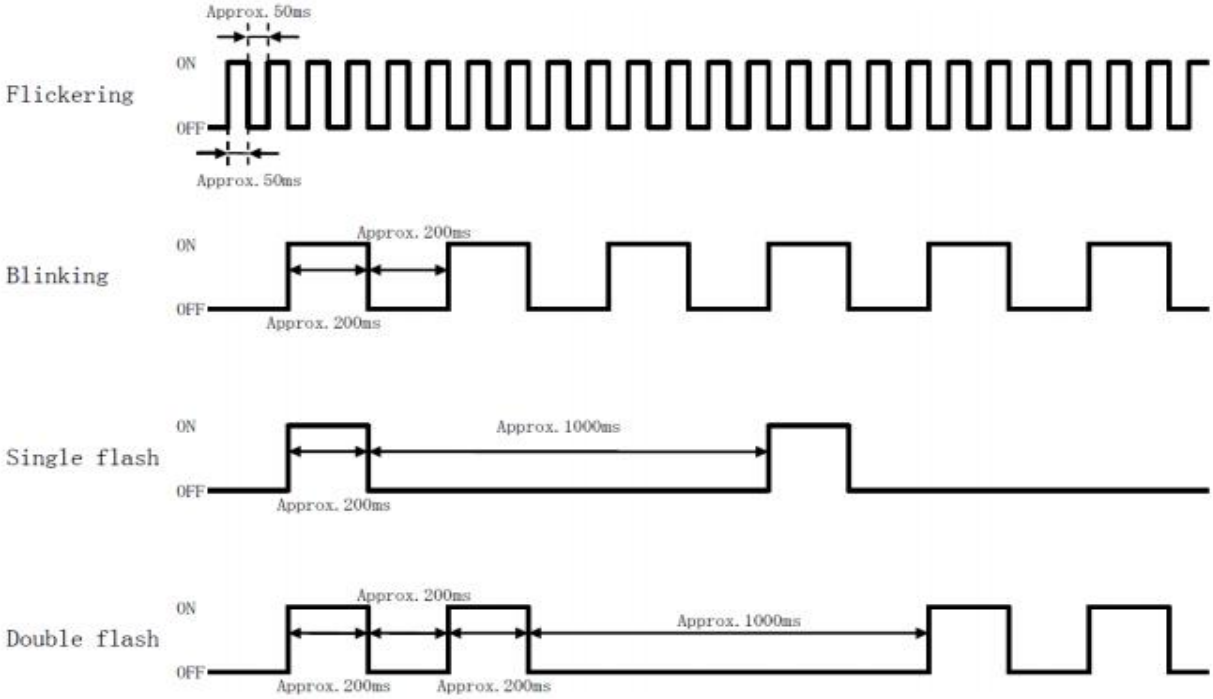


■ Display content of the bit data

project	Bitus data	Display content	project	Bitus data	Display content
①	The A-axis is running	When the axis A servo ON state is lit (Motor is energized)	⑥	continue to have	continue to have
②	The B-axis is running	B axis servo ON state (Motor is energized)	④	A axis positive and reverse prohibited	When the A-axis servo is in the limit: The light-up indicates the positive turn-forbidden state The out indicates the reversal prohibited state The flicker indicates the positive / reverse forbidden state
⑤	The C-axis is running	C axis servo ON state (Motor is energized)	⑧	B axis positive and reverse prohibited	When the axis B servo is in the limit: The light-up indicates the positive turn-forbidden state The out indicates the reversal prohibited state The flicker indicates the positive / reverse forbidden state
③	LINK state	Output port physical layer connection status and action status	⑨	main power source be all set	The main circuit is switched on when the power supply is normal Off when the main circuit power supply is disconnected
⑦	LINK state	Output port physical layer connection status and action status	⑩	C-axis positive and reversal prohibited	When the C-axis servo is in the limit position: The light-up indicates the positive turn-forbidden state The out indicates the reversal prohibited state The flicker indicates the positive / reverse forbidden state

EtherCAT Indicators

As LED status, ON, OFF has four modes:



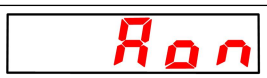
RUNIndicator state

LED state	explain
OFF	ESM: Initialized state
Blinking	ESM: Pre-Operational status
Single Flash	ESM: Safe-Operational status
ON	ESM:Operational state

LINK state

LED state	explain
OFF	The connection is not established
Blinking	Connection establishment, data sending and receiving
ON	Connection establishment, no data sending and receiving

■ Oomit the display content of the symbols

apostrophe	Display content
	**Serservo are in OFF state** (Motor is not energized)
	**The servo is in the ON state** (Motor is energized)
	**The servo is positive or reversed prohibited state** (According to the positive and reverse forbidden bits in the bit display)
	**Alarm status** Display the alarm number

4.2 Application operation

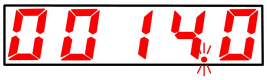
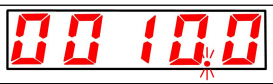
4.2.1 User parameter mode (P □□□□)

Functions can be selected or adjusted by setting the parameters. User parameters have two types: Parameter Setting and Function Selection. A list of user parameters is provided in the attached schedule. The scope of modifications can be confirmed in the parameter list of the Appendix.

The parameter setting is the function that changes the parameter data to be adjusted within a certain range; the function selection is the function number assigned to the panel operator.

■ Example of the change step for the Parameter Setting:

The following are the steps for changing the user parameter PA100 (speed ring gain) from "40" to "100".

operating steps	operation declaration	operational key	Display after operation
1	Press the F function key to select the parameter setting mode	F	
2	Press the shift key 2 times, select the second place currently displayed, display PA0.00, and the decimal point of the second place currently displayed flashes	◀	
4	Please press the UP key to change the data and display PA1.00	▲	
5	Press the setting key to display the current data of PA100	S	
6	Press the shift key 2 times, select the second currently displayed, display 000.40, and the decimal point of the second currently displayed flashes	◀	
7	Please press the UP key to change the data and display 001.40	▲	
8	Press the shift key 4 times, select the first position currently displayed, display 0014.0, and the decimal point of the second position currently displayed flashes	◀	
9	Please press DOWN to change the data and display 001.00	▼	
10	Press the setting key to return to PA1.00, where the content of PA100 changes from "40" to "100"	S	

■ Example of the change steps for Function Selection:

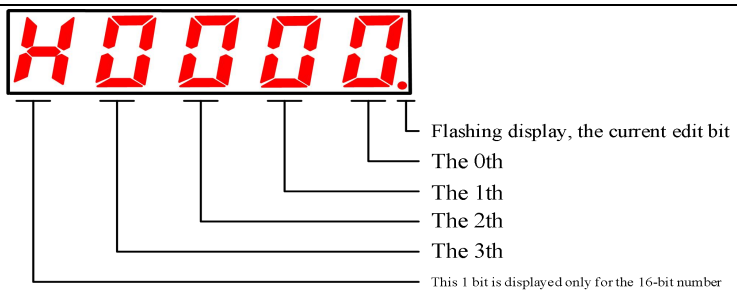
Shown below are the operation steps for changing the control mode selection (PA000.1) of the A-axis function selection basic switch PA 000 from speed control to position control.

operating steps	operation declaration	operational key	Display after operation
1	Please press the F function key (for more than 1 second) to display PA0.00	F	
2	Press the setting key to display the current data of PA000, and the current decimal point at position 0 flashes	S	
3	Press the shift key once to select the currently displayed first bit, and display H000.0. the decimal point of the currently displayed first bit flashes	◀	
4	Please press UP to change the data and display H001.0	▲	
5	Press the setting key to return to PA0.00 display, so that the A-axis control mode is changed to position control	S	

■ User parameter representation in this manual

The user parameters selected by function are expressed by 16 decimal numbers, and each number of set value has its own meaning.

This manual uses the following representation for function selection user parameters.



PA000.0 or A.Hxx x□...It represents the value indicated by the setting value "0 digits" of the A-axis user parameter "PA000".

PA000.1 or A.Hxx □x...It represents the value indicated by the setting value "1 digit" of the A-axis user parameter "PA000".

PA000.2 or A.Hx □x x...It represents the value indicated by the setting value "2 digits" of the A-axis user parameter "PA000".

PA000.3 or A.H □xx x...It represents the value indicated by the set value "3 digits" of the A-axis user parameter "PA000".

4.2.2 Auxiliary function mode (F □□□□)

■ **Overview of the auxiliary function execution mode**

Auxiliary function number	function
F □000	Displays the software version of the servo
F □001	Position instruction (valid in position mode only)
F □002	Micro-motion (JOG) mode operation
F □003	Identify load inertia (relative to motor body inertia)
F □004	User password verification
F □005	View the motor-related parameters
F □006	Manually adjust the speed command offset
F □007	Manually adjust the torque command offset
F □008	Automatically adjust the analog quantity (speed, torque) instruction offset
F □009	Clear the encoder multiloop information data (valid only with the bus encoder)
F □010	Clear the encoder error (valid only with the bus encoder)
F □011	Initialize the user parameter settings
F □012	Display the historical alarm data

■ **Operation for displaying the software version of the servo:**

The following are the steps to display the software version.

operating steps	operation declaration	operational key	Display after operation
1	Press the F function key to select accessibility mode, which is currently accessibility mode	F	
2	Press the setting key to display A-1.00; the processor program version is V1.00	S	
3	Press the shift key to display P-1.00, indicating the FPGA program version is V1.00	◀	
4	Press the set key to return to the Fb 000 display.	S	

■ **Operation of micro-motion (JOG) mode operation:**

Below are the operation steps to display the JOG run.

operating steps	operation declaration	operational key	Display after operation
1	Please press either UP or DOWN to select the accessibility FA002 that you want to operate on	▲ ▼	
2	Press the setting key to enter the JOG operation	S	
3	Please press the F function key to enter the servo ON state (the motor is powered on)	F	
4	Please press UP or DOWN for the motor runs	▲ ▼	
5	Press the setting key to return to the FA002 display	S	

■ **Bus encoder A27 alarm clearance operation:**

The following are the operation steps of bus encoder A27.

operating steps	operation declaration	operational key	Display after operation
1	Please press UP or DOWN to select the accessibility FA009 you want to operate	▲ ▼	
2	Press the setting key to enter the submenu	S	
3	Press the F function key to clear the encoder multi-loop data	F	
4	Press the setting key to return to the FA009 display	S	

■ **Initialization of user parameter settings:**

Below are the operation steps to display the user parameter Setpoint initialization.

operating steps	operation declaration	operational key	Display after operation
1	Please press UP or DOWN to select the accessibility FA011 you want to operate	▲ ▼	
2	Press the setting key to enter the parameter initialization operation	S	
3	Press the setting key (for more than 1 second) until "donE" is flashing, indicating that the user parameter setting initialization has been successfully completed	S	
4	Press the set key to return to the FA011 display	S	

4.2.3 Monitoring Mode (Un □□□)

In the monitoring mode, the command value input to the servo drive, the state of the input and output signal, and the internal state of the servo can be monitored. The monitoring mode can be changed even when the servo motor is in operation.

Surveillance number	Display content	unit
Un000	motor speed	1r/min
Un001	Rotation angle (electrical angle)	1deg
Un002	Input command pulse speed (valid in position control mode only)	1KHz
Un003	busbar voltage	1V
Un004	Simulate the input speed instruction value	1r/min
Un005	Percentage of input torque instructions (relative rated torque)	1%
Un006	Internal torque instruction (relative rated torque or given current of the motor)	1% or 0.1A
Un007	Input port signal monitoring	—
Un008	Output port signal monitoring	—
Un009	Encoder signal monitoring (is only valid for incremental encoder)	—
Un010	Input command pulse counter (32-bit 10-decimal display, is only valid in position control mode)	1 Directive pulse
Un011	Feedback pulse counter (encoder pulse 4 x frequency data, 32-bit 10-decimal display)	1 Directive pulse
Un012	Position Offset counter (valid in position control mode only)	1 Directive pulse
Un013	Cumulative load rate (value when setting rated torque to 100%)	1%
Un014	Inent of inertia ratio (load inertia relative to inertia of motor)	1%
Un015	Encoder actual angle (32-bit 10-decimal point display)	1 Directive pulse
Un016	Encoder circles display (valid only at absolute encoder)	1 Circle

■ Use method of the monitoring mode

The following are the operation steps to display the Un000 data.(When the servo motor rotates at 1000 and 1500 r/min respectively)

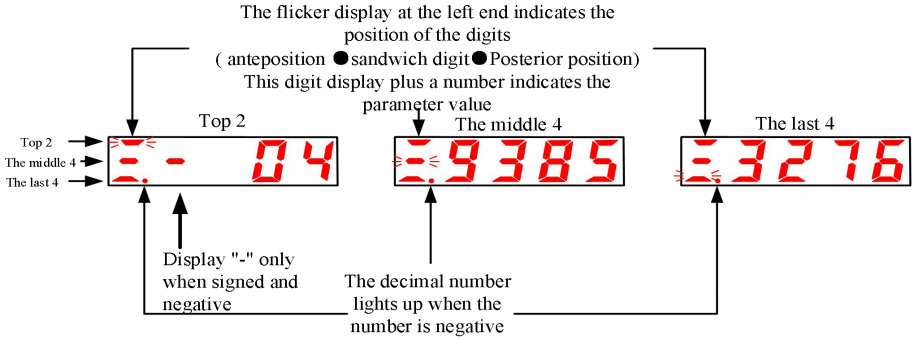
operating steps	operation declaration	operational key	Display after operation
1	Press the F function key to select the monitor mode	F	
2	Please press either UP or DOWN to select the monitoring number Un000 that you want to display	▲ ▼	
3	Please press the setting key to display the Un000 data. Currently, the first decimal point is extinguished, so it is displayed as Un000	S	

■ 32-bit 10-decimal shown read method

Shbelow are the operation steps for display Un010 data.

operating steps	operation declaration	operational key	Display after operation
1	Press the F function key to select the monitor mode	F	
2	Please press either UP or DOWN to select the monitoring number Un010 that you want to display	▲ ▼	
3	Press the setting key to display the last 4 bits of the UN 010 data	S	
4	Press the shift key to display the middle 4 bits of the Un010 data	◀	
5	Please press the shift key to display the top 2 positions of Un010 data If you press the shift button again, restore the last 4 bits of the displayed data	◀	
6	Press the setting key to return to the monitoring number display.	S	

The displayed read methods are summarized as follows:



5. EtherCAT Information

5.1 CANopen over EtherCAT Reference model

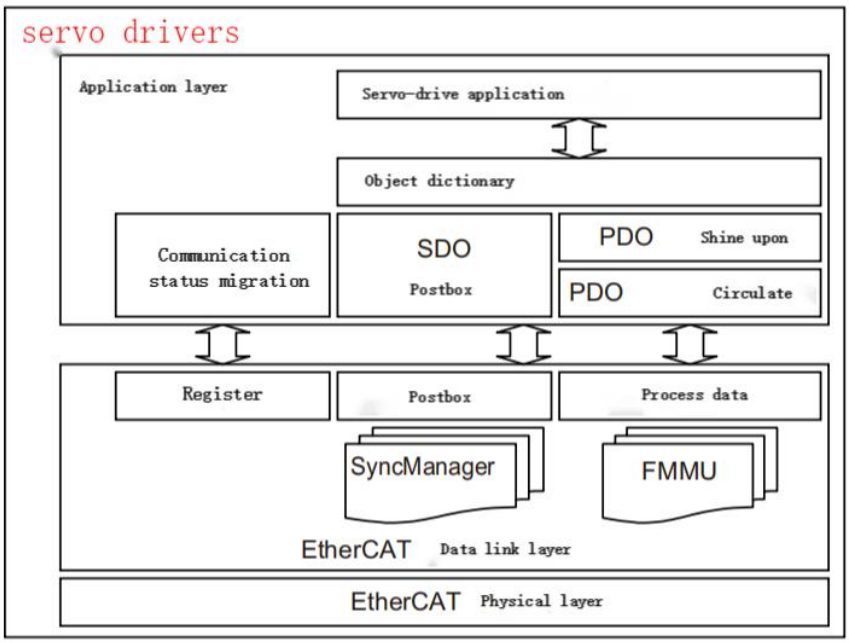


Figure 5-1, for the reference model

The EtherCAT (CoE) network reference model is mainly composed of two parts: the data link layer and the application layer. The data link layer is mainly responsible for the EtherCAT communication protocol, and the application layer is embedded with the CANopen Drive Profile (DS402) communication specification. The object dictionary in the CoE includes the parameters, the application data, and the PDO mapping information.

Process data objects (PDO) consists of objects that can be PDO mapping in the object dictionary, and the content of PDO data is defined by PDO mapping. The reading and writing of PDO data are periodic and do not need to find object dictionary; while mailbox communication (SDO) is nonperiodic communication to find object dictionary when reading and writing them.

Note: To resolve SDO and PDO data correctly on the EtherCAT data link layer, configure the FMU and Sync Manager (the synchronization manager).

5.2 EtherCAT Network state machine

EtherCAT The status machine is used to describe the status and status changes of the slave station application. Status change requests are usually initiated by the primary station and responded by the slave station.

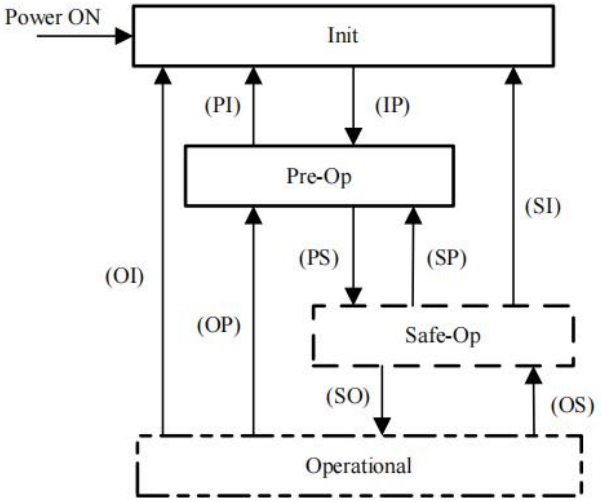


Figure 5-2 Schematic diagram of the slave station status machine

Table 5-1, with a description of the status

state	description	SDO communication	PDO receive	PDO transmit by radio
Init	■There is no email newsletter ■There is no process data communication	nonsupport	nonsupport	nonsupport
Init to Pre-Op	■ The master station configure the link layer address and starts the mailbox communication ■ The master station initializes the DC clock synchronization ■ The master station requests a state transition to the Pre-Op ■ The master station sets the AL control register ■ Station to check that the mailbox is initialized correctly	nonsupport	nonsupport	nonsupport
Pre-Operation（Pre-Op）	■ Mailbox communication is activated (SDO communication is available only) ■ Process data communication cannot be performed	support	nonsupport	nonsupport
Pre-Op to Safe-Op	■ The master station configures the Synchronization Manager (Sync Manager) channels and the FMMU channels for the process data ■ The main station conducts PDO data mapping and Sync Manager PDO parameter setting for the slave station through SDO ■ Master station request state transition to Safe-Op ■ Check the Sync Manager configuration of the PDO data, and if the master station sends a startup synchronization request, check that the distribution clock is set correctly	support	nonsupport	nonsupport
Safe-Operation（Safe-Op）	■ The slave application will transmit the actual input data, not operating the output, the output is set to "safe state" (In addition to SDO communication, you can also perform the state of PDO transmission, using PDO transmission, can be sent from the servo drive state, etc.)	support	nonsupport	support
Safe-Op to Op	■ The master station sends a valid output data ■ The master request transition to Op state	support	nonsupport	support
Operation（Op）	■ Process data communication is possible (PDO communication)	support	support	support

5.3 EtherCAT Equipment model

■Communication

This functional unit includes various functions for data transmission through the network structure.

■Object Dictionary

Using the object dictionary has an impact on the application object, the communication object, and the state machine using the device.

■Application

The application includes the communication device function for data exchange adapted to the action environment.

The object dictionary has a function as an interface between communication and application.

The description of the device application is called the "device line gauge", with the individual data of the object dictionary taken as the entry of the description.

■ Object Index (Object Index)

All objects were positioned using a 4-bit 16-decimal 16-bit index.

Objects are grouped in the object dictionary.

The object dictionary profile as specified in the CoE is shown below.

Object Index Configuration

Index（Hex）	target
0x1000~0x1FFF	Communication Profile Area
0x2000~0x5FFF	Manufacturer Specific Profile Area
0x6000~0x9FFF	Standardized Device Profile Area
0xA000~0xFFFF	Reserved

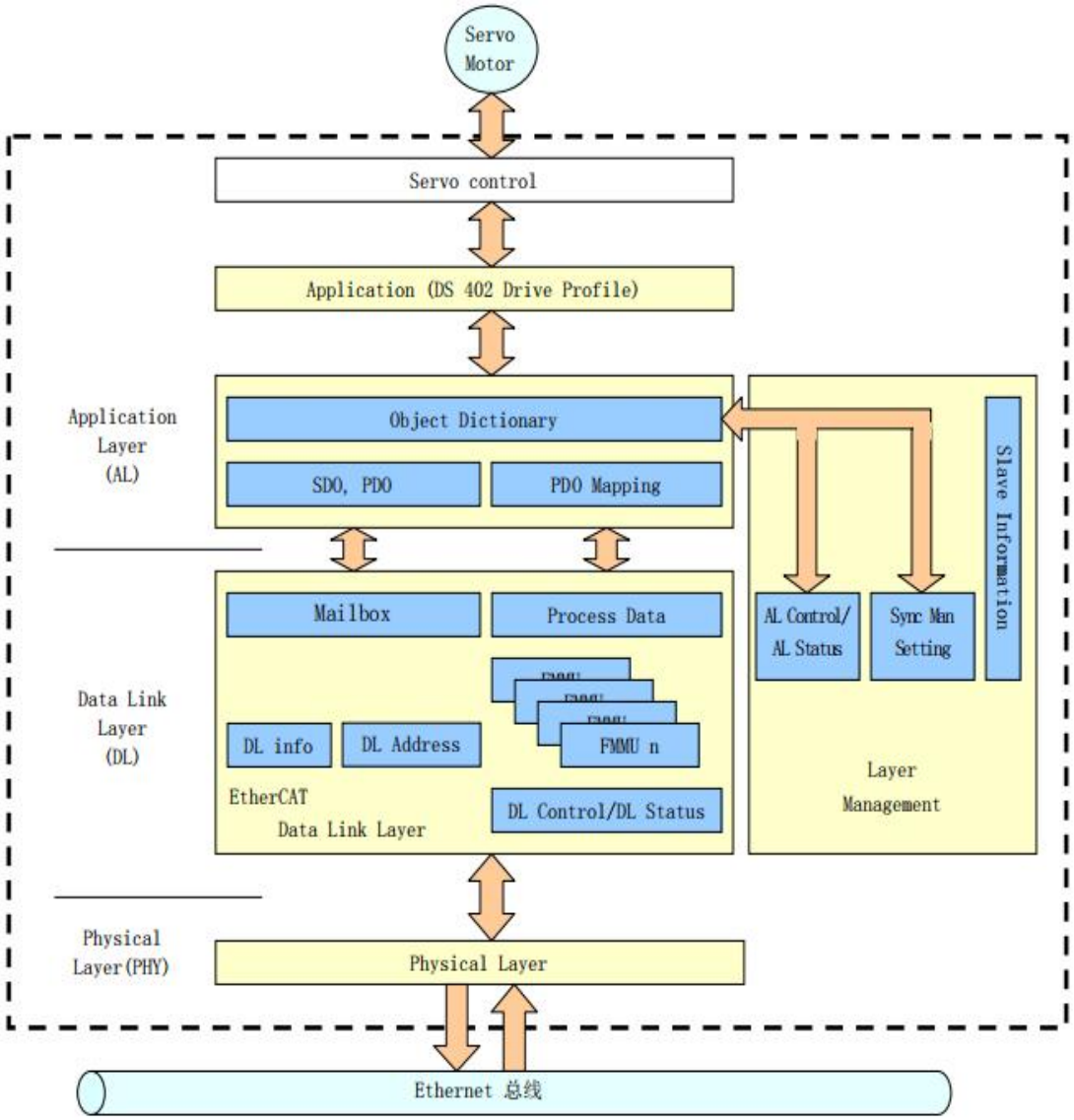


Figure 5-3 Object dictionary and device model

5.4 The PDO process data mapping

EtherCAT The process data of slave stations consists of synchronization manager channel objects, each of which describes the consistent region of EtherCAT process data and contains multiple process data objects. A EtherCAT slave station with application control capabilities should support reads both for PDO mapping and also for SM-PDO-Assign

objects.

PDO shine upon

PDO mapping involves the object dictionary to the application objects (real-time process data) mapping of PDOs.

In the subindex "00 Hex", describe the number of objects. For this mapping table, the index 0x1600~0x17FF is used by Rx PDO, and the index 0 x 1 A 00 ~ 0 x 1 BFF is used by Tx PDO.

The following figure is an example of the PDO mapping.

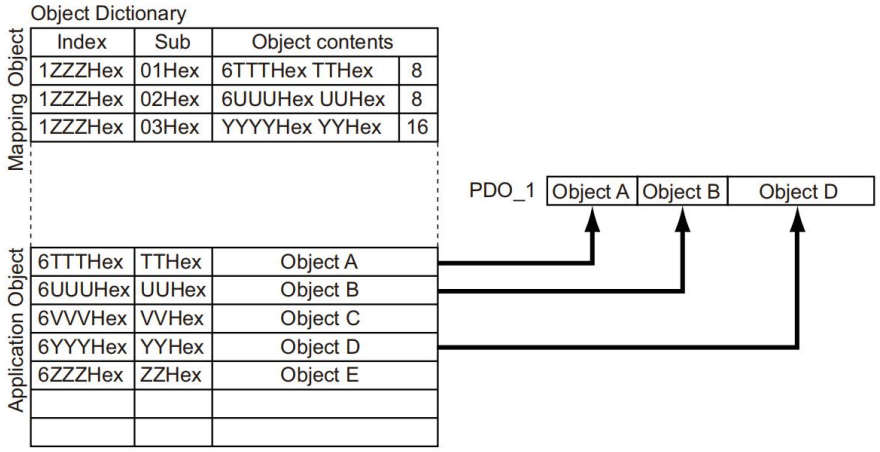


Figure 5-4 Example of the PDO mapping

PDO distribution

The synchronization manager channels can be composed of multiple PDOs. Synchronization Manager PDO allocation object describes the relationship between PDO and Synchronization Manager. In the subindex of the sub-index "0x00", describe the number of PDO. LS Series servo drives with "0x1C12" for RxPDO and "0x1C13" for TxPDO.

The following figure is an example of the Sync Manager PDO mapping.

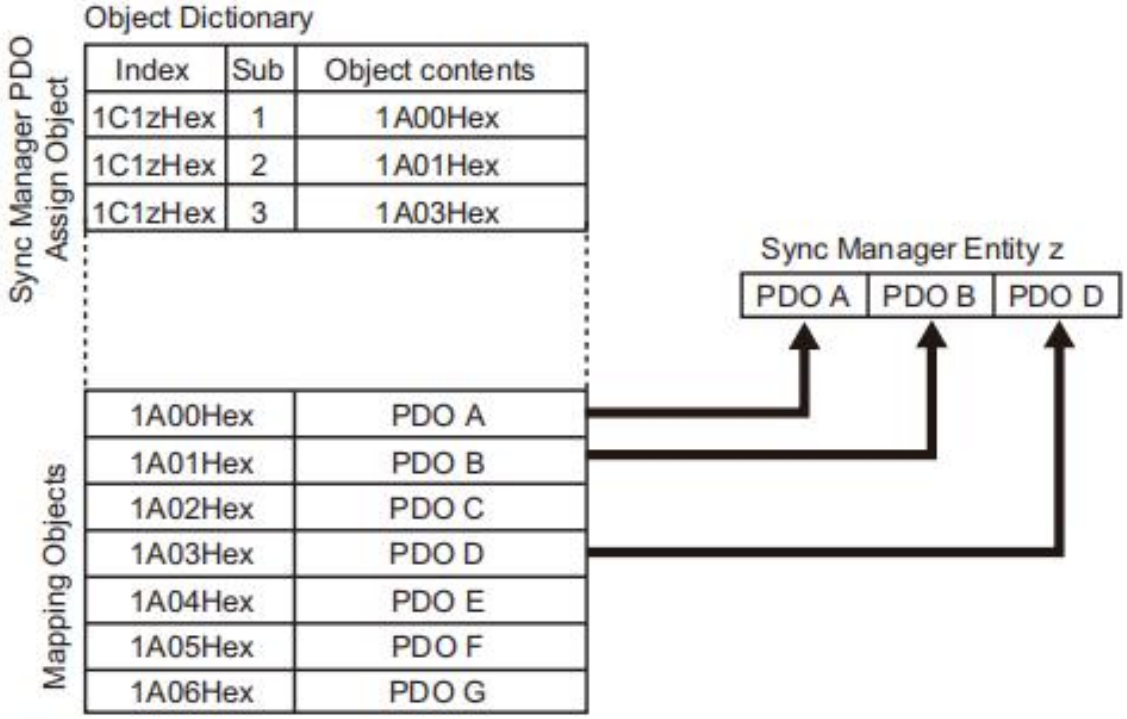


Figure 5-5 Example of the synchronization manager PDO mapping

Note: PDO mapping objects (0x1600~0x17FF and 0 x 1 A 00 ~ 0 x 1 BFF) and SM-PDO-Assign objects (0x1C12 and 0x1C13) write only in the Pre-Op state.

The PDO mapping takes the following steps:

1、 Stop the PDO allocation function (the subindex 0 for 0x1C12 vs. 0x1C13 is set to 0).

2、 Stop PDO mapping (0x1600~0x17FF and 0 x 1 A 00 ~ 0 x 1 BFF subindex 0 is all set to 0).
3、 Sets the mapping entry for the PDO mapping objects (0x1600~0x17FF and 0 x 1 A 00 ~ 0 x 1 BFF).
4、 Sets the value of the PDO mapping object (0x1600~0x17FF and 0 x 1 A 00 ~ 0 x 1 BFF) mapping entry.
5、 Set the PDO assignment object (subindex 1 for 0x1C12 and 0x1C13).
6、Open the PDO allocation function (subindex 0 for 0x1C12 and 0x1C13 is set to 1).

5.5 Status control of the servo drive

In the LS series EtherCAT servo drive, the state of the servo drive is called the "PDS state".
The PDS status is controlled by the [control word] (0x6040).
Furthermore, each PDS state is displayed with the [status word] (0x6041).

state transition

EtherCAT The servo drive status is transferred as shown in the figure below.

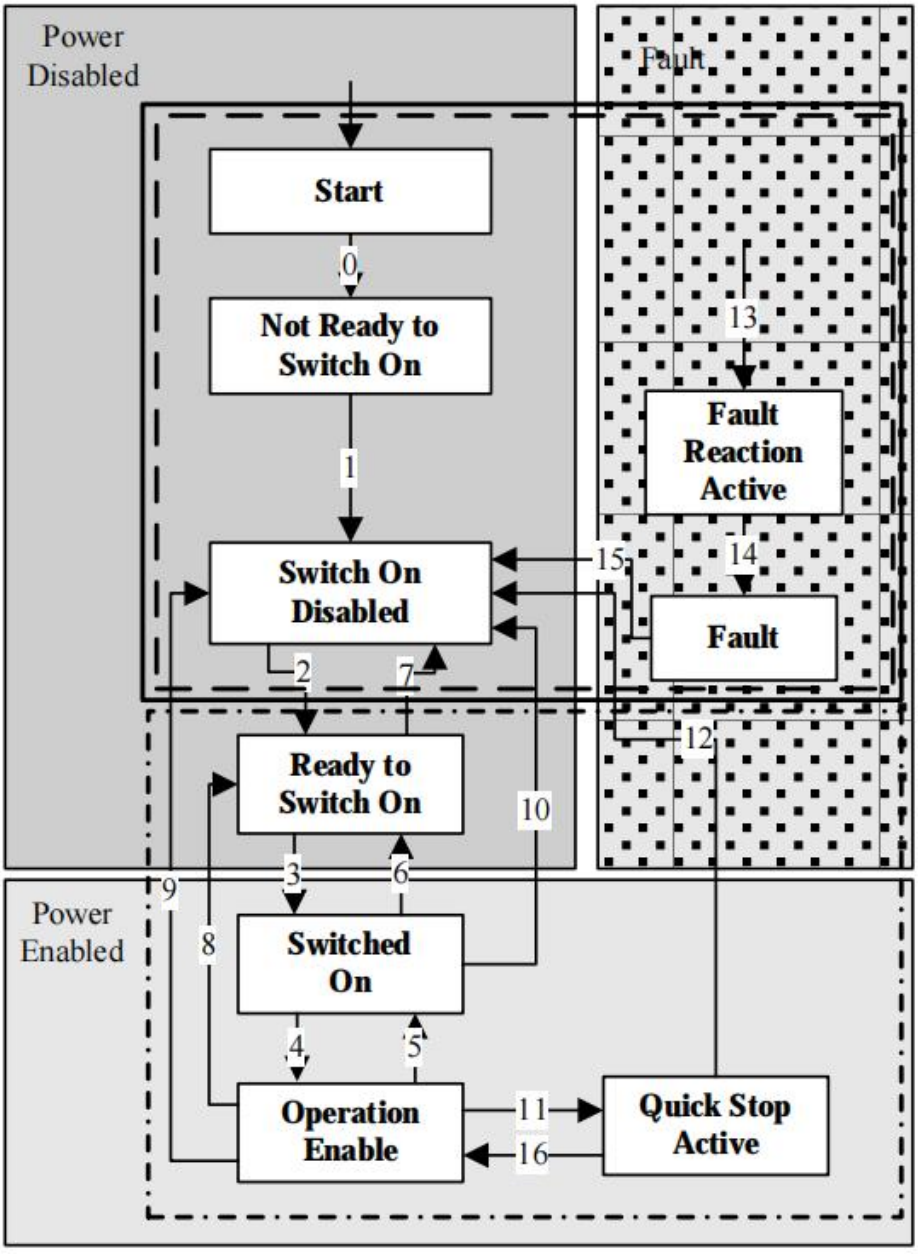


Figure 5-6 PDS state shift plot

explain

The ■ status word (0x6041) is only updated under the Op state and Safe-Op
■ The control word (0x6040) is read from the station only in the Op state
The PDS can be divided into three parts: "Power Disabled" (off), "Power Enabled" (on) and "Fault". All states enter the

"Fault" after sending the alarm. After power-up, the drive completes initializing and then enters the SWITCH _ ON _ DISABLED state. The drive can be configured (for example, set the drive operating mode to the CSP mode, etc.).

At this point, the main power supply is still closed, and the motor is not excited. After State Transition (state transmission) 2,3,4, enter the OPERATION ENABLE. At this point, the main power is turned on, and the servo driver controls the motor according to the configured operating mode. Therefore, the state must be confirmed that the drive parameters and corresponding input values are properly configured as zero. State Transition (State transmission) 9 Complete the circuit main power. Once the servo drive sends an alarm, the status of the drives enters the Fault.

State name	explain
Not Ready to Switch On	The servo drive is in initialization
Switch On Disabled	Servo-drive initialization is complete
Ready to Switch On	The servo driver waits to enter the Switch On state, and the motor is not excited
Switched On	Servo drive servo is ready, the main power is on
Operation Enabled	The servo driver servo inputs the excitation signal to the motor and controls the motor according to the control mode
Quick Stop Active	The servo drive will stop in a set manner
Fault Reaction Active	The servo driver detects an alarm, stops in the set way, the motor still has excitation signal
Fault	The motor has no excitation signal

ControlWord (Control word) description

15 – 11	10	9	8	7	6 – 4	3	2	1	0
ms	*r*	*oms*	*h*	*fr*	*oms*	*eo*	*qs*	*ev*	*so*

MSB LSB

fr=fault reset、eo=enable operation、qs=quick stop、ev=enable voltage、so=switch on、ms=manufacturer-specific、oms=operation mode specific

Table 5-2 Equipment control command table

Command	Bits of the *controlword*					Transitions
	Bit 7	Bit 3	Bit 2	Bit 1	Bit 0	
Shutdown	0	X	1	1	0	2,6,8
Switch on	0	0	1	1	1	3
Switch on + enable operation	0	1	1	1	1	3 + 4 (NOTE)
Disable voltage	0	X	X	0	X	7,9,10,12
Quick stop	0	X	0	1	X	7,10,11
Disable operation	0	0	1	1	1	5
Enable operation	0	1	1	1	1	4,16
Fault reset	↑	X	X	X	X	15
NOTE Automatic transition to Enable operation state after executing SWITCHED ON state functionality.						

StatusWord (Status word) description

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ms		*oms*		*ila*	*tr*	*rm*	*ms*	*w*	*sod*	*qs*	*ve*	*f*	*oe*	*so*	*rtso*

MSB LSB

ms=manufacturer-specific、oms=operation mode specific、ila=internal limit active、tr=target reached、rm=remote、w=warning、sod=switch on disabled、qs=quick stop、ve=voltage enabled、f=fault、oe=operation enabled、so=switched on、rtso=ready to switch on

Table 5-3 Description table of equipment status words

Statusword	PDS FSA state
xxxx xxxx x0xx 0000_b	Not ready to switch on
xxxx xxxx x1xx 0000_b	Switch on disabled
xxxx xxxx x01x 0001_b	Ready to switch on
xxxx xxxx x01x 0011_b	Switched on
xxxx xxxx x01x 0111_b	Operation enabled
xxxx xxxx x00x 0111_b	Quick stop active
xxxx xxxx x0xx 1111_b	Fault reaction active
xxxx xxxx x0xx 1000_b	Fault

Note: For a more detailed description of the control word and the status word, please consult the CiA402 protocol specification.

6. Commissioning and application

6.1 Notes for quick debugging

- R, S, T and U, V, W are not connected, and can not be loose.
- Whether the motor connection cable has any grounding or short-circuit phenomenon.
- The same drive cable (power line, encoder cable) must be connected to the same motor.

6.2 Description of the debugging of the common parameters

Parameter number	The parameter name	Parameter debugging method
PA100	Speed ring gain	The larger the setting value, the greater the rigidity; In the case of the system does not produce oscillation and howling, set a larger value as much as possible.
PA101	The velocity loop integral time constant	Reducing this value reduces the positioning time and improves the speed response.
PA102	Position loop gain	This value determines the gain size of the position ring. Increasing this value can improve the servo rigidity of the position control, but too large may cause oscillation.
PA134	Acceleration compensation coefficient	Increase the value, can eliminate the motor static jitter problem, the value is too large, will cause howling; This compensation, you can make the low speed more stable.
PA135	Acceleration is compensated by the first-order filtering coefficient	Increasing this value will smoother the acceleration compensation.
PA136	Speed of the low-pass filtering coefficient	Increasing this value can make the feedback speed more stable. This value is too large, which will cause the speed lag and cause the system no problem, leading to oscillation.
PA137	Acceleration compensation for the second-order filtering coefficient	Increasing this value will smoother the acceleration compensation.
PA401	Torque-command filtering time constant	Setting torque filtering can eliminate or reduce mechanical vibration, but mechanical vibration can sometimes be introduced when the setting is not reasonable.

6.3 Adaptive trap device debugging

（1） Procedure for manually setting the trap parameters

Set PA144 to 3, keep the motor in operation, and monitor Un020 (resonance frequency). If a value above 300 appears in Un020, set the value to PA409. Observe whether the motor vibration is eliminated. If the motor vibration is not eliminated, the adaptive trap device can be automatically set in step (2).

(2) Operation steps of automatically setting the trap parameters

① PA144 (adaptive trap mode selection) is set to 1 or 2 according to the number of resonance points;

When resonance occurs, PA144 can be set to 1 and an adaptive trap can be opened. After the gain is adjusted, if a new resonance appears, PA144 can be set to 2 to start two adaptive traps.

② When the servo is running, the first or second group of trap parameters are automatically updated, and the corresponding PA parameters are automatically stored every 30min.

③ If the resonance is suppressed, it indicates that the adaptive trap achieves the effect. After the servo runs stably for a period of time, when PA144 is set to 0, the adaptive trap parameters are fixed as the last updated value.

This step can update the trap parameters to the wrong value due to the misoperation during the servo operation, and then aggravate the vibration condition.

④ If the vibration cannot be eliminated for a long time, please close the servo enabling force in time.

pour:

1) When using the adaptive trap device, if the servo-enabled OFF occurs within 30min, the trap parameters will not be stored in the corresponding PA parameters;

2) When the resonance frequency is below 300Hz, the effect of the adaptive trap will be reduced.

Appendix A List of user parameters

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□000	Function selection base switch	——	——	0010	Y	

H 3 2 1 0

Spin direction selection	
0	Take the CCW (counterclockwise) as the positive turn direction
1	Take CW (clockwise) as the positive direction (reversal mode)

Control mode selection	
0	Speed control (analog quantity instruction)
1	Position control (pulse train command)
2	Torque control (analog quantity command)
3	Internal setting speed control (contact command)
4	Internal setting speed control (contact command) --Speed control
5	Internal setting speed control (contact command) --position control
6	Internal setting speed control (contact command) --Torque control
7	Position control (pulse train command) Speed control (analog command)
8	Position control (pulse train command) Torque control (analog command)
9	Torque control (analog command) Speed control (analog command)
A	Speed control (analog volume command) zero clamp
B	Position control (pulse train command) Position control (pulse off)
C	Internal location control
D	Speed control (analog instruction: PCL control forward, NCL control reversal)
E	Spindle directional control
F	Spindle speed / position (Cs) control

Stop mode of the servo OFF	
0	The reverse brake slows the motor to stop and then placed in a free sliding state
1	Place the motor in inertial running state

Stop mode overation (OT)	
0	The reverse brake slows the motor to stop and then placed in a free sliding state
1	The reverse brake slows the motor to stop and then placed in the servo locked state
2	Place the motor in inertial running state

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□001	Function selection base switch 1	——	——	0001	Y	

H 3 2 1 0

How the encoder is used	
0	Use the absolute encoder as an absolute encoder to enable serial output of absolute data (PG division PAO port)
1	Use the absolute value encoder as an incremental encoder
2	Use the absolute encoder as an absolute encoder and does not enable serial output of absolute data

Speed Control Option (T-REF assignment)	
0	Manufacturer retained
1	Use the T-REF as an external torque-limiting input
2	Use the T-REF as a feedforward input to the torque
3	When P-CL, N-CL is "active", T-REF is used as external torque limiting input

Torque Control Option (V-REF Distribution)	
0	Manufacturer retained
1	Use the V-REF as an external torque-limiting input

Acceleration and feedforward form selection	
0	Acceleration feedforward type 1 (filter calculation method)
1	Acceleration Feedforward type 2 (fast calculation method)

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□002	Function selection base switch 2	——	——	1100	Y	

LS series ECAT bus type

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
	H 3 2 1 0					
	The second electronic gear enables the power					
	0 Close the second electronic gear, and the / P-CON signal acts as a P / PI switch					
	1 Enables the second electronic gear, and the / P-CON signal acts as the second electronic gear switching					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	1 Manufacturer retained					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	1 Manufacturer retained					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	1 Manufacturer retained					
P□003	Function selection base switch 3	——	——	0000	Y	
	H 3 2 1 0					
	Common encoder (non-serial encoder) alarm enable switch					
	0 Close A05~A08 or b05~b08 alarm detection					
	1 A05~A08 or b05~b08 alarm detection					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	1 Manufacturer retained					
	Instant blackout alarm enable switch					
	0 Instant power failure for a cycle without alarm					
	1 Instant power outage for a cycle of alarm					
	Overload-enhanced enabling switch					
	0 Turn off the overload enhancement feature					
	1 Enable overload enhancement function (enhanced overload capacity, suitable for frequent start and stop situations)					
P□004	Function selection base switch 4	——	——	0100	Y	
	H 3 2 1 0					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	1 Manufacturer retained					
	Appointment Constant (No Change)					
	0 Manufacturer retained					
	Low-frequency jitter suppression enable switch					
	0 Turn off the low-frequency jitter suppression					
	1 Enable the low-frequency jitter suppression					
	Oance alarm enable switch					
	0 Turn off the alarm detection					
	1 Enenable alarm detection (alarm when deviation counter value is greater than P □ 504)					
P□100	Speed ring gain	1 ~ 2500	1Hz	40	N	
P□101	The velocity loop integration time parameter	1 ~ 4000	0.1ms	200	N	
P□102	Position loop gain	1 ~ 2000	1/s	40	N	
P□103	Turn the inertia ratio	0 ~ 20000	1%	0	N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□104	The 2nd velocity loop gain	1 ~ 2500	1Hz	40	N	
P□105	The 2nd velocity loop integrates with the time parameter	1 ~ 4000	0.1ms	200	N	
P□106	Position 2 in the ring gain	1 ~ 2000	1/s	40	N	
P□107	Offset (Speed Offset)	0 ~ 450	1r/min	0	N	
P□108	The offset superposition range	0 ~ 5000	1 Directive pulse	10	N	
P□109	feedforward	0 ~ 100	1%	0	N	
P□110	Feedforward filtering time parameters	0 ~ 640	0.1ms	0	N	
P□111	Feedforward percent of the acceleration rate	0 ~ 100	1%	0	N	
P□112	Acceleration feedforward filter time parameters	0 ~ 640	0.1ms	0	N	
P□113	Gain class application switch	0000 ~ 0064	——	0000	Y	

H 3 2 1 0

Mode switch selection

0	Conditional on the internal torque instruction (level setting: P □ 114)
1	With speed (level setting: P □ 115)
2	With acceleration as the condition (level setting: P □ 116)
3	Conset offset pulse instruction (level setting: P □ 117)
4	There is no mode switch function

Automatic gain switching condition selection

0	No automatic gain switch (fixed to the first set of gain)
1	External Switch gain ch (G-SEL signal)
2	Torque percent switching
3	Only switched under the position offset conditions
4	Given acceleration value (10 r/min / s)
5	Given the velocity values
6	There are location instruction input

Manufacturer retained

Manufacturer retained

P□114	Mode switch (torque command)	0 ~ 300	1%	200	N	
P□115	Mode switch (speed command)	0 ~ 10000	1r/min	0	N	
P□116	Mode switch (acceleration command)	0 ~ 3000	10r/min/s	0	N	
P□117	Mode switch (Offset pulse)	0 ~ 10000	1 Directive pulse	0	N	
P□118	Gain switching delay time	0 ~ 20000	0.1ms (uniaxis)	0	N	0.2ms (biis)
P□119	Gain switching amplitude	0 ~ 20000	freedom	0	N	
	At P □ 113.1 = 2, in unit: 1% At P □ 113.1 = 3, unit: 1 command pulse At P □ 113.1 = 4, in 10 r/min / s At P □ 113.1 = 5, in 1r / min At P □ 113.1 = 6, unit: 1 command pulse					
P□120	Position-gain switching time	0 ~ 20000	0.1ms (uniaxis)	0	N	0.2ms (biis)
P□121	Gain switch switch lag ring	0 ~ 20000	1 Directive pulse	0	N	
P□122	Friction load	0 ~ 3000	1‰	0	N	
P□123	Frictional compensation velocity lag zone	0 ~ 100	1r/min	0	Y	
P□124	Adhesive friction load	0 ~ 20000	1‰/1krpm	0	N	
P□125	Friction gain	0 ~ 30000		0	N	
P□126	The velocity observer period	0 ~ 100	0.1ms	0/35/70	N	
P□127	Online automatic tuning class switch	——	——	1340	Y/N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
	H 3 2 1 0					

Real-time automatic gain settings — Power restart: Y

0	No real-time automatic gain adjustment
1	General mode (suitable for no load inertia at runtime)
2	General mode (suitable for very small load inertia changes during runtime)
3	General mode (suitable for highly variable load inertia during runtime)
4	Vertical load (suitable for operational load inertia without change)
5	Vertical load (suitable for small load inertia changes)
6	Vertical load (suitable for operational load inertia)

Select for real-time automatic gain of mechanical rigidity — Power restart: N

0	Mechanical rigidity during real-time automatic gain adjustment can be selected. The larger the parameter value is set, the faster the response is. If this parameter is suddenly set very large, the system gain will change significantly, resulting in a large impact on the machine. It is recommended to set a smaller value first, and gradually select the larger rigidity while monitoring the operation condition of the machine.
...	
F	

Manufacturer retained

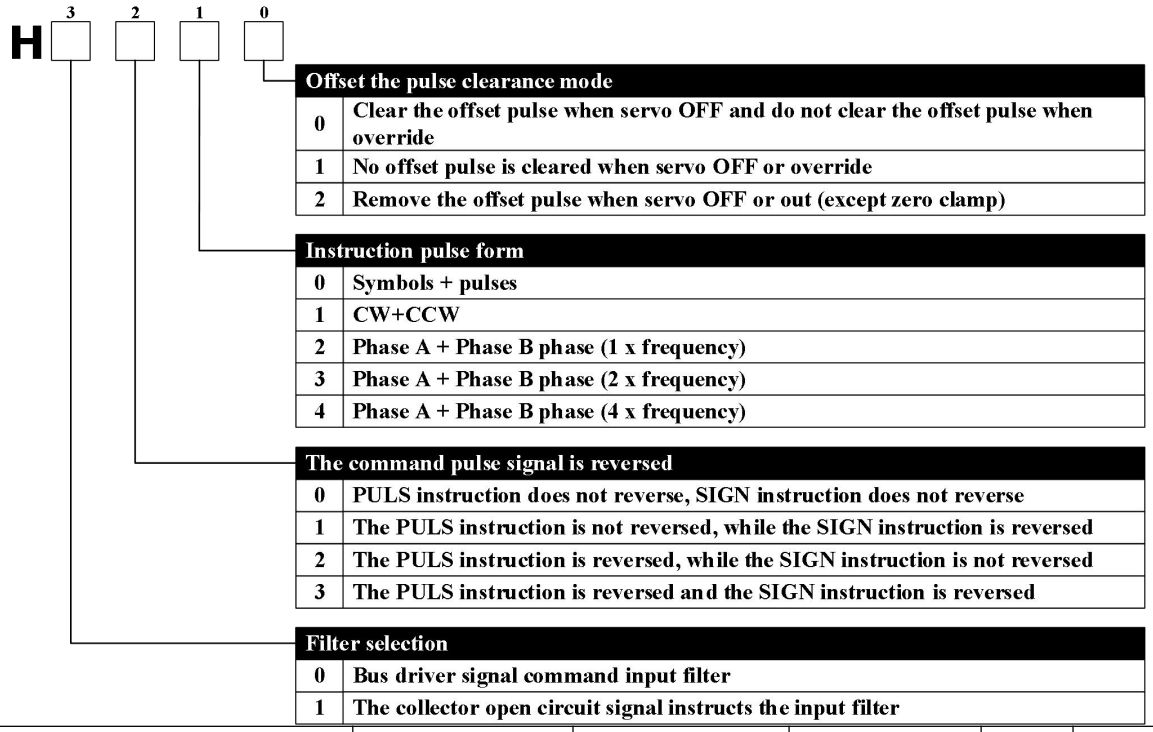
General auto-adjust mode settings — Power restart: N

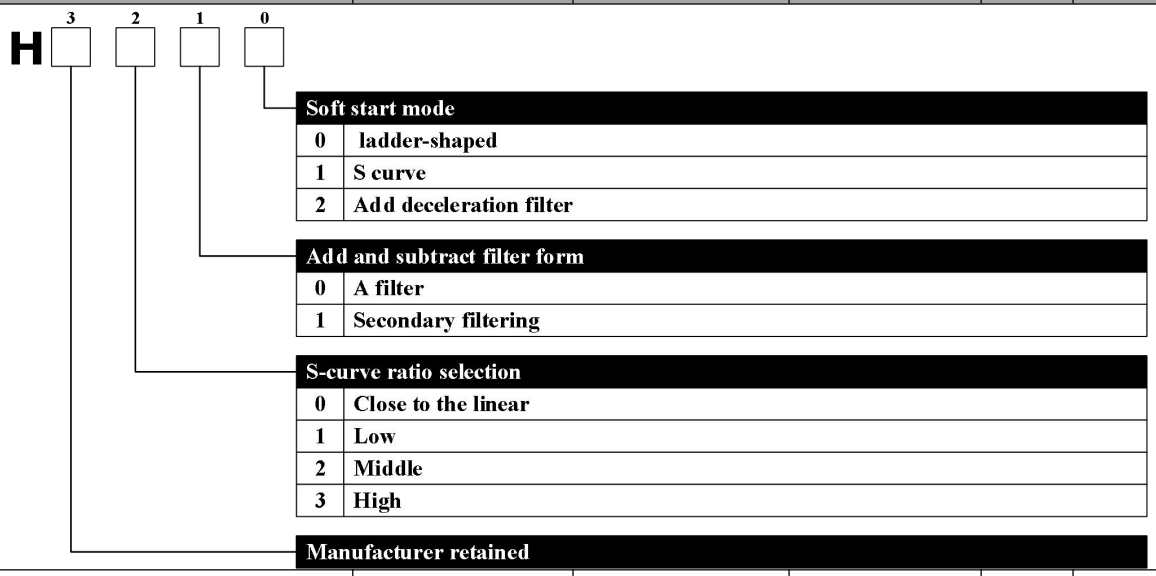
0	Number of rotating circles: 1 circle, direction of rotation: CCWCW
1	Number of rotation circles: 2 circles, direction of rotation: CCWCW
2	Number of rotation circles: 3 circles, direction of rotation: CCWCW
3	Number of rotation circles: 4 circles, direction of rotation: CCWCW
4	Number of turns: 1 lap, direction of rotation: CWCCW
5	Number of turns: 2 turns, direction of rotation: CWCCW
6	Number of turns: 3 turns, direction of rotation: CWCCW
7	Number of turns: 4 turns, rotation direction: CWCCW

P□128	Overvoltage detection and filtering time	0~200	0.5ms	4	N	
P□129	Under-time detection undertime	0~200	0.5ms	50	N	
P□130	Discharge point voltage setting	350~400	1V	380	Y	
P□133	Compensation switch	——	——	0000	Y	
	PA133.bit0- -Speed low-pass filter switch, 0 off, 1 on (PA136 is the low-pass filter parameter); PA133.bit1- -Acceleration feedback switch, 0 off, 1 open (PA134 is the acceleration feedback coefficient, PA135 is the acceleration feedback filtering time constant); PA133.bit2-Acceleration feedback range selection, 0 when the motor is still, 1 full speed range; PA133.bit3- -Acceleration feedback calculation position selection, 0 low pass filtering speed after the acceleration calculation, 1 low pass speed before the acceleration calculation;					
P□134	Acceleration compensation coefficient	0~3000	%	30	N	
P□135	Acceleration is compensated by the first-order filtering coefficient	0~250	0.1ms	5	N	
P□136	Speed of the low-pass filtering coefficient	0~10000	0.01ms	60	N	
P□137	Acceleration compensation for the second-order filtering coefficient	0~250	0.1ms	5	N	
P□138	Control switch parameters	0000~0601	——	0601	Y	

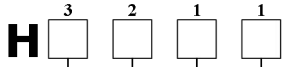
Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
	PA138.hex0-Whether the acceleration compensation is considered torque limiting switch: 0-not considered, 1-considered; PA138.hex1- -Speed ring variable integral processing: 0-Mode 0 (considering the torque limit and the speed loop input / output symbol), 1-Mode 1 (considering only torque limit processing) 2-Mode 2 (normal mode); PA138.hex2- -Current ring integral separation switch: 0-Integral separation is closed, 1-integral separation mode 1 (commissioning with PA142, PA143), 2-integral separation mode 2 (with PA143 commissioning), 3-Integral separation mode 3 (cooperate with PA143 debugging); 4-integral separation mode 4 (with PA143 debugging); 5-integral separation mode 5 (with PA143 debugging); 6-Integral separation mode 6 (cooperate with PA143 debugging);					
P□139	Current response frequency	10~30000	rad/s	2500	Y	
P□140	Voltage low-pass filtering time	0~65535	0.01ms	0	Y	
P□141	Control switch parameters	0000~1111	——	0	Y	
	PA141.hex0-whether the bus voltage participates in the control: 0-No participation, 1-participation PA141.hex1-Whether the current feed-forward function is turned on: 0-not open, 1-open PA141.hex2-Speed command low-pass filter enable switch: 0-not enable, 1-enable PA141.hex3-Speed loop change PI switch: 0-not open, 1-open					
P□142	Current ring integral separation coefficient of 1	0~2000	%	400	N	
P□143	Current ring integral separation coefficient 2	1~3000	%	20	N	
P□144	Adaptive trap mode selection	0~4	——	0	N	
	0--The first and second sets of adaptive trap parameters are no longer updated 1--1 adaptive trap is effective, and the parameters of the first group of trap are updated in real time according to the vibration situation 2--2 adaptive traps are effective, and the parameters of the first and second traps are updated in real time according to the vibration situation 3--Test resonance frequency only, shown in Un020 (unit Hz) 4-Clear the adaptive trap and restore the values of the first and second group traps to the factory state					
P □	Position control command form selection switch	——	——	0000	Y	

LS series ECAT bus type

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
200						
P□201	PG frequency score	16 ~ 32768	1P/rev	2500	Y	
P□202	1st electron gear ratio (molecular)	1 ~ 65535	——	1	Y	
P□203	1st electronic gear ratio (denominator)	1 ~ 65535	——	1	Y	
P□204	2nd electron gear ratio (molecular)	1 ~ 65535	——	1	Y	
P□205	Position command acceleration and deceleration time parameter	0 ~ 6400	0.1ms	0	N	
P□206	Position command filtering form selection	0 ~ 1	——	0	Y	
P□300	Speed command input gain	0 ~ 3000	（r/min）/V	150	N	
P□301	Internal speed 1	0 ~ 6000	1r/min	100	N	
P□302	Internal speed 2	0 ~ 6000	1r/min	200	N	
P□303	Internal speed 3	0 ~ 6000	1r/min	300	N	
P□304	Micromotion (JOG) velocity	0 ~ 6000	1r/min	500	N	
P□305	Soft-start-up acceleration time	0 ~ 10000	1ms	0	N	
P□306	Soft start and deceleration time	0 ~ 10000	1ms	0	N	
P□307	The velocity command filtering constant	0 ~ 10000	1ms	0	N	
P□308	S-curve rise time	0 ~ 10000	1ms	0	N	
P□309	Speed command curve form	——	——	0000	Y	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
						
P□310	Encoder number setting	0~65535	1 Circle	0	Y	
P□312	Third sink frequency	200~5000	Hz	5000	N	
P□313	Third sink depth	0~99	——	0	N	
P□314	Third sink width	0~20	——	2	N	
P□315	Fourth wave frequency	200~5000	Hz	5000	N	
P□316	Fourth sink depth	0~99	——	0	N	
P□317	Fourth sink width	0~20	——	2	N	
P□318	Overload decay ratio	1~100	——	1	N	
P□400	Torque command input gain	10 ~ 100	0.1V / Rated torque	30	N	
P□401	Torque command filter time parameters	0 ~ 250	0.1ms	4	N	
P□402	The second torque command filter time parameter	0 ~ 250	0.1ms	4	N	
P□403	Positive turn torque limit	0 ~ 300	1%	300	N	
P□404	Reverse torque limit	0 ~ 300	1%	300	N	
P□405	External limit of forward turn torque	0 ~ 300	1%	100	N	
P□406	Reverse the torque external limit	0 ~ 300	1%	100	N	
P□407	Reverse connection brake torque limit	0 ~ 300	1%	300	N	
P□408	Speed limit during torque control	0 ~ 6000	1r/min	1500	N	
P□409	First wave frequency	200 ~ 5000	1Hz	5000	N	
P□410	The first wave depth	0 ~ 99	——	0	N	
P□411	First sink width	0~20	——	2	N	
P□412	Second sink frequency	200 ~ 5000	1Hz	5000	N	
P□413	Second sink depth	0 ~ 99	——	0	N	
□P 414	Second sink width	0~20	——	2	N	
P□416	Adaptive trap device vibration threshold	0~1000	%	20	N	
P□500	Location completion width	0 ~ 5000	1 Directive unit	10	N	
P□501	Zero virus position level	0 ~ 3000	1r/min	10	N	
P□502	Rotation detection level	0 ~ 3000	1r/min	20	N	
P□503	The-speed signal detection width	0 ~ 100	1r/min	10	N	
P□504	Offset pulse overflow level	1 ~ 32767	256 instruction units	1024	N	
P□505	Servo On waiting time	0 ~ 2000	ms	0	N	
P□506	Brake instruction — Servo OFF delay time	0 ~ 500	10ms	0	N	
P□507	Brake command output speed level	0 ~ 6000	1r/min	100	N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□508	Servo OFF-Brake command waiting time	10 ~ 100	10ms	50	N	
P□509	Input signal selection of 1	——	——	4321	Y	8765 (bis / b)
P□510	Input signal selection 2	——	——	8765 (single axis)	Y	0000 (biaxial)



And / S-ON signal assignment

0	Hold the signal to be invalid at all times
1	The input signal of IN 1 (CN1-14) is ON
2	The input signal of IN 2 (CN1-15) is ON
3	The input signal of IN 3 (CN1-16) is ON
4	The input signal of IN 4 (CN1-17) is ON
5	The input signal of IN 5 (CN1-39) is ON
6	The input signal of IN 6 (CN1-40) is ON
7	The input signal of IN 7 (CN1-41) is ON
8	The input signal for IN 8 (CN1-42) is ON
9	Hold the signal to "valid"

/ P-CON signal allocation (P control for ON)

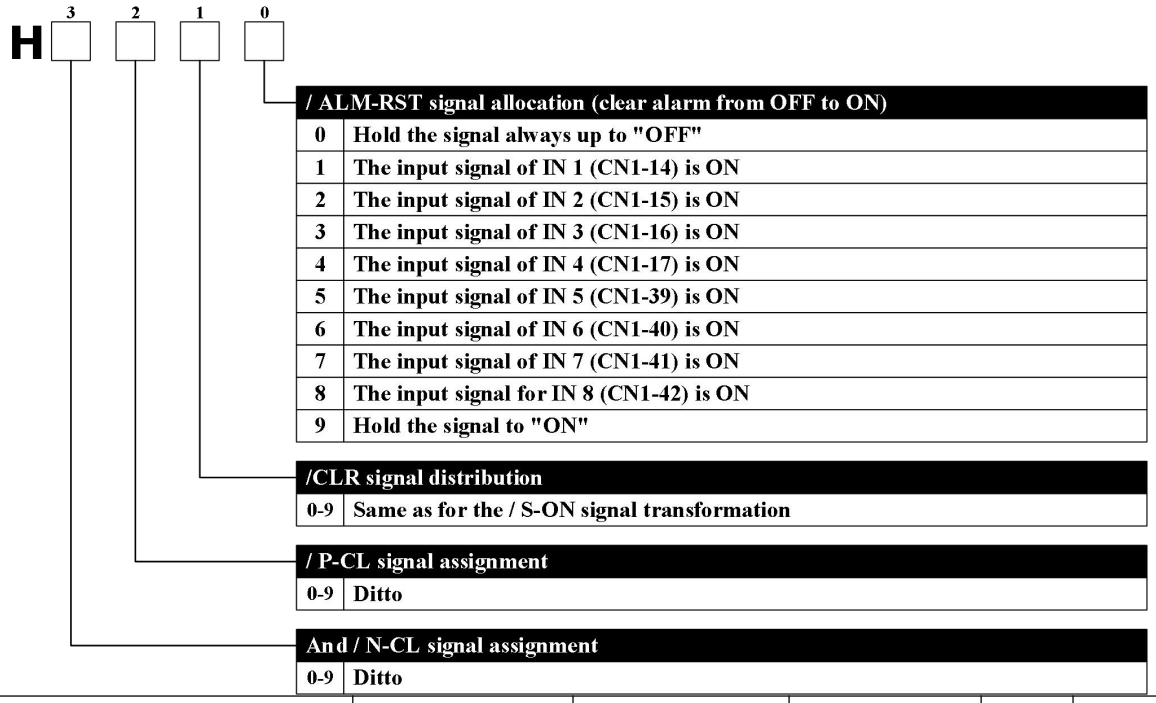
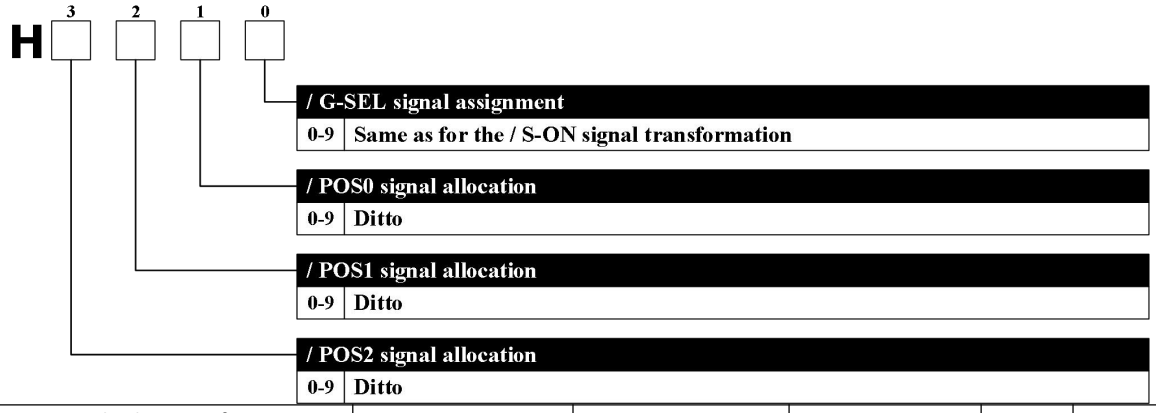
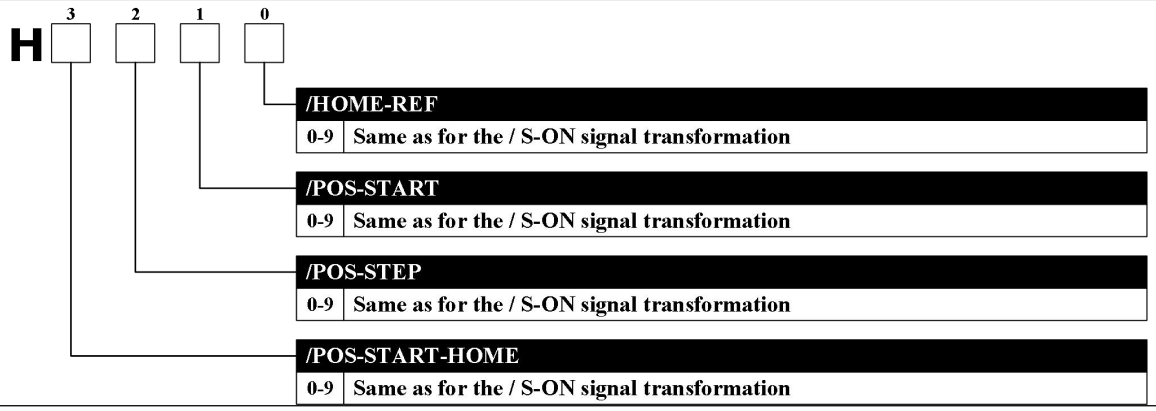
0-9	Ditto

P-OT signal allocation (forbidden for OFF)

0	Hold the signal to "no forward side drive"
1	The input signal of IN 1 (CN1-14) is ON
2	The input signal of IN 2 (CN1-15) is ON
3	The input signal of IN 3 (CN1-16) is ON
4	The input signal of IN 4 (CN1-17) is ON
5	The input signal of IN 5 (CN1-39) is ON
6	The input signal of IN 6 (CN1-40) is ON
7	The input signal of IN 7 (CN1-41) is ON
8	The input signal of IN 8 (CN1-42) is ON
9	Hold the signal to "allow forward side drive"

N-OT signal allocation (no reverse side drive for OFF)

0	Hold the signal to "no reverse side drive"
1	The input signal of IN 1 (CN1-14) is ON
2	The input signal of IN 2 (CN1-15) is ON
3	The input signal of IN 3 (CN1-16) is ON
4	The input signal of IN 4 (CN1-17) is ON
5	The input signal of IN 5 (CN1-39) is ON
6	The input signal of IN 6 (CN1-40) is ON
7	The input signal of IN 7 (CN1-41) is ON
8	The input signal for IN 8 (CN1-42) is ON
9	Hold the signal to "allow reverse side drive"

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
						
P□511	Input signal selection of 3	——	——	0000	Y	
						
P□512	Input signal selection of 4	——	——	0000	Y	
						

LS series ECAT bus type

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□513	Output signal selection 1	——	——	4321	Y	0321 (Dual-axis / A) 0654 (bis / b)

H 3 2 1 0

Servo Alarm signal distribution (ALM)

0	Invalid (not using this signal)
1	The above signal is output via the output terminal of OUT 1 (CN1-7,8)
2	The signal is output by the output terminal of OUT 2 (CN1-9,10)
3	The signal is output via the output terminal of OUT 3 (CN1-11,12)
4	The signal is output by the output terminal of OUT 4 (CN1-32,33)
5	The signal is output by the output terminal of OUT 5 (CN1-34,35)
6	The signal is output by the output terminal of OUT 6 (CN1-36,37)

Positioning complete signal allocation (/ COIN) / same-speed detection signal allocation (/ V-CMP)

0-6	Ditto

Motor Rotation Detection Signal Distribution (/ TGON)

0-6	Ditto

Servo-readiness signal allocation (/ S-RDY)

0-6	Ditto

P□514	Output signal selection 2	——	——	0065	Y	0000 (biaxial)

H 3 2 1 0

Torque-limiting output signal distribution (/ CLT)

0-6	Same as for the ALM signal transformation

Brake signal allocation (/ BK)

0-6	Ditto

Encoder Origin signal distribution (/ PGC)

0-6	Ditto

Manufacturer retained

P□515	Output signal selection 3	——	——	0000	Y	

H 3 2 1 0

Current data group number bit0 signal allocation with internal position control in position (/ InPosNum0)

0-6	Ditto

Current data group number bit1 signal allocation with internal position control in place (/ InPosNum1)

0-6	Ditto

Current data group number bit2 signal allocation with internal position control in position (/ InPosNum2)

0-6	Ditto

Current data group number bit3 signal allocation with internal position control in position (/ InPosNum3)

0-6	Ditto

P□516	Manufacturer retained	——	——	——	N	
P□517	Enter the port filter time parameter	0 ~ 1000	0.1ms	1	N	
P□518	Alert input filter time parameter	0 ~ 3	0.1ms	1	N	
P□519	Input port signal valid level select 1	——	——	0000	N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
	H 3 2 1 0 **CN1-14 input effective level selection** 0 Effective on the input signal ON (L level) 1 OFF (H level) is input **CN1-15 input effective level selection** 0-1 Ditto **CN1-16 input effective level selection** 0-1 Ditto **CN1-17 input effective level selection** 0-1 Ditto					
P□520	Input port signal logical selection 2	——	——	0000	N	
	H 3 2 1 0 **CN1-39 input effective level selection** 0-1 Same as the CN1-14 input level selection **CN1-40 input effective level selection** 0-1 Ditto **CN1-41 input effective level selection** 0-1 Ditto **CN1-42 input effective level selection** 0-1 Ditto					
P□521	Output port signal to backselect 1	——	——	0000	N	
	H 3 2 1 0 **OUT 1 (CN1-7,8) output backselection** 0 Don't take the back 1 Retreat **OUT 2 (CN1-9,10) output backselection** 0-1 Ditto **OUT 3 (CN1-11,12) output backselection** 0-1 Ditto **OUT 4 (CN1-32,33) output is backselected** 0-1 Ditto					
P□522	Output port signal backselection 2	——	——	0000	N	
	H 3 2 1 0 **OUT 5 (CN1-34,35) output backselection** 0-1 Ditto **OUT 6 (CN1-36,37) output backselection** 0-1 Ditto **Manufacturer retained**					
P□525	Overload alarm detection threshold	100~150	%	100	N	
P□526	AD self-calibration drag voltage	0~200	0.01V	50	N	
P□529	Dead zone compensation settings	1~300	1us	90	N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□530	Death zone compensation threshold	1~5000	0.1%	300	N	

Parameter number	name	Set the scope	Set unit	Factory setting	source restart	remarks
P□600	The RS-485 communication parameter selector switch	——	——	0151	Y	
P□601	RS-485 communication shaft address	1 ~ 127	——	1 (Axis A)	Y	2 (b-axis)
P□602	controlling parameter	0000~1111	——	1101	N	
	Hex 0 blocking turn alarm (A07) detection enabling mark: 1-enabling motor blocking turn alarm detection; 0-no enabling motor blocking turn alarm detection Hex 1 regenerative overload (A31) detection enabling mark: 1-not enabling regenerative overload (A31) detection; 0-enabling regenerative overload (A31) detection Detection of hex 2 bus encoder overspeed (A41) mark: 1-No enable bus encoder overspeed detection; 0-enable bus encoder overspeed detection The hex 3 dead zone compensation enabling sign: 1-dead zone compensation enabled; 0-dead zone compensation is not enabled					
P□603	Time window for blocking and turning detection	1~65535	1ms	400	N	
P□604	Blocking lock detection speed threshold	0~30000	0.1rpm	10	N	
P□605	continue to have	——	——	——	——	
P□606	Station address setting X axis: 1 Z axis: 2 Y axis: 3 Axis A: 4 B axis: 5 C axis: 6	——	——	0001	Y	

Appendix B Alarm display list

B.1 Alarm Information

The relationship between alarm display and alarm coding output ON / OFF is shown in the table below. Motor stop method in case of alarm: free operation stop: a natural stop method of friction resistance through the motor rotation without braking

alarm display	ALM output	The name of the alarm	The alarm content	Can you clear
☐01	H	Encoder PA, PB, PC disconnection	Encoder failure or cable welding problem.	approve
☐02	H	Encoder PU, PV, PW disconnection	Encoder failure or cable welding problem.	approve
☐03	H	overload	Continuous operation over the rated torque.	approve
☐04	H	The A / D conversion channel is abnormal	The A / D conversion channel is abnormal	approve
☐05	H	PU, PV, PW illegal code	PU, PV, PW signal all high or low	approve
☐06	H	PU, PV, and PW phase are wrong	PU, PV, PW signal all high or low	approve
☐07	H	motor stalling	motor stalling	approve
☐10	H	overcurrent	Servo driver IPM module current is too large.	approve
☐11	H	overvoltage	Servo driver main circuit voltage is too high.	deny
☐12	H	undervoltage	Servo driver main circuit voltage is too low.	deny
☐13	H	Parameter destruction	EE ROM data exception in the server drive.	approve
☐14	H	exceed the speed limit	The servo motor speed is abnormally high	approve
☐15	H	Deviation counter overflow	Internal position deviation counter overflow	approve
☐16	H	The position offset is too large	The position offset pulse exceeds the set point of the user parameter P ☐ 504.	approve
☐17	H	The electronic gear is wrong	The electronic gear is not set properly or the pulse frequency is too high	approve
☐18	H	Current detects abnormal channel 1	The current detection is abnormal	approve
☐19	H	Current detects abnormal channel 2	The current detection is abnormal	approve
☐22	H	The motor model is wrong	The servo driver parameters do not match with the motor	approve
☐23	H	The servo driver does not match with the motor	The servo driver does not match with the motor	approve
☐25	H	Bus encoder multi-loop message error	Multiple circle information error	approve
☐26	H	Bus encoder multi-loop information overflow	Multiple circle information overflow	approve
☐27	H	Bus encoder battery alarm 1	The battery voltage is below 2.5v, and the multiple-loop position information has been lost	approve
☐28	H	Bus encoder battery alarm 2	The battery voltage is lower than 3.1v, and the battery voltage is too low	approve

alarm display	ALM output	The name of the alarm	The alarm content	Can you clear
☐30	H	Discharge blocking line alarm	Discharge resistance is damaged.	approve
☐31	H	Regeneration overload	The regeneration processing loop is abnormal.	deny
☐33	H	Instant power outage alarm	In AC, there are power outages of more than one power cycle.	approve
☐34	H	The rotary transformer is abnormal	Communication of the rotary transformer is abnormal.	approve
☐40	H	The Bus encoder communication is abnormal	The servo drive could not communicate with the encoder.	approve
☐41	H	Bus encoder overspeed	When the power supply is ON, the encoder rotates at a high speed	approve
☐42	H	Bus encoder absolute state error	Encoder damage or encoder decoding circuit damage	approve
☐43	H	Bus encoder count error	Encoder damage or encoder decoding circuit damage	approve
☐44	H	Check error in the bus encoder control domain	The encoder signal is disturbed or the encoder decoding circuit is damaged	approve
☐45	H	Bus encoder communication data verification error	The encoder signal is disturbed or the encoder decoding circuit is damaged	approve
☐46	H	Error in the cutoff position in the bus encoder state domain	The encoder signal is disturbed or the encoder decoding circuit is damaged	approve
☐47	H	Bus encoder SFOME, wrong cutoff bit	The encoder signal is disturbed or the encoder decoding circuit is damaged	approve
☐48	H	The bus encoder data is not initialized	The bus encoder EEPROM data is empty	approve
☐49	H	Bus encoder data and number check errors	Bus encoder EEPROM data and number check exception	approve
☐50	H	The ESC chip initialization has failed	The ESC chip initialization has failed	approve
☐51	H	SII EEPROM Mount error	SII EEPROM Mount error	approve
☐52	H	Incorrect ESM requirements	Incorrect ESM requirements	approve
☐53	H	The ESM requirements are not defined	The ESM requirements are not defined	approve
☐54	H	The boot status requirement is abnormal	The boot status requirement is abnormal	approve
☐55	H	The PLL did not complete the exception	The PLL did not complete the exception	approve
☐56	H	The PDO watchdog is abnormal	The PDO watchdog is abnormal	approve
☐57	H	PLL unusual	PLL unusual	approve
☐58	H	Synchronous signal anomaly	Synchronous signal anomaly	approve
☐59	H	The synchronization period setting is abnormal	The synchronization period setting is abnormal	approve
☐60	H	The mailbox is set exceptionally	The mailbox is set exceptionally	approve
☐61	H	PDO watchdog set abnormal	PDO watchdog set abnormal	approve

alarm display	ALM output	The name of the alarm	The alarm content	Can you clear
□62	H	DC setting exception	DC setting exception	approve
□64	H	Synchronous signal is lost	Synchronous signal is lost	approve
□65	H	The SM event mode setting is abnormal	The SM event mode setting is abnormal	approve
□66	H	The SyncManager2 / 3 setting is abnormal	The SyncManager2 / 3 setting is abnormal	approve
□67	H	The TxPDO assignment was abnormal	The TxPDO assignment was abnormal	approve
□68	H	The RxPDO allocation was abnormal	The RxPDO allocation was abnormal	approve
□69	H	Lost link Detected abnormal	EtherCAT Drop the line	approve
□70	H	Drive overheat alarm	The IPM module inside the drive is too high	approve
□71	H	SII EEPROM Exception	SII EEPROM Exception	approve
□72	H	Invalid firmware	Invalid firmware	approve
□73	H	The SM setting is invalid	The SM setting is invalid	approve
□74	H	Invalid input	Invalid input	approve
□75	H	The output is invalid	The output is invalid	approve
□77	H	Invalid SM type	Invalid SM type	approve
□--	L	No error shown	Show the normal action status	approve

pour:

1. "□" in the alarm display may be "A" or "b", or A or b axis alarm respectively.
2. □ 25, □ 26, □ 27, □ 41 shall clear the internal alarm of the encoder through the auxiliary function mode before the alarm can be reset.

B.2 Alarm display and alarm display reasons and treatment measures

If the servo drive is bad, the panel operator alarm displays A □□ or b □□. The alarm display and its handling measures are shown below.

If the bad condition cannot be resolved after treatment, please contact the service department of our company.

Alert display list

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
□01	The incremental encoder ABC is disconnected	Occurs during power on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded wire or multiple stranded shielding line, with the core wire above 0.12mm2, and tin-plated soft copper multiple stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder	Implement the anti-jamming

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
			are disturbed	countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□02	The incremental encoder UVW is disconnected	Occurs during power on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specifications to multiple stranded lines or multiple stranded shielding lines
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□03	overload	Occurs when the control power is switched on	Servo driver circuit board failure	Replace the servo driver
		Occurs during the servo ON	Abnormal motor wiring (poor wiring, poor connection)	Correct motor wiring
			Encoder wiring is abnormal (poor wiring, poor connection)	Correct the encoder wiring
			Servo driver circuit board failure	Replace the servo driver
		Occurs when the servo motor does not rotate with the input command	Abnormal motor wiring (poor wiring, poor connection)	Correct motor wiring
			Encoder wiring is abnormal (poor wiring, poor connection)	Correct the encoder wiring
			Starting torque exceeds the maximum torque	Restudy load conditions, operating conditions or motor capacity
			Servo driver circuit board failure	Replace the servo driver
		Occurs at the usual runtime	The effective torque exceeds the rated torque or the starting torque greatly exceeds the rated torque	Restudy load conditions, operating conditions or motor capacity
			High temperature in the servo drive storage disk	Reduce the disk temperature to below 55
			Servo driver circuit board failure	Replace the servo driver
□05	The incremental encoder UVW signal is abnormal	Occurs when the control power supply is switched on	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□07	motor stalling	It happens in an instant	The motor power line UVW has an incorrect phase sequence	Ensure that the power line phase sequence is correct, and confirm that the motor

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
		during the enabling process		type number is set correctly
			Motor zero point is incorrect	Make zero calibration operation on the motor
		Occurs at the usual runtime	The motor has actually been blocked for rotation	Please check the machinery
			The motor is not blocked, which belongs to a false alarm	Please enlarge the P □ 603
□10	overcurrent	Occurs when the control power supply is switched on	Overload alarm reset operation several times due to power disconnection	Change the reset method of the alert
			Servo driver circuit board failure	Replace the servo driver
		Overcurrent occurs when the main circuit is switched on or occurs during the motor operation	U, V, W and ground wire connection error	Check the wiring and connect correctly
			The ground wire is wrapped around the other terminals	
			Short circuit between U, V, W of the main circuit and the ground wire	Correct or replace the cable used for the motor main circuit
			Short circuit between U, V, W of the motor main circuit	
			Wrong regeneration resistance wiring	Check the wiring and connect correctly
			Road between the U, V, W and the ground wire of the servo drive	Replace the servo driver
			Servo driver failure (current feedback circuit, power transistor, or circuit board failure)	
			Short circuit between U, V, W of the main circuit and the ground wire	Replace the servo motor
			Short circuit between U, V, W of the motor main circuit	
			Overload alarm reset operation several times due to power disconnection	Change the reset method of the alert
			The position speed command changes dramatically	Reess the instruction value
			Whether the load is too large, whether it exceeds the regeneration processing capacity, etc	Rediscuss the load conditions and operating conditions
			The installation method of servo drive (direction, interval from other parts) is not suitable (whether the storage plate heating, surrounding heating effect)	Reduce the ambient temperature of the servo drive to below 55℃
			The encoder skidded	Replace the servo motor
			The fan of the servo unit stops turning	Replace the servo driver
			Servo driver circuit board failure	
□11	overvoltage * Detection when the	Occurs when the control power supply is switched	Servo driver circuit board failure	Replace the servo driver

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
	main circuit is powered on	on		
		Power is switched on to the main circuit When happened	The AC power supply voltage is too high	Adjust the AC power supply voltage to the normal range
			Servo driver circuit board failure	Replace the servo driver
		Occurs at the usual runtime	Check AC supply voltage (for excessive voltage change)	Adjust the AC power supply voltage to the normal range
			High revolutions, high load inertia (insufficient regeneration)	Rediscuss load conditions and operating conditions (check the specifications of load inertia and negative load)
			Servo driver circuit board failure	Replace the servo driver
		When the servo motor decelerates happen	Use high revolutions, high load inertia	Rediscuss the load conditions and operating conditions
□12	undervoltage * Detection when the main circuit is powered on	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
		Power is switched on to the main circuit When happened	The AC power supply voltage is too low	Adjust the AC power supply voltage to the normal range
			The fuse of the servo unit is fused	Replace the servo driver
			The shock current limit resistance break line (whether the power supply voltage is abnormal, whether the impact current limit resistance is overloaded)	Replace servo unit (confirm supply voltage, reduce frequency of main circuit ON / OFF)
			Servo driver circuit board failure	Replace the servo driver
		Occurs at the usual runtime	Low voltage of AC supply (too excessive pressure drop)	Adjust the AC power supply voltage to the normal range
			An instant blackout occurred	Start running again with an alarm reset
			Short circuit for motor main circuit	Correct or replace the cable used for the motor main circuit
			Servo motor short circuit	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□13	Parameter destruction	Occurs when the control power supply is switched on	Power is off while setting the parameter	Perform the user parameter initialization processing (F □ 011)
			Power is off while writing to the alert	
			Servo driver circuit board failure	Replace the servo driver
□14	exceed the speed limit	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
		Occurs during the servo ON	The U, V, and W phase of the motor alignment is misordered	Correct motor wiring
			The encoder has a wrong wiring	Correct the encoder wiring
			The encoder wiring misates due to interference	Implement the anti-jamming countermeasures of the encoder wiring
			Servo driver circuit board	Replace the servo driver

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
			failure	
		At the servo motor to start the operation When traveling or rotating at a high speed When happened	The U, V, and W phase of the motor alignment is misordered	Correct motor wiring
			The encoder has a wrong wiring	Correct the encoder wiring
			The encoder wiring misates due to interference	Implement the anti-jamming countermeasures of the encoder wiring
			Excessive input for position / speed instructions, etc	Lower the instruction value
			Command input gain set error	Correcting the instruction input gain
			Servo driver circuit board failure	Replace the servo driver
□15	Position counter to overflow	Occurs when the servo motor starts running or rotates at a high speed	motor stalling	Check the load
			Input command frequency is abnormal	The upper computer reduces the frequency
			wiring error	Correct the wiring
□16	The position offset is too large (In the servo ON state Lower position offset exceeds User parameter overpower Flat P □ 504 setting)	Occurs when the control power supply is switched on	Position offset is incorrect for too large alarm level (P □ 504)	Set the value of the user parameter P □ 504 to a value other than 0
			Servo driver circuit board failure	Replace the servo driver
		Occurs at a high-speed of rotation	Improper wiring of U, V, W of servo motor (incomplete connected)	Correct motor wiring
				Correct the encoder wiring
			Servo driver circuit board failure	Replace the servo driver
		Occurs when the motor does not rotate when the position command is given	The U, V, W of the servo motor has poor wiring	Correct motor wiring
			Servo driver circuit board failure	Replace the servo driver
		Action is normal, but occurs during long commands	Gain adjustment for servo drive	Up-speed ring gain (P □ 100), position ring gain (P □ 102)
			The frequency of the position command pulse is too high	Slowly reduce the position command frequency
				Add the smoothing function
				Re-evaluate the electron tooth number ratio
			Position offset is incorrect for too large alarm level (P □ 504)	Set the user parameter P □ 504 to the correct value
			The load conditions (torque, moment of inertia) do not match the motor specifications	Study to reevaluate the load or motor capacity
□17	The electronic gear is wrong	Occurs when the control power supply is switched on	The electronic gear is not set up correctly	Reset the P □ 202, P □ 203
		Occurs when the servo motor starts running		
□18	Current detects abnormal channel 1	Occurs when the control power supply is switched	Servo driver circuit board failure	Replace the servo driver

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
		on		
		Occurs when the servo motor starts running		
□19	Current detects abnormal channel 1	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
		Occurs when the servo motor starts running		
□22	The motor model is wrong	Occurs when the control power supply is switched on	Driver motor parameter setting is abnormal	Replace the servo driver
			Parameter exception written to the encoder	Replace the servo motor (encoder)
			Servo driver circuit board failure	Replace the servo driver
□23	The driver does not chip with the motor	Occurs when the control power supply is switched on	Servo unit capacity and motor capacity are not suitable for the motor capacity	Make the capacity of the servo unit and the servo motor fit to each other
			Parameter exception written to the encoder	Replace the servo motor (encoder)
			Driver motor parameter setting is abnormal	Replace the servo driver
			Servo driver circuit board failure	Replace the servo driver
□25	Bus encoder multiple loop data error	Occurs when the control power supply is switched on	Absolute value encoder multi-circle data exception	Execute the clear bus encoder multiloop position (F □ 09) and perform the clear bus encoder alarm register (F □ 010)
		Occurs while the servo motor is running		
□26	Bus encoder multi-loop data overflow	Occurs when the control power supply is switched on	Absolute value encoder multi-circle data exception	Execute the clear bus encoder multiloop position (F □ 09) and perform the clear bus encoder alarm register (F □ 010)
		Occurs while the servo motor is running		
□27	Bus encoder battery alarm 1	Occurs when the control power supply is switched on		
□28	Bus encoder battery alarm 2	Occurs when the control power supply is switched on		
□30	htteroplasia	Occurs when	Servo driver circuit board	Replace the servo driver

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
		the control power supply is switched on	failure	
		Occurs when the main circuit is powered on	No external regeneration resistance	Connect the regeneration resistance
			Check whether the regeneration resistance is poor, fall off or broken	Correct the wiring for the external regeneration resistance
			Crossing per between B2-B3 (when using built-in regeneration resistance)	Correct wiring
		Occurs at the usual runtime	Check whether the regeneration resistance is poorly wired and falls off	Correct the wiring for the external regeneration resistance
			Regeneration resistance break line (whether the regeneration energy is too large)	Replace regenerative resistance or replace servo driver (rediscuss load, operating conditions)
			Servo driver fault (regeneration transistor, voltage detection partial fault)	Replace the servo driver
□31	Regeneration overload	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
		Occurs when the main circuit is powered on	Power supply voltage exceeds 270V	correction voltage
		During normal operation (high temperature increase of regeneration resistance)	The renewable energy is too large	Re-select the regenerative resistance capacity or re-discuss the load conditions and operating conditions
			In a continuous regeneration state	
		Ococcurs during normal operation (regeneration resistance temperature increase is low)	Servo driver circuit board failure	Replace the servo driver
		Occurs when the servo motor decelerates	The renewable energy is too large	Re-select the regenerative resistance capacity or re-discuss the load conditions and operating conditions
□32	Power supply lack of phase (Low voltage state in L1, L2, L3 phase in main power	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
		Occurs when the main power supply is switched	Three-phase wire has poor wiring	Correct the power distribution line
			Three-phase power supply imbalance	Correct power supply imbalance (switch phase)
			Servo driver circuit board	Replace the servo driver

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
	supply ON state) * Detection when the main circuit is powered on	on	failure	
		Occurs during the servo-motor drive	Three-phase wire has poor wiring	Correct the power distribution line
			Three-phase power supply imbalance	Correct power supply imbalance (switch phase)
			Servo driver circuit board failure	Replace the servo driver
□33	Instant power outage alarm	Occurs at the usual runtime	In AC, there are power outages of more than one power cycle	Check the power supply circuit
□40	The Bus encoder is abnormal	Occurs when the control power supply is switched on	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
		Occurs during the operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change cable specification to multiple stranded line or multiple stranded shielding line with core of 0.12mm^{2}Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□41	Bus encoder overspeed	Occurs when the control power supply is switched on	The servo motor rotates at speeds above 100r / min when PG power is on	PG power supply is ON when the rotation of servo motor is below 100 r / min
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
		Send it during the operation	Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□42	Bus encoder FS status is wrong	Usually occurs at runtime	Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□43	Bus encoder count error	Occurs at the usual runtime	Servo driver circuit board failure	Replace the servo driver
□44	Check error in the bus encoder	Occurs with the control power supply	Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded line or multiple stranded shielding line, the core wire

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
	control domain	on or during operation		is.12mm²Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
□45	Bus encoder communication data check error	Occurs with the control power supply on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded line or multiple stranded shielding line, the core wire is.12mm²Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□46	Error in cutoff in the line encoder state domain	Occurs with the control power supply on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded line or multiple stranded shielding line, the core wire is.12mm²Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
			Servo driver circuit board failure	Replace the servo driver
□47	Occurs with the control power supply on or during operation	Occurs with the control power supply on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded line or multiple stranded shielding line, the core wire is.12㎜²Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□48	The bus encoder data is not initialized	Occurs with the control power supply on or during operation	The Encoder EEROM is not initialized	Replace the servo motor
□49	Bus encoder data and number check errors	Occurs with the control power supply on or during operation	The encoder has a wrong wiring	Correct the encoder wiring
			Encoder cables have different specifications and are disturbed	Change the cable specification to multiple stranded line or multiple stranded shielding line, the core wire is.12㎜²Above, tin soft copper multistranded stranded wire
			The encoder cable is too long and is disturbed	The longest wiring distance is 20m
			The encoder cable causes rodent-in, foreskin damage, and the signal line is disturbed	Correct the encoder cable laying
			The encoder cable is tied together or separated from the high current line	Lay the encoder cable in a position where the surge voltage is not applied
			The potential of FG changes due to the influence of the motor side equipment (welding machine, etc.)	Connect the ground wire of the equipment to avoid the FG shunt to the PG side
			The signal lines of the encoder are disturbed	Implement the anti-jamming countermeasures of the encoder wiring
			Encoder failure	Replace the servo motor
			Servo driver circuit board failure	Replace the servo driver
□70	superheat	Occurs when the control power supply is switched on	Servo driver circuit board failure	Replace the servo driver
			Overload alarm reset operation several times due to power disconnection	Change the reset method of the alert

report to the police	The alarm content	State of alarm occurrence	cause	treatment measure
		The radiator overheating occurs during the main power supply ON or during the motor operation	The load exceeds the rated load	Restudy load conditions, operating conditions or motor capacity
			The ambient temperature of the servo driver exceeds 55℃	Reduce the ambient temperature of the servo drive to below 55℃
			Servo driver circuit board failure	Replace the servo driver

EtherCAT Alarm description and handling measures:

The alarm number	Alarm instructions
50	**The ESC chip initialization has failed**
51	**SII EEPROM Mount error**
52	**Incorrect ESM requests an exception**

cause	Receive state transition requirements that cannot be converted from the current state Init -> SafeOP Init -> OP PreOP -> OP OP -> Bootstrap PreOP -> Bootstrap SafeOP -> Bootstrap
Deed ESM status	whole ESM
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	1、 When the current state is Init, PreOP, SafeOP, stop in the current ESM state; 2、When the current state is OP, stop at the SafeOP state.
The ESC register, the AL Status Code	0x0011
handle	Confirm the status transition requirements for the upper device
Alarm zero attribute	Can clear

53	**No ESM requirement exception was defined**

cause	Receiving undefined (other than below) status transition requirements. 1：Request Init State 2：Request Pre-Operational State 3：Request Bootstrap State 4：Request Safe-Operational State 8：Request Operational State
Deed ESM status	whole ESM
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	1. When the current state is Init, PreOP, and SafeOP, stop at the current ESM state; 2, when the current state is OP, stop in the SafeOP state.
The ESC register, the AL	0x0012

Status Code	
handle	Confirm the status transition requirements for the upper device
Alarm zero attribute	Can clear

54	The boot status requirement is abnormal

cause	Receiving undefined (other than below) status transition requirements. 3：Request Bootstrap State
Deed ESM status	Init -> Bootstrap
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	Init
The ESC register, the AL Status Code	0x0013
handle	Confirm the status transition requirements for the upper device
Alarm zero attribute	Can clear

55	The PLL did not complete the exception

cause	1s after synchronization processing, the bit phase combination of communication and servo (PLL lock) cannot complete
Deed ESM status	PreOP -> SafeOP
Check-out synchronization mode	DC、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x002D
handle	<DC situation> Confirm the DC setting; confirm whether the transmission delay compensation and deviation compensation are correct. <SM2 situation> Confirm whether the delivery time of the PDO from the upper device is fixed; Confirm whether there is a problem with the wiring of the EtherCAT communication cable; Confirm for excessive noise on the EtherCAT communication cable
Alarm zero attribute	Can clear

56	The PDO watchdog is abnormal

cause	During PDO communication (in SafeOP or OP state), 0x0220 (AL Event Request) through ESC register address 0x0400 (Watchdog Divider) and 0x0420 (Watchdog Time Process Data).
Deed ESM status	PreOP 、SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	SafeOP
The ESC register, the AL Status Code	0x001B

handle	Confirm whether the delivery time of PDO from upper device is fixed (interrupted); PDO watchdog detection delay value is too large; Confirm whether there is a problem with the wiring of the EtherCAT communication cable; Confirm whether there is any excessive noise on the EtherCAT communication cable;
Alarm zero attribute	Can clear

57	**PLL unusual**

cause	The ESM state is when the bit phase of the communication and the servo (PLL lock) is inconsistent in the SafeOP or OP state.
Deed ESM status	OP 、SafeOP
Check-out synchronization mode	DC、SM2
The ESM status after detection	SafeOP
The ESC register, the AL Status Code	0x0032
handle	<DC situation> Confirm the DC setting; Confirm whether the transmission delay compensation and deviation compensation are correct <SM2 situation> Confirm whether the PDO delivery time from the upper device is fixed; Confirm whether there is a problem with the wiring of the EtherCAT communication cable; Please confirm the excessive noise on the EtherCAT communication cable.
Alarm zero attribute	Can clear

58	**Synchronous signal anomaly**

cause	After the synchronization process, the parameter set threshold occurs per SYNC 0 or IRQ interrupt process (PA608)
Deed ESM status	OP 、SafeOP
Check-out synchronization mode	DC、SM2
The ESM status after detection	SafeOP
The ESC register, the AL Status Code	0x002C
handle	<DC situation> Confirm the DC setting; Confirm whether the transmission delay compensation and deviation compensation are correct <SM2 situation> Confirm whether the PDO delivery time from the upper device is fixed; Confirm whether there is a problem with the wiring of the EtherCAT communication cable; Confirm whether there is any excessive noise on the EtherCAT communication cable; Determine if the parameter setting threshold (PA608) is too large;

Alarm zero attribute	Can clear

59	The synchronization period setting is abnormal

cause	No corresponding synchronization period (SYNC 0 cycle) is set.
Deed ESM status	PreOP ->SafeOP
Check-out synchronization mode	DC、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x0035
handle	Set the synchronization period correctly.
Alarm zero attribute	Can clear

60	The mailbox is set exceptionally

cause	Wrong settings for SyncManager0 / 1 for the mailbox. The Physical Start Address (ESC register: 0x0800,0x0801 / 0x0808,0x0809). The receiving area and delivery area of mailbox overlap; the receiving area of Mailbox overlaps with the receiving field of SyncManager2 / 3, and the address of the receiving area of mailbox is odd; the start address of Mailbox is outside SyncManager0:0x1000~0x10FF, SyncManager1:0x1200~0x12FF; The length of SyncManager0 / 1 (ESC register: 0x0802,0x0803 / 0x080A, 0x080B) is not set correctly; SyncManager0: Outside the range of 32 ~ 256 byte; SyncManager1: Outside the range of 40 ~ 256 byte; SyncManager0 / 1 Control Register (ESC register: 0x0804 / 0x080C) incorrect setting; Set beyond 100110b to 0x0804: bit5-0; Set beyond 100110b to 0x080C: bit5-0;
Deed ESM status	Init ->PreOP、SafeOP、OP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	Init
The ESC register, the AL Status Code	0x0016
handle	Set the SyncManager correctly according to the ESI document description.
Alarm zero attribute	Can clear

61	PDO watchdog set abnormal

cause	The PDO is the wrong case <DC, SM2 The PDO watchdog trigger is valid (SyncManager: the bit6 in register 0x0804 is 1); The set value of the timeout value (register 0x0400,0x0420) does not meet [communication cycle 2]; <FreeRun> The PDO watchdog trigger is valid (SyncManager: the bit6 in register

	0x0804 is 1); The set value of PDO dog (register 0x0400,0x0420) does not meet 2ms;
Deed ESM status	PreOP->SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x001F
handle	Set the watchdog check out timeout value correctly.
Alarm zero attribute	Can clear

62	**DC setting exception**

cause	The setting of DC is wrong. The bit2-0 of the ESC register 0x0981 (Activation) is set to values other than those described below. Bit2-0 = 000b Bit2-0 = 011b
Deed ESM status	PreOP->SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x0030
handle	Set the DC.
Alarm zero attribute	Can clear

65	**The SM event mode setting is abnormal**

cause	Unsupported SM event mode is set 0x1C32-0x01 (SyncMode) Set for values other than 0x00 (FreeRun), 0x01 (Synchronous), 0x02 (DC SYNC0); 0x1C33-0x01 (SyncMode) Set values other than 0x00 (FreeRun), 0x02 (DC SYNC0), 0x22 (SM2); The bit2-0 = 000b for the ESC register 0x0981 and only the SM2 for 0x1C32-0x01 and 0x1C33-0x01 are set.
Deed ESM status	PreOP->SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x0028
handle	0x1C32-0x01 (SyncMode) Set 0x00 (FreeRun), 0x01 (Synchronous), 0x02 (DC SYNC0) either; 0x1C33-0x01 (SyncMode) Set 0x00 (FreeRun), 0x02 (DC SYNC0), 0x22 (SM2) either; 0x1C32-0x01 and 0x1C33-0x01 are set consistent.
Alarm zero attribute	Can clear

66	The SyncManager2 / 3 setting is abnormal

cause	SyncManager2 Is set to an incorrect value. SyncManager2 Physical Start Address (ESC register: 0x0810) is not incorrectly: The receiving area and the delivery area overlap; Mailbox The receiving and sending field coincides with the SyncManager2 / 3 receiving and sending field; The address in the receiving area is odd; Start address, complete address are outside of scope; SyncManager2 Control Register (ESC register: 0x0814): Set it beyond 100110b to bit5-0;
Deed ESM status	PreOP->SafeOP、SafeOP、OP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x001D
handle	Set the SyncManager2 correctly according to the ESI document description.
Alarm zero attribute	Can clear

cause	SyncManager3 Is set to an incorrect value. SyncManager3 Physical Start Address (ESC register: 0x0818) is not incorrectly: The receiving area and the delivery area overlap; Mailbox The receiving and sending field coincides with the SyncManager2 / 3 receiving and sending field; The address in the receiving area is odd; Start address, complete address are outside of scope; SyncManager3 Improper setting of Control Register (ESC register: 0x081C): Set it beyond 100110b to bit5-0;
Deed ESM status	PreOP->SafeOP、SafeOP、OP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x001E
handle	Set the SyncManager3 correctly according to the ESI document description.
Alarm zero attribute	Can clear

67	The TxPDO assignment was abnormal

cause	TxPDO maps more than 32 bytes
Deed ESM status	PreOP->SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP

The ESC register, the AL Status Code	0x0024
handle	The data size of the TxPDO map is set to be within 32 bytes.
Alarm zero attribute	Can clear

68	**The RxPDO allocation was abnormal**

cause	RxPDO maps more than 32 bytes
Deed ESM status	PreOP->SafeOP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x0025
handle	The data size for the RxPDO mapping is set to within 32 bytes.
Alarm zero attribute	Can clear

69	**Lost link Detected abnormal**

cause	After ESM state Init-> PreOP conversion, either of Port0 or Port1 is the time set by PA607 (Lost link detection time (unit: ms)) in Lost link state (Lost link at Init-> PreOP conversion).
Deed ESM status	PreOP、SafeOP、OP
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	PreOP
The ESC register, the AL Status Code	0x0000
handle	Confirm whether there is a problem with the EtherCAT communication cable wiring. Confirm whether there is any communication with the upper device.
Alarm zero attribute	Can clear

71	**SII EEPROM Exception**

cause	VendorID, Product code, Revision number are cases where the values of SII (EEPROM) and objects are inconsistent. SII (EEPROM) reads, incorrect write case. One of the bit11-14 of the ESC register 0x0502 is 1 time.
Deed ESM status	whole ESM
Check-out synchronization mode	DC、FreeRun、SM2
The ESM status after detection	Init
The ESC register, the AL Status Code	0x0051
handle	Confirm the data for the SII.

	Read out of SII, execute the write again.
Alarm zero attribute	Can't clear

Appendix C Motor model code table

1. Miguel motor Settings:

PA006 parameter and PA005 parameter settings: (very important!)

PA005：Motor code

PA006：Encoder resolution

Miguel motor	PA005	PA006		Adapt drive							
		23Bit	17Bit	LS30ES	LS50ES	LS75ES	LS20ED LS20EDi	LS30ED LS30EDi	LS40ED LS40EDi	LS20ET LS20ETi	LS30ET LS30ETi
60ST-M00630	0000	26	23	√	√	√	√	√	√	√	√
60ST-M01330	0001			√	√	√	√	√	√	√	√
60ST-M01930	0002			√	√	√	√	√	√	√	√
40ST-AM00330	0003			√	√	√	√	√	√	√	√
80ST-M02430	0004			√	√	√	√	√	√	√	√
80ST-M03520	0005			√	√	√	√	√	√	√	√
80ST-M04025	0006			√	√	√	√	√	√	√	√
90ST-M02430	0007			√	√	√	√	√	√	√	√
90ST-M03520	0008			√	√	√	√	√	√	√	√
90ST-M04025	0009			√	√	√	√	√	√	√	√
110ST-M04020	0011			√	√	√	√	√	√	√	√
110ST-M04030	0012			√	√	√	√	√	√	√	√
110ST-M05030	0013			√	√	√	√	√	√	√	√
110ST-M06020	0014			√	√	√	√	√	√	√	√
110ST-M06030	0015			√	√	√	√	√	√	√	√
130ST-M04025	0016			√	√	√	√	√	√	√	√
130ST-M05025	0017			√	√	√	√	√	√	√	√
130ST-M06025	0018			√	√	√	√	√	√	√	√
130ST-M07725	0019			√	√	√		√	√		√
130ST-M10010	0020			√	√	√		√	√		√
130ST-M10015	0021			√	√	√	√	√	√	√	√
130ST-M10025	0022			√	√	√		√	√		√
130ST-M15015	0023			√	√	√		√	√		√
130ST-M15025	0024				√	√			√		
130ST-M10030	0025				√				√		
150ST-M15020	0026				√	√			√		
150ST-M18020	0027				√	√			√		
150ST-M23020	0028				√	√			√		
150ST-M27020	0029				√	√			√		
180ST-M17215	0030				√	√			√		
180ST-M19015	0031				√	√			√		
180ST-M21520	0032				√	√			√		
180ST-M27015	0034				√	√			√		
180ST-M35010	0035				√	√			√		
180ST-M35015	0036					√					
80ST-M01330	0037			√		√	√	√		√	√
130ST-M23020	0038					√					
130ST-M04030	0040			√	√	√	√	√	√	√	√
130ST-M06030	0041			√	√	√		√	√		√

2. Model setting of Huada motor:

PA006 parameter and PA005 parameter settings: (very important!）

PA005： Motor code

PA006： Encoder resolution

Huada motor model	PA005	PA006		Adapt drive							
		23Bit	17Bit	LS30ES	LS50ES	LS75ES	LS20ED LS20EDi	LS30ED LS30EDi	LS40ED LS40EDi	LS20ET LS20ETi	LS30ET LS30ETi
80ST-01330LF1B	0000	6	3	√	√	√	√	√	√	√	√
80ST-02430LF1B	0001			√	√	√	√	√	√	√	√
80ST-03330LF1B	0002			√	√	√	√	√	√	√	√
110ST-M02030LFB	0003			√	√	√	√	√	√	√	√
110ST-M04030LFB	0004			√	√	√	√	√	√	√	√
110ST-M05030LFB	0005			√	√	√	√	√	√	√	√
110ST-M06020LFB	0006			√	√	√	√	√	√	√	√
110ST-M06030LFB	0007			√	√	√		√	√		√
130ST-M04025LFB	0008			√	√	√	√	√	√	√	√
130ST-M05025LFB	0010			√	√	√	√	√	√	√	√
130ST-M06025LFB	0011			√	√	√	√	√	√	√	√
130ST-M07720LFB	0012			√	√	√		√	√		√
130ST-M07725LFB	0013			√	√	√		√	√		√
130ST-M07730LFB	0014			√	√	√		√	√		√
130ST-M10015LFB	0015			√	√	√		√	√		√
130ST-M10025LFB	0016			√	√	√		√	√		√
130ST-M15015LFB	0017			√	√	√		√	√		√
130ST-M15025LFB	0018				√	√			√		
150ST-M15025LFB	0019				√	√			√		
150ST-M18020LFB	0020				√	√			√		
150ST-M23020LFB	0021					√					
150ST-M27020LFB	0022					√					

LS series ECAT bus type

Huada LMDD series motor	PA005	PA006		Adapt drive							
		23Bit	17Bit	LS30ES	LS50ES	LS75ES	LS20ED LS20EDi	LS30ED LS30EDi	LS40ED LS40EDi	LS20ET LS20ETi	LS30ET LS30ETi
80ST-M0133050LMDD	56	6	3	√	√	√	√	√	√	√	√
80ST-M0333050LMDD	55			√	√	√	√	√	√	√	√
80ST-M0243050LMDD	60			√	√	√	√	√	√	√	√
80ST-M0403050LMDD	59			√	√	√		√	√		√
110ST-M0422030LMDD	51			√	√	√	√	√	√	√	√
110ST-M0542030LMDD	52			√	√	√	√	√	√	√	√
110ST-M0642030LMDD	53			√	√	√		√	√		√
110ST-M0752030LMDD	54			√	√	√		√	√		√
110ST-M0543040LMDD	57			√	√	√		√	√		√
110ST-M0423040LMDD	61			√	√	√		√	√		√
130ST-M0421530LMDD	43			√	√	√	√	√	√	√	√
130ST-M0541530LMDD	44			√	√	√		√	√		√
130ST-M0641530LMDD	45			√	√	√		√	√		√
130ST-M0751530LMDD	46			√	√	√		√	√		√
130ST-M1151520LMDD	47			√	√	√		√	√		√
130ST-M1151530LMDD	48				√	√			√		
130ST-M1461530LMDD	50				√	√			√		
130ST-M0643040LMDD	58			√	√	√		√	√		√
130ST-M0841530LMDD	42			√	√	√		√	√		√
130ST-M0961530LMDD	41					√					

3. AST 5:

PA006 parameter and PA005 parameter settings: (very important!）

PA005：Motor code

PA006：Encoder resolution

Dafeng AST series motor	PA005	PA006		Adapt drive							
		23Bit	17Bit	LS30ES	LS50ES	LS75ES	LS20ED LS20EDi	LS30ED LS30EDi	LS40ED LS40EDi	LS20ET LS20ETi	LS30ET LS30ETi
60AST-M00630	0000	46	43	√	√	√	√	√	√	√	√
60AST-M01330	0001			√	√	√	√	√	√	√	√
80AST-M01330	0002			√	√	√	√	√	√	√	√
80AST-M02430	0003			√	√	√	√	√	√	√	√
80AST-M03230	0004			√	√	√	√	√	√	√	√
110AST-M04220	0005			√	√	√	√	√	√	√	√
110AST-M05420	0006			√	√	√	√	√	√	√	√
110AST-M06420	0007			√	√	√		√	√		√
110AST-M07520	0008			√	√	√		√	√		√
110AST-M04230	0009			√	√	√		√	√		√
110AST-M05430	0010			√	√	√		√	√		√
110AST-M06425	0011			√	√	√		√	√		√
130AST-M05415	0012			√	√	√		√	√		√
130AST-M06415	0013			√	√	√		√	√		√
130AST-M07515	0014			√	√	√		√	√		√
130AST-M08415	0015			√	√	√		√	√		√
130AST-M09615	0016				√	√			√		
130AST-M11515	0017				√	√			√		
130AST-M14615	0018				√	√			√		
130AST-M05430	0019				√	√			√		
130AST-M06430	0020				√	√			√		
130AST-M07530	0021				√	√			√		
130AST-M08430	0022				√	√			√		
130AST-M09625	0023				√	√			√		
130AST-M11520	0024					√					
130AST-M14620	0025					√					
180AST-M17215	0026					√					
180AST-M27015	0027					√					
180AST-M48015	0028					√					
180AST-M19015	0029					√					

Appendix D Fault treatment method

1. A08 and A09 are speed alarm. Processing method: first detect the power line UVW and the encoder line connection; determine the line connection
If there is no problem, PA001 (or Pb 001) can be set to 0011, and then such alarm will not be detected.

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