LZ3 series

Ac servo driver

Commissioning Manual

(V.2020 Version)

- **Product Profile**

LZ3 digital AC servo driver is a leading general AC servo drive product in china. The series products adopt advanced full-digital control and AC motor vector control theory. Its system has excellent performance and high reliability. And the products are widely used in servo shaft drive of food processing, packaging machinery, textile machinery and other related automatic industrial machinery.

- **Product Features**

- The use of high-performance DSC chip and large-scale programmable logic control chip, excellent control performance.
- **LZ3a is full seal design, with good protection and strong anti-interference ability.**
- **For small and exquisite design of LZ3b saves installation space**
- Choosing a new industrial-grade IPM module with strong overload drive capability.
- Set speed control, position control, torque control in one.
- Various types of permanent magnet synchronous servo motor that can drive
- Supporting for dual encoder control, the full closed loop high precision control of automatic equipment can be realized
- With perfect fault protection and the condition monitoring function.
- With excellent low speed torque characteristics and industry-leading dynamic acceleration and deceleration performance. characteristics and industry-leading dynamic acceleration and deceleration performance

- **Model Specification**

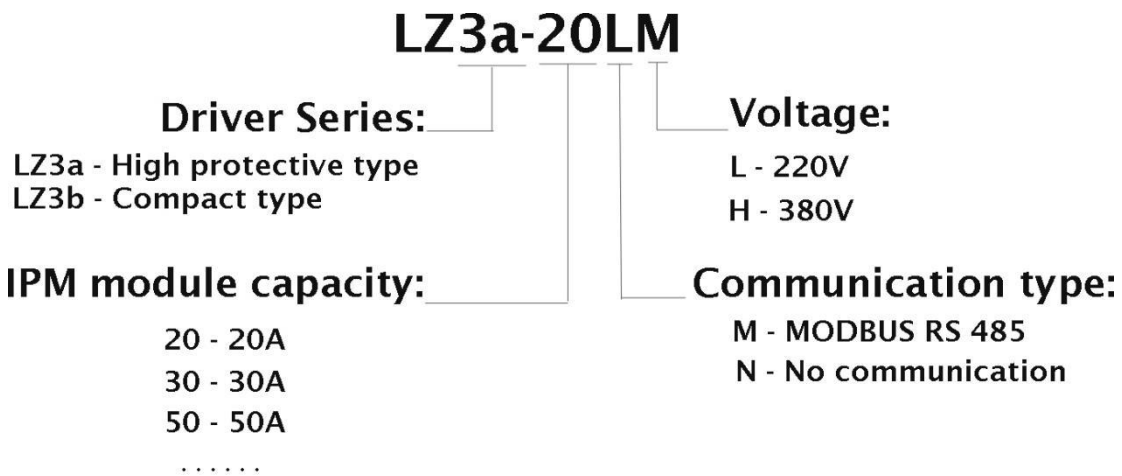
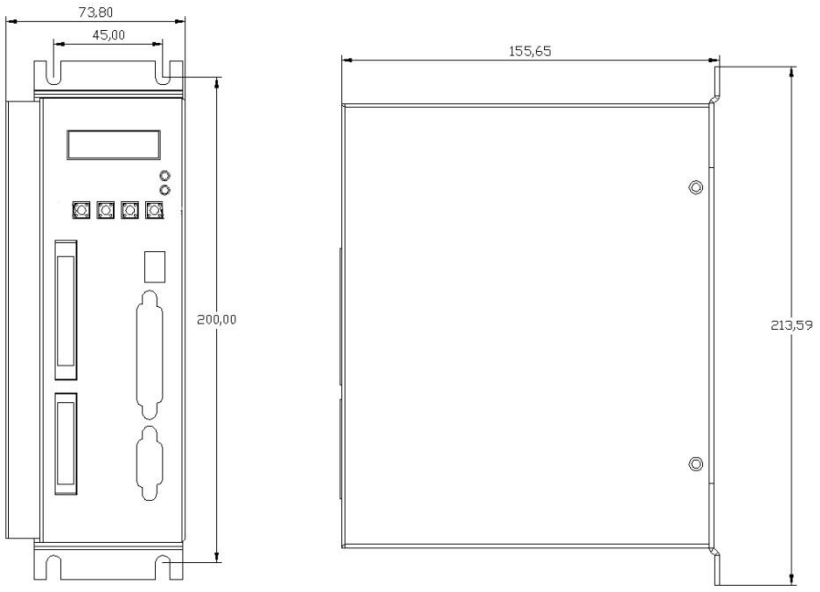


Table of Contents

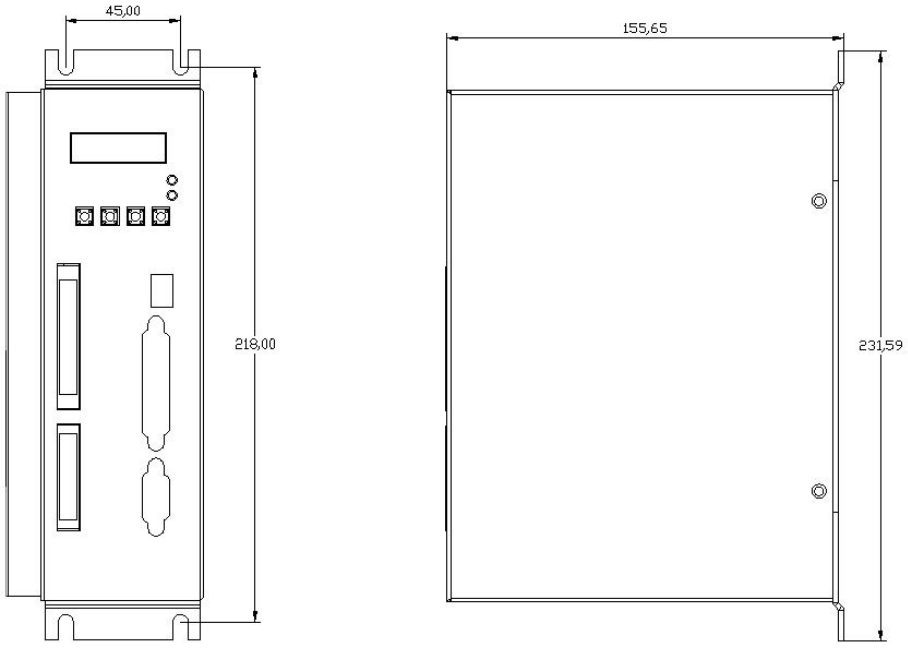
1、Wiring Instructions

1.1 Front panel terminal wiring diagram

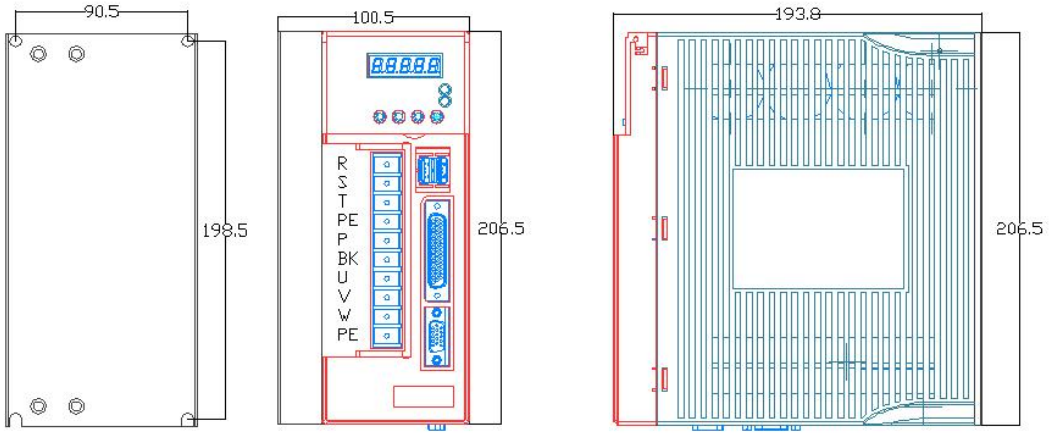
LZ3a-20L Installation dimension diagram (unit: mm)



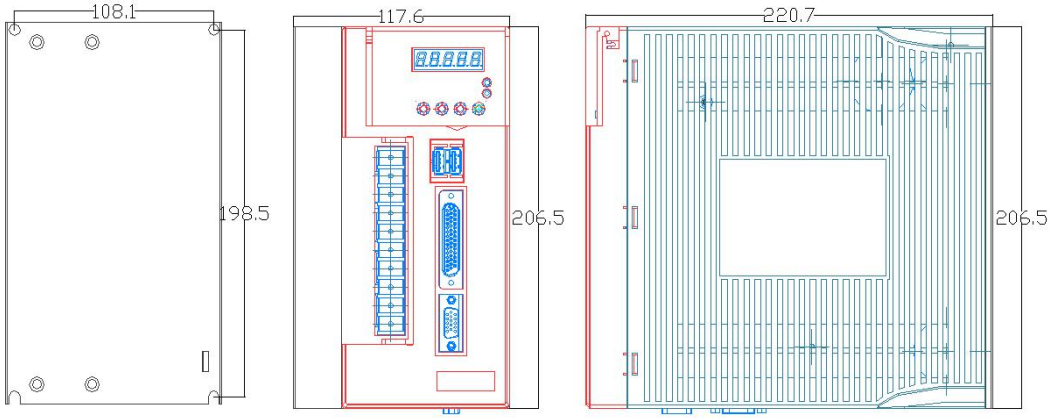
LZ3a-30L Installation dimension diagram (unit: mm)



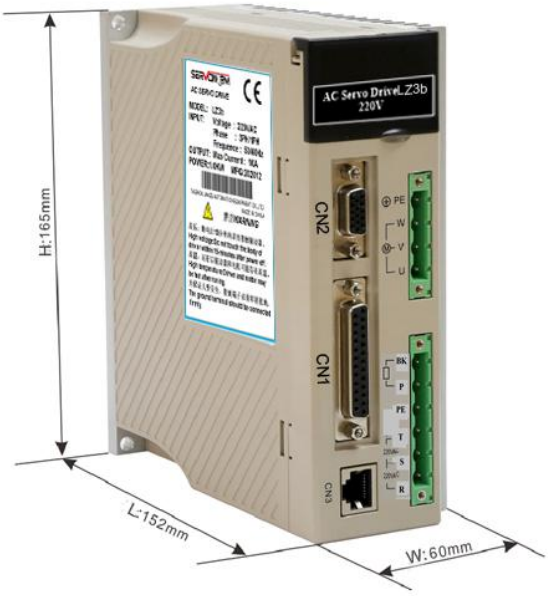
LZ3a-40L/LZ3a-25H Installation dimension diagram (unit: mm)



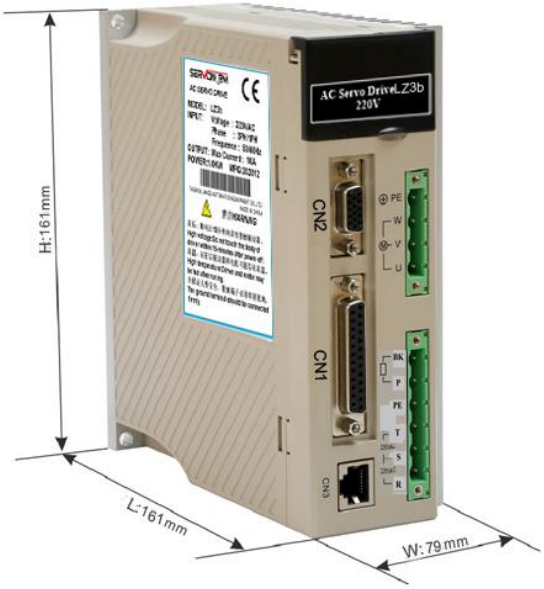
LZ3a-50L/75L and LZ3a-50H/75H Installation dimension diagram (unit: mm)



LZ3b-15L/20L Installation dimension dragram

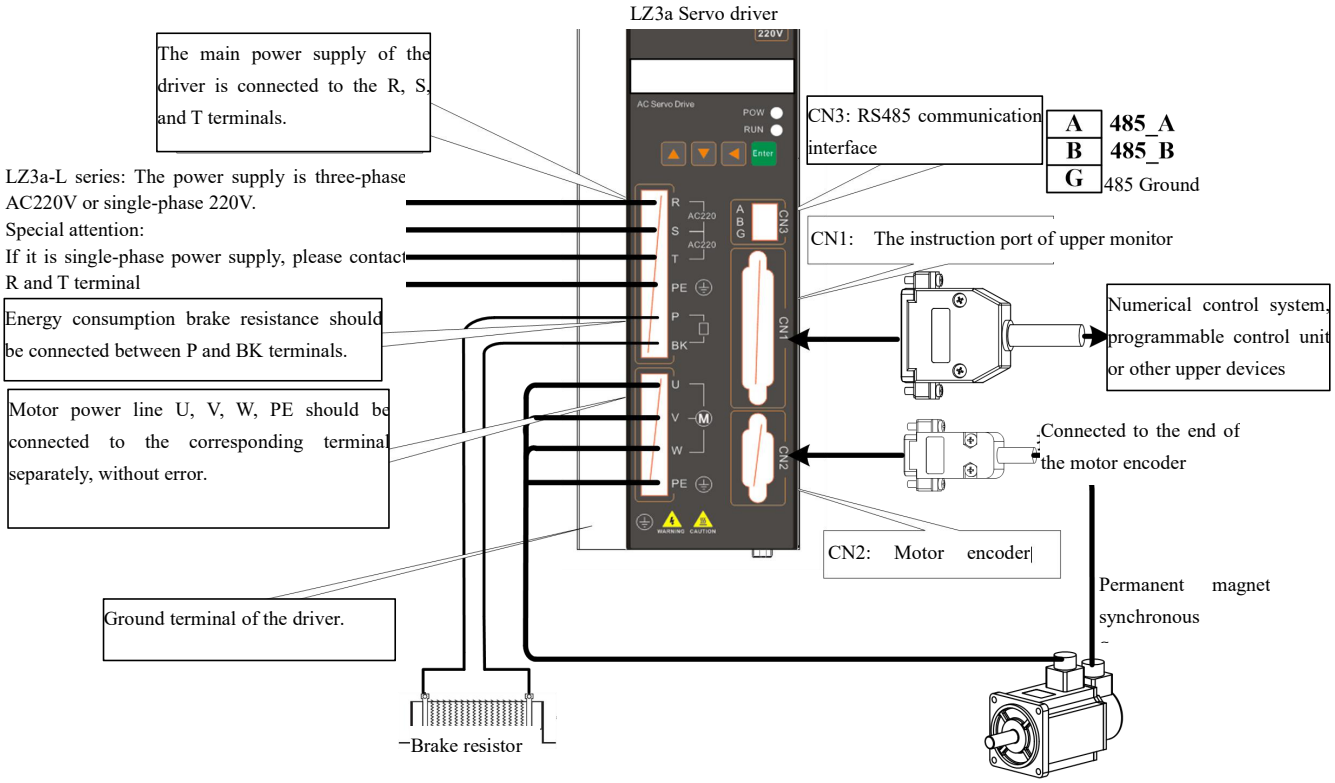


LZ3b-30L Installation dimension dragram

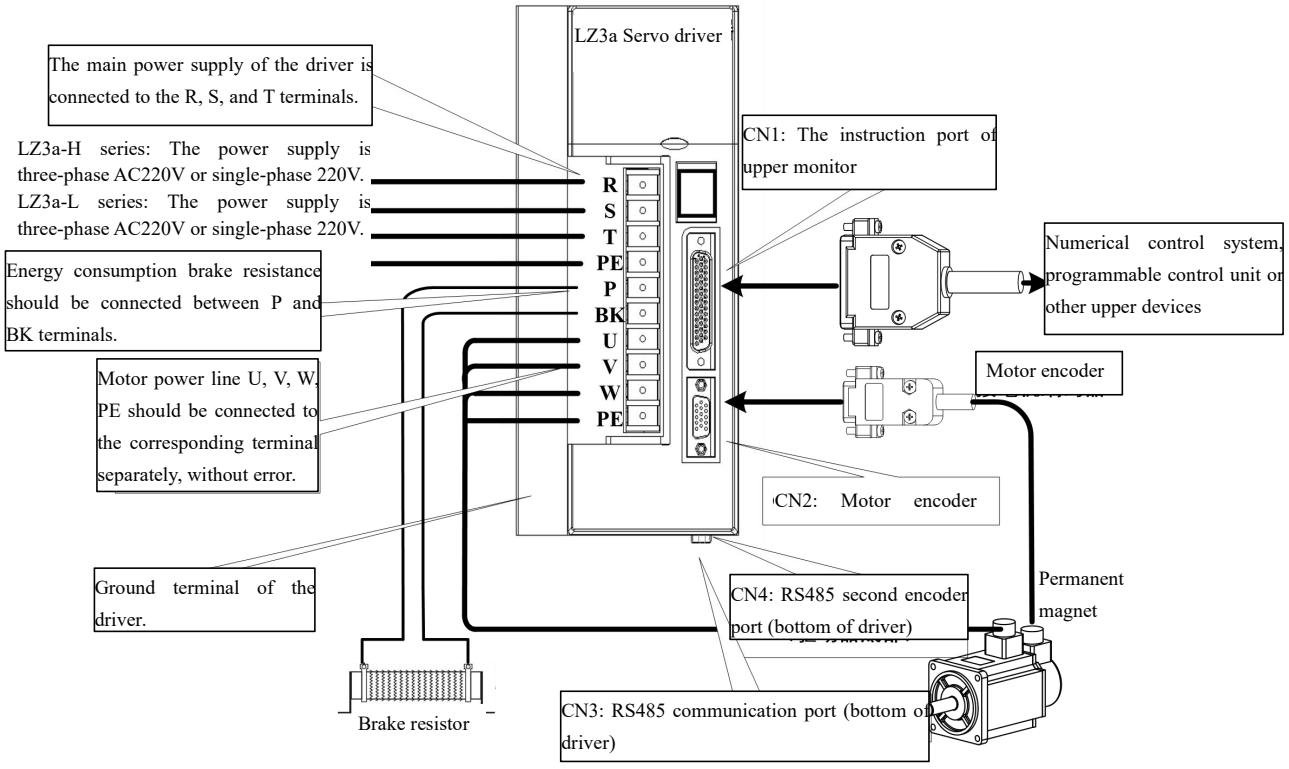


1.2 Wiring schematic diagram of terminal wiring in front panel

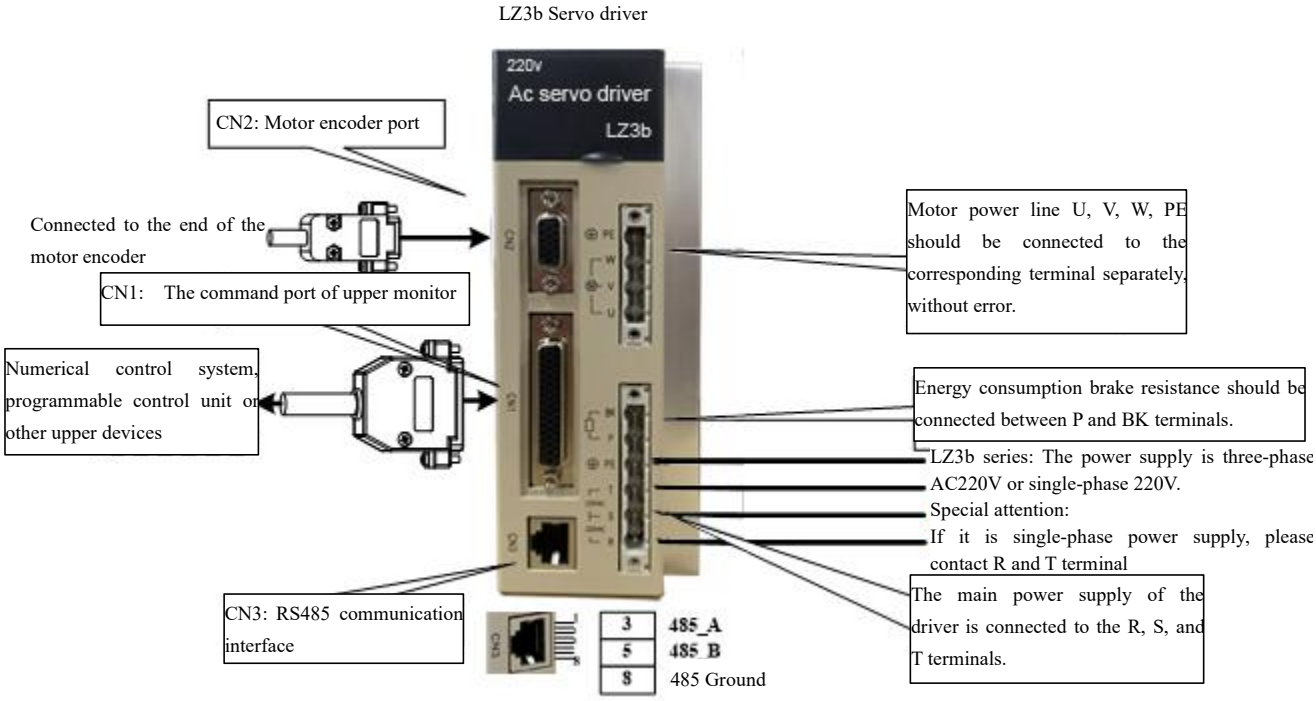
LZ3a-20L/30L Wiring schematic diagram



LZ3a-40L/50L/75L/25H/50H/75H Wiring schematic diagram



LZ3b-20L/30L Wiring schematic diagram



1.3 Specification of braking resistor

LZ3a/LZ3b Series (220V Servo) braking resistor configuration Table

(standard 220V servo has built-in resistance, external brake resistance can be selected based on load

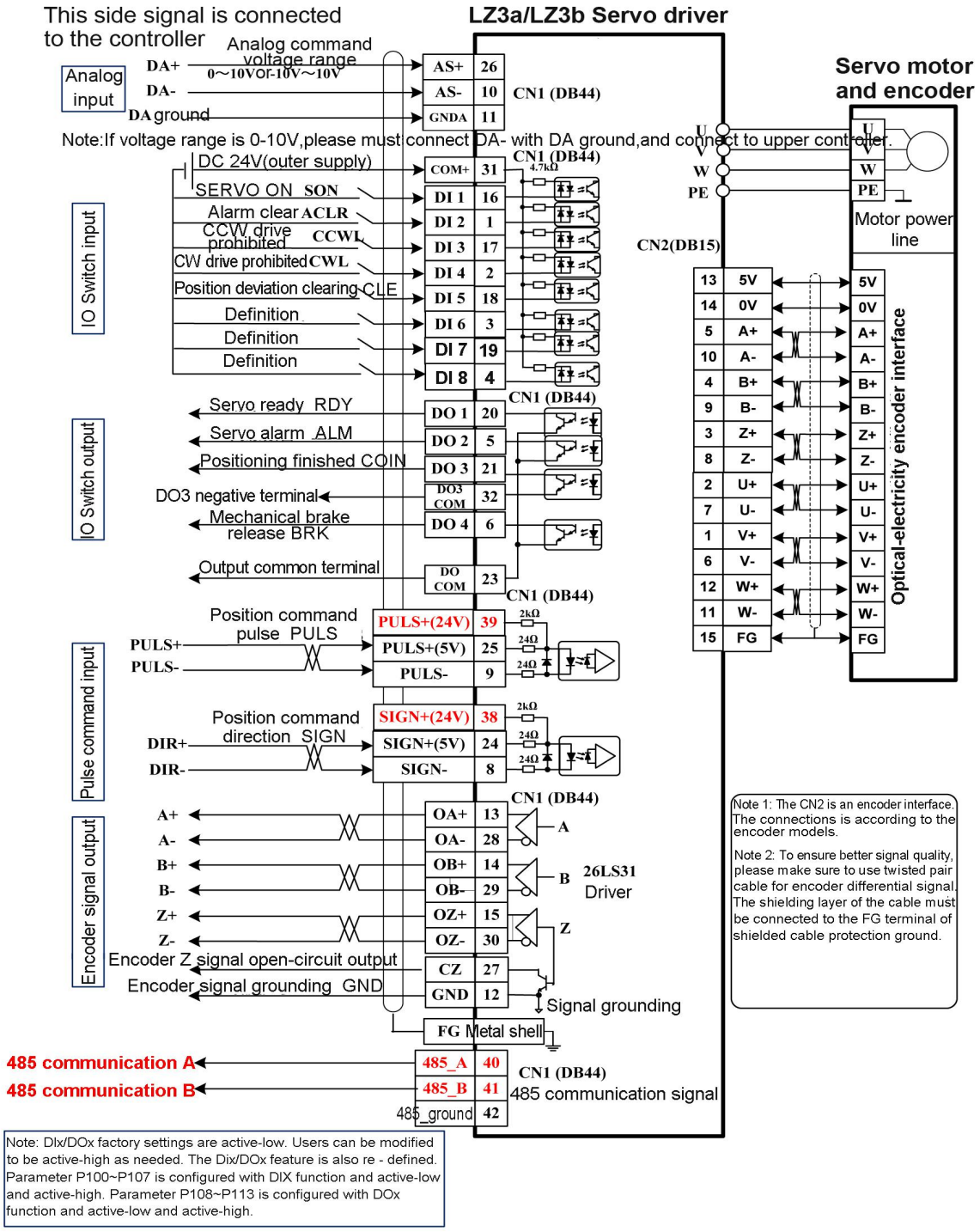
Driver model	Recommended configuration (light load type) (Use built - in resistor)	Recommended configuration (overload type) (and connect to external resistor)
LZ3a/T3b-20L	47Ω (built-in)	47Ω, 500 W
LZ3a/T3b-30L	47Ω (built-in)	47Ω, 500 W
LZ3a-L40	47Ω (built-in)	47Ω, 500 W
LZ3a-L50	47Ω (built-in)	47Ω, 500 W
LZ3a-L75	47Ω (built-in)	20Ω,1000W

LZ3a-H series (380V servo) braking resistor configuration table

(Standard 380V servo does not contain built-in resistance, and the brake resistor must be connected externally, except for custom models)

Driver model	Recommended configuration (light load type) (Starting and stopping is not frequent)	Recommended configuration (overload type) (Starting and stopping is frequent)
LZ3a-25H	50Ω, its power is greater than 1000 W	**50Ω, its power is greater than 1500 W**
LZ3a-50H	50Ω, its power is greater than 1000 W	**50Ω, its power is greater than 1500 W**
LZ3a-75H	30Ω, its power is greater than 1500 W	**30Ω, its power is greater than 2000 W**

1.4 Connection diagram of control port CN1 and Encoder port CN2



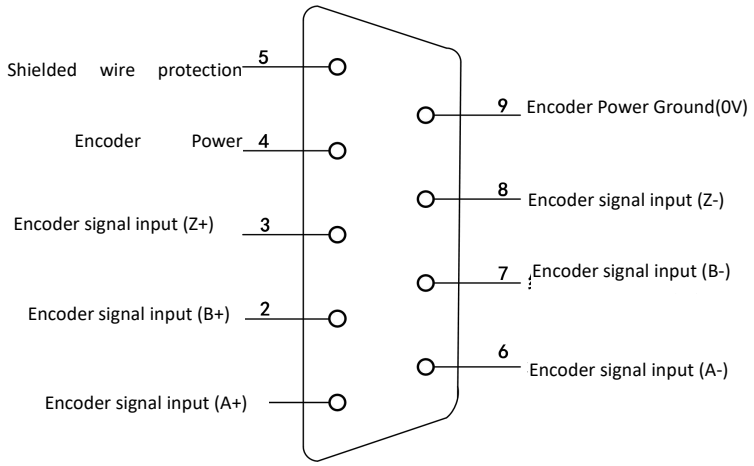
Special attention:

If the pulse instruction signal is a 24V power supply, the PULS + must be connected to the 39 foot of the CN1 and SIGN+ must be connected to the 38 foot of CN1, or it is possible to damage the pulse instruction port;

If the pulse instruction signal is a 5V power supply, the PULS + must be connected to the 25 foot of the CN1 and SIGN+ must be connected to the 24 foot of CN1. Otherwise, the pulse receiving may be abnormal;

1.5 The second encoder port CN4 connection diagram

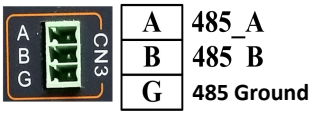
LZ3a-H Series Servo driver second Encoder Port uses a double-row DB9 socket. The shape and pin distribution are as follows:



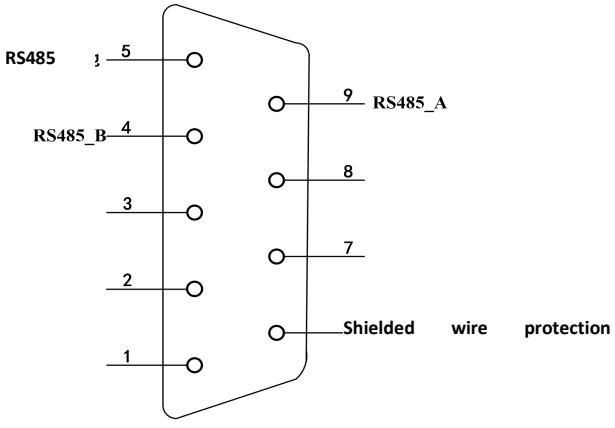
The second encoder port Second encoder port (Incremental photoelectric encoder)

1.6 Communication port CN3 connection diagram

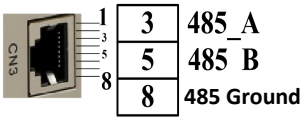
LZ3a-20L/30L The communication port of the driver uses three-position terminals. The shape and pin distribution are as picture:



LZ3a Communication ports for other specifications of driver use double-row DB9 sockets. The shape and pin distribution are as follows:



LZ3a-20L/30L The communication port of the driver uses eight of the front-end connector. Pin distribution are as picture::



2. Panel operation

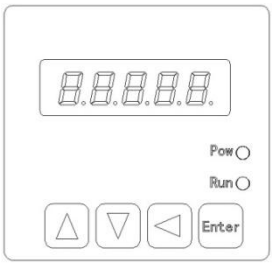
2.1 Introduction to operation panel

LZ3a series panel consists of 5 LED digital tube displays, 4 keys ▲, ▼, ◄, and Enter, two LED POW, RUN, which are used for displaying various state setting parameters of the system.

LZ3a series panel is composed of 5 LED digital tube displays, 5 keys ▲, ▼, ◄, E, and S, which are used for displaying various state setting parameters of the system.

The operation is stratified by layer-by-layer expansion by the main menu. The operation panel is shown in the following figure:

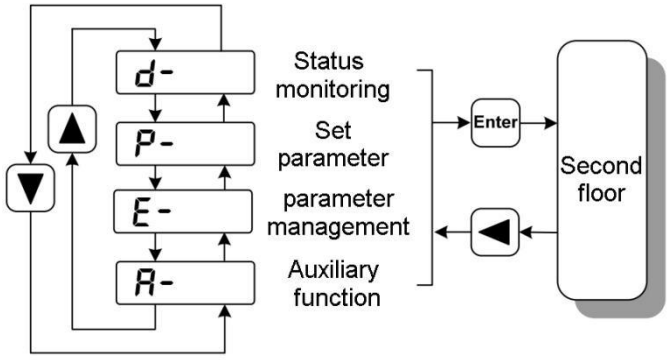
LZ3a operation panel **LZ3b operation panel**



Symbols	Name	Function	
POW	Power indicator	Lighten: Main power source power-on; Light off: Main power source power-off;	LZ3b the second left nixie tube decimal point on indicate the servo under-voltage.
RUN	Running light	Lighten: The motor is in power-on operation; Light off: The motor is power-off.	LZ3b the second left nixie tube decimal point on indicate the servo ON.
▲	Increase key	Increase the sequence number or the numerical value; Long press has a repetitive effect.	
▼	Decrease key	Decrease the sequence number or the numerical value; Long press has a repetitive effect.	
◄	Exit key	Menu exits; Operation canceled.	
Enter or E	Confirmation key	Menu entry; Parameter modification confirmation or operation confirmation.	
S	Shift key	Used for quick modification of parameter number or parameter value(for LZ3b only) .	

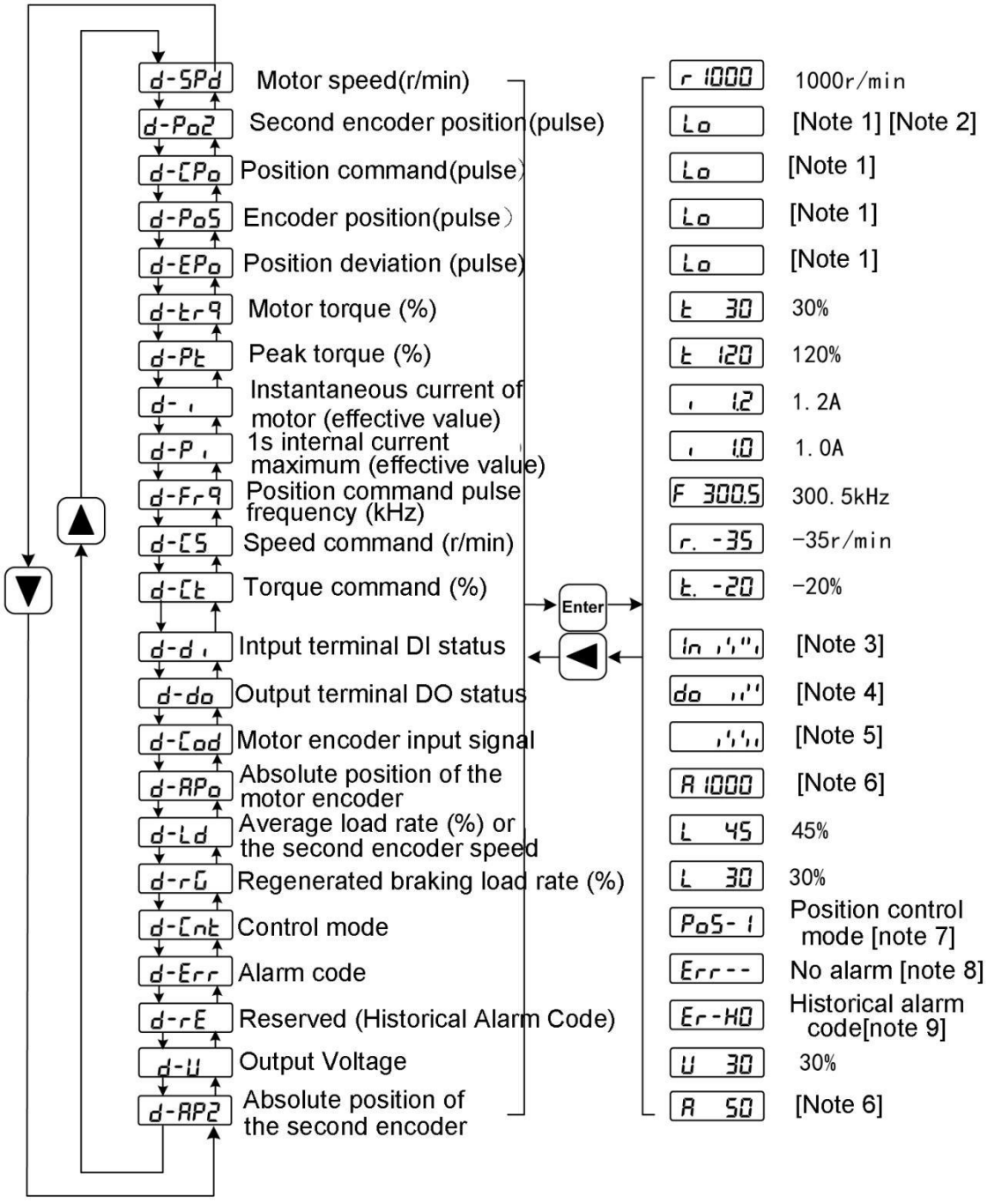
2.2 Main menu

The first floor is the main menu and there are four modes of operation, changing the way with the key ▲and ▼. Press Enter to enter second floor, to carry out the specific operation. Press the key ◄, it returns to the main menu from Second floor.



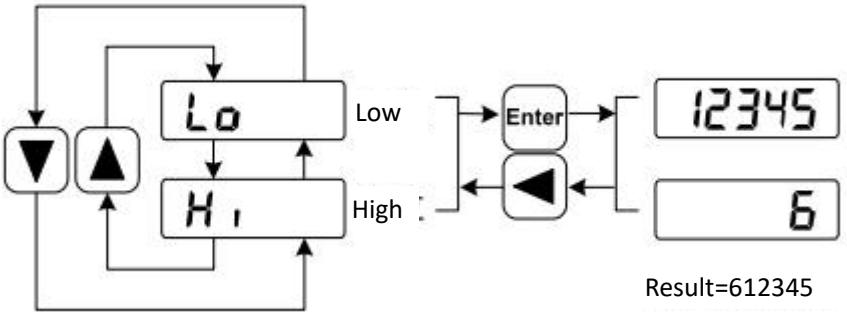
2.3 Status monitoring

Select status monitoring "d -"under the main menu and press Enter to enter the monitoring mode. There are various monitoring items. The user uses the key ▲and ▼to select the desired display item, press enter again, to enter the specific display status. The specific meanings of Status Monitor Display are as follows:



1. 32 bits binary numerical display [note 1]

32 bit binary number range is -2147483648～2147483647, represented by the combination of low and high positions. Select low and high through the menu. The full value is synthesized by the formula in the figure.



32-bit value=high value*100000+low value

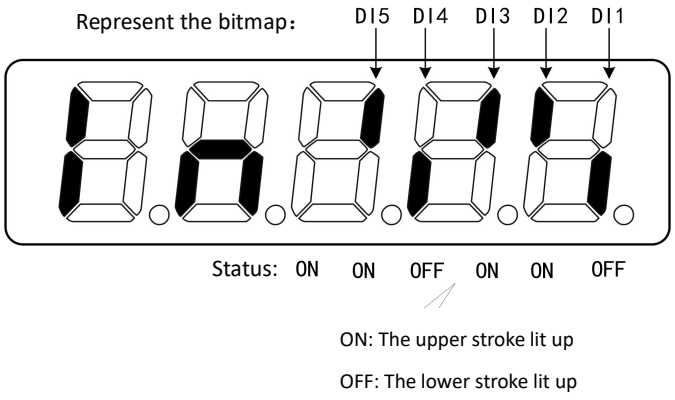
2. Pulse unit [Note 2]

The pulse unit is the encoder pulse unit. Take the use of the 2500-wire encoder as an example:

Encoder Pulse UNIT = Encoder resolution
= 4 x encoder lines
= 4 x 2500 (pulse/rev)
=10000 (pulse/rev)

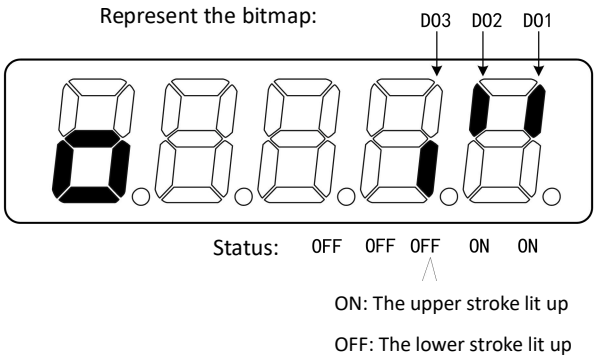
3. Input terminal DI [Note 3]

The vertical line of the digital tube represents the state of a bit, the up stroke on the vertical line is lit to indicate on, and the down stroke is lit to indicate off.



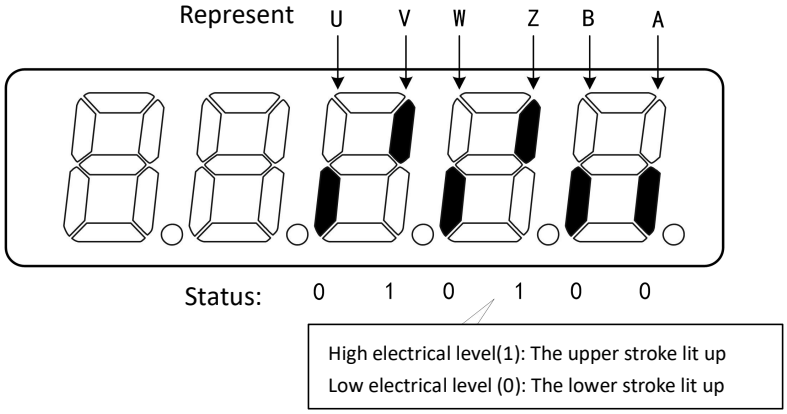
4. Output terminal DO [Note 4]

The vertical line of the digital tube represents the state of a bit, the up stroke on the vertical line is lit to indicate on, and the down stroke is lit to indicate off.



5. Encoder input signal [Note 5]

The vertical line of the digital tube represents the state of a bit, the up stroke on the vertical line is lit to indicate a high level, and down stroke is lit to indicate a low level. (Note: Absolute position encoder, this display is meaningless)



6. Rotor single-ring position [Note 6]

Represents the position of the rotor relative to the stator in a turn, with one conversion to a period, the minimum resolution of the encoder is in units, and the Encoder Z pulse as the origin point.

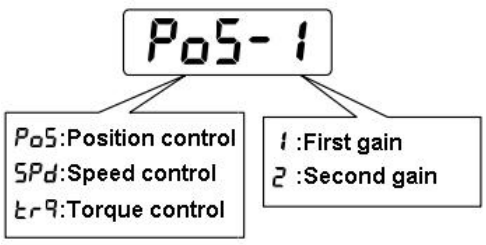
2500-Wire Encoder: The range is 0~9999 (10binary),and the z pulse appears with a value of 0.

Absolute POSITION encoder: its range is 0~1ffff (16 decimal), which is represented by high and low bits.

Rotary Transformer Encoder: Its range is 0~65535 (10 binary), and the z pulse appears with a value of 0.

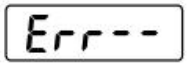
7. Control mode [Note 7]

Display characters represent the current control mode of the spindle drive.

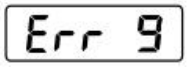


8. Error code [note 8]

No error display two minus sign. There is an error to display the alarm number and blink. When the alarm appears, the monitor automatically enters the status monitoring and displays the alarm number, but can do other operations through the keyboard. When it is not in the monitoring state, the rightmost digital tube of the decimal point flicker indicates that there is an alarm presence.



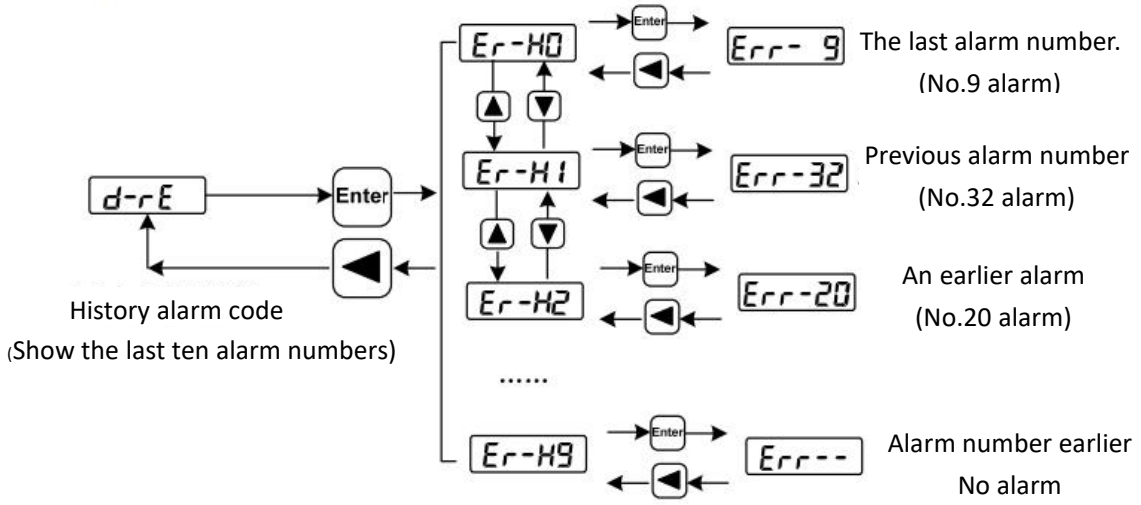
No alarm



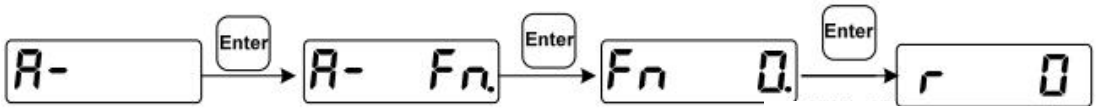
Flicker No.9 alarm

9. History alarm code [note 9]

The history alarm code shows the last 10 alarm contents. If there is no alarm, it displays two minus signs, while it displays alarm number if there is alarm. When the alarm appears, the driver automatically will update and store the alarm number. The historical alarm code view operation and specific display content are described below:



The cleaning method of history alarm code is as follows: Without alarm, Set parameter P-119 to be 4 first, then follow the following steps, the history alarm code can be cleared completely.



Long press for 3s

Historical alarm is cleared successfully.

2.4 Parameter setting

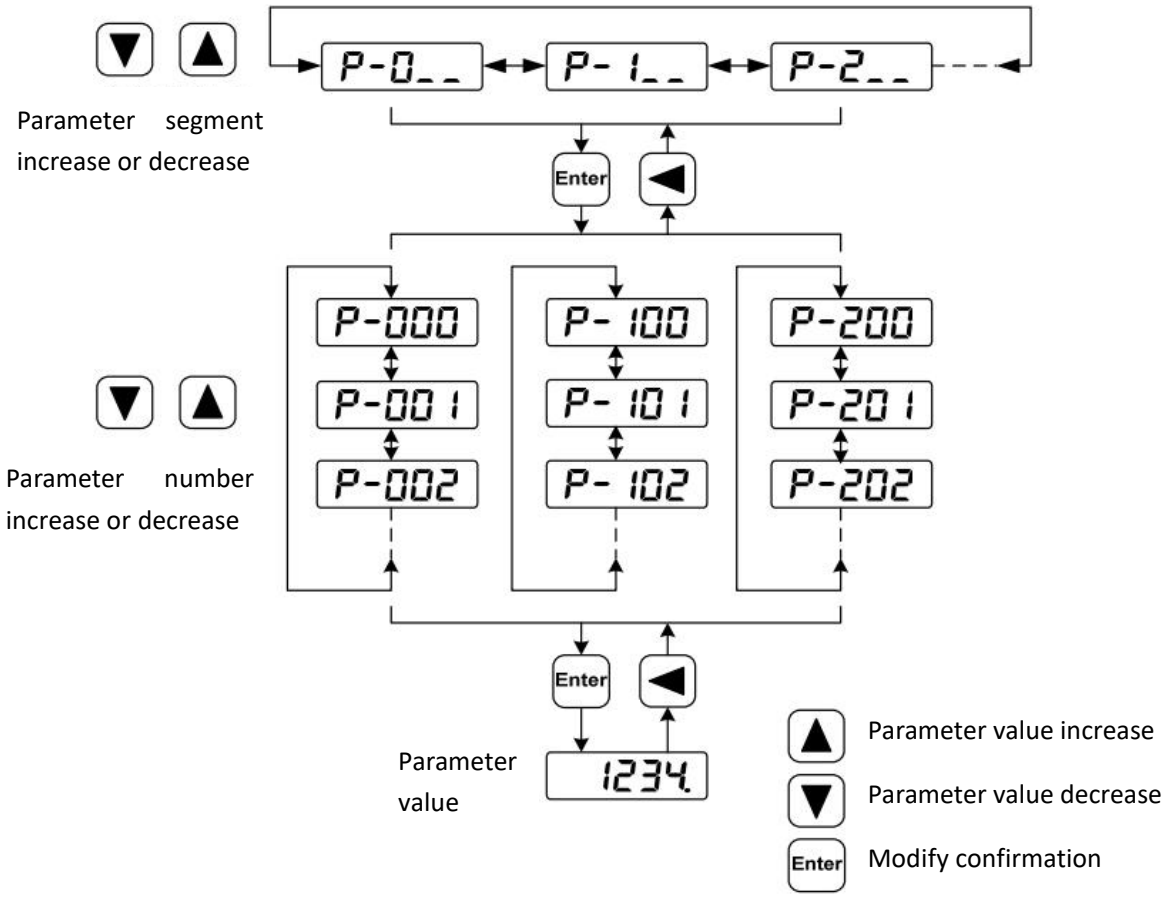
The parameters are represented by parameter segment + parameter number, the hundred.For example, parameter P-105, segment number is "1", parameter number is "05", and digital tube is displayed as "P-105". digits are the segment number, and the ten digits and one digit are the parameter numbers.

In the main menu, select parameter setting ' P- ' and press Enter to enter the parameter setting mode. First use the ▲, ▼ keys to select the parameter segment. After selecting it, press the Enter key to enter the parameter number selection. Then use the ▲, ▼ keys to select the parameter number. When selected, press Enter to display the parameter value.

Use the ▲, ▼ keys to modify the parameter value. Press the ▲ or ▼ key once to increase or decrease the parameter by 1. Press and hold the ▲ or ▼ key to increase or decrease the parameter continuously. When the parameter value is modified, the decimal point of the rightmost LED digital tube is lit. Press Enter to confirm that the modified value is valid. At this time, the decimal point of the LED digital tube on the right is off, and the modified value will be immediately reflected in the control (some parameters need to be saved and re-power on to work).

After that, you can continue to modify the parameters. After the modification is completed, press the ◄ key to return to the parameter number selection state. If you are not satisfied with the value being modified, do not press Enter to confirm. Press ◄ to cancel and the parameter will return to the original value.

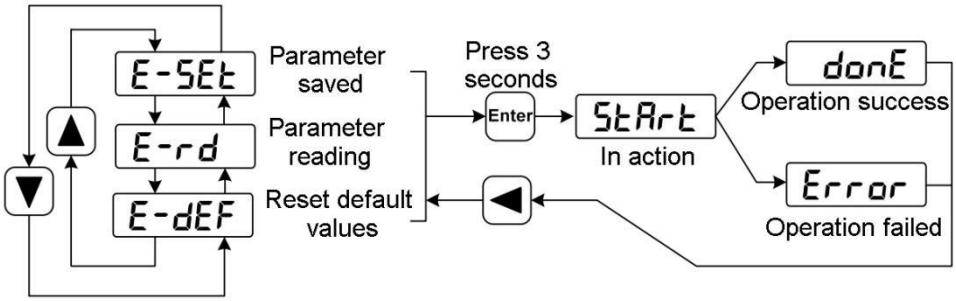
The modified parameters are not saved to the EEPROM. If you need to save them permanently, use the parameter write operation in the parameter management.



2.5 Parameter management

Parameter management mainly deals with the operation between the parameter table and the EEPROM. In the main menu, select parameter management ' E- ' and press Enter to enter the parameter management mode.

Select the operation mode, there are 3 modes, use ▲, ▼ to select. Press the Enter key after selecting the operation mode and hold it for more than 3 seconds to activate the operation. After the completion, press the ◄ key to return to the operation mode selection state.

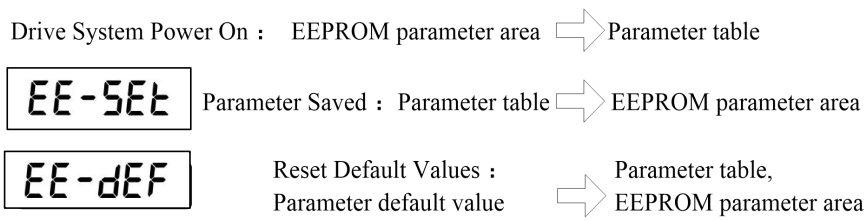


- Parameter Saved

This operation represents writing parameters from a parameter table to EEPROM. If user modifies the parameter, only the parameter value in the parameter table are changed, the parameter will maintain the original value when you power up again. If user wants to permanently change the parameter value, you need to perform a parameter saving operation, write the parameters in the parameter table to the EEPROM, so that the parameter is modified when you power up again.

- Reset default values

This operation indicates that the default value (factory value) for all parameters is read into the parameter table and written to EEPROM, and the default parameter will be used the next time you power up. Use this action to reset all parameters to the factory state when the user has messed up the parameters and the drive not working properly. Because the default values of parameters for different drive models and motor models are different, the correctness of the motor code (parameter P-002) must be guaranteed when doing this operation firstly.



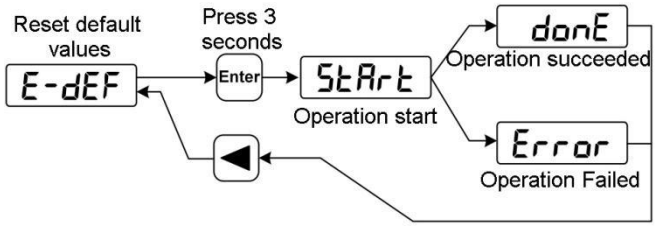
3. Parameter setting and function debugging

- When the user uses the drive unit at the first time, it is recommended to perform a test running (keyboard speed regulation or JOG Running) without connecting the load. Ensure that the drive unit and servo motor work properly after handling and installation, and ensure that the default parameters of the drive unit adapter are valid.
- After the drive unit and the motor are working properly, connect the CN1 control terminal without connecting the load, and cooperate with the CNC device of the upper computer to debug and run the speed mode, position mode or other working mode that the user needs.
- After the signal connection, parameter setting, motor operation are debugged normally, then connect the load and run with load.

3.1 Set Motor Code

Switch on the main circuit power supply, the drive's POW light is lit, the display panel is lit, if there is an alarm appears, please check the connection. Set the motor code parameters according to the following steps:

1. modify the operation password (parameter P-000) is 385;
2. according to the motor model to modify the motor Code (parameter P-002), the motor model code is detailed in the 6th chapter of the Motor adapter table;
3. Enter parameter management and perform reset default values action as shown in the following figure:



Rest default values for all parameters

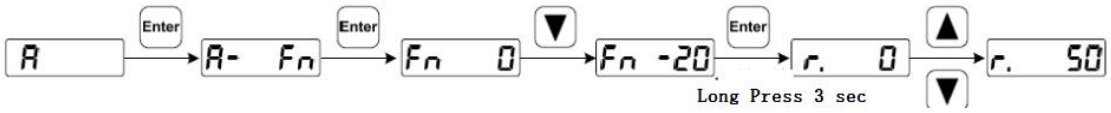
Special attention: The operation to restore the default values must be carried out when the driver is not enabled, otherwise Error will be displayed.

4. when the panel display operation succeeded, turn off the power supply, waiting for the drive panel extinguishing, and then turn on the power supply again, user can do the next operation (keyboard speed test running or JOG running)

3.2 Trial run

3.2.1 Keyboard Speed regulation test run

After switching on the drive power to confirm that there are no alarms and any exceptions, user can operate as the following figure:



The panel prompt is 'r.', the value unit is r/min, and the speed command is provided by the button. Use the ▲, ▼ keys to change the speed command and the motor will run at the given speed. A positive number indicates forward rotation (CCW), a negative number indicates reverse rotation (CW), and the minimum given speed is 0.1 r/min. **If the motor is running normally, you can enter the spindle control parameter settings.**

3.2.2 Jog spot test run

Turn on the main circuit power, the Pow indicator of the drive lights up, the display panel lights up, if there is an alarm, please check the connection.

After confirming that there is no alarm or any abnormal condition, set P-098 to 1, the servo enable (SON) is ON, and the RUN indicator is lit. At this time, the motor is energized and is at zero speed.

In the auxiliary function menu 'A- ', select 'A-JOG' and press Enter to enter jog (JOG) operation mode. The jog prompt is 'J ', the value unit is r/min, and the speed command is provided by the button:

Press ▲ key and hold, the motor will run at JOG speed (CCW), release the button, the motor will stop and keep zero speed; press ▼ and hold, the motor will run according to JOG speed reverse (CW), release the button the motor will stop and keep zero speed.

The JOG speed is set by parameter P076, and the default speed is 100r/min. **If the motor runs normally, it can enter the next operation (coordinated with the upper computer controller).**

The meanings of the test run related parameters are as follows:

Parameter No.	name	setting value	default value	parameter description
P060	Speed command acceleration time	Suitable value	200	Unit: ms 0-1000r/min acceleration time, increase this parameter to reduce acceleration impact
P061	Speed command deceleration time	Suitable value	200	Unit: ms 1000r/min-0 deceleration time, increase this parameter can reduce deceleration impact
P069	Commissioning torque limit	100~200	100	Unit: Rated torque *1%
P075	Maximum speed limit	Set as needed	6000	Unit: r/min Setting this parameter can play the role of speeding safety protection
P076	JOG running speed	Suitable value	100	Unit: r/min JOG speed
P098	Forced enable (Internal Servo On)	1 or 0	0	Forced enabling: set to 1 the motor is energized, set to 0 the motor is not energized if no external servo on signal.

Note: When the keyboard speed test run or jog point test run, if the motor appears vibration, noise

3.3 Coordinate with PC controller

The servo driver can work in three modes: Position mode, speed mode and torque mode.

(1) Position control mode is applied to systems requiring precise positioning, such as numerical control machine tools, textile machinery, etc. The source of position command is pulse command, which is input by PULS+, PULS- and SIGN+, SIGN- of input terminals;

(2) Speed control is applied to occasions requiring precise speed control, such as knitting machines, drilling machines and CNC machining machines. The position closed loop control can also be formed by cooperating with the upper device;

(3) Torque control is used in printing machines, winding machines, injection molding machines, etc. The output torque of the motor is proportional to the input command.

3.3.1 Control parameter setting

After confirming the correct wiring of the upper computer command port CN1, keep all input signals OFF, switch on the power supply, and then set the necessary parameters as follows:

(1) The position control mode sets relevant control parameters according to the following table:

Table 3.1 setting of key parameters of position control mode

Parameters	Name	Set value	Parameter description
P-004	Control mode	0 (Default values)	Set to position control mode
P-029	Electronic gear molecule	1 (Default values)	Electronic gear molecule
P-030	Electronic gear denominator	1 (Default values)	Electronic gear denominator
P-035	Pulse input mode	0 (Default values)	**0 Pulse+direction** 1: Forward/reverse pulse 2: Orthogonal pulse
P-036	Pulse input direction	0 (Default values)	0: Normal direction 1: Reverse direction
P-005	Speed loop proportional gain	50 (Default values)	To improve rigidity or reduce tracking error, adjust P-005/ P-009 appropriately, with each adjustment of 5
P-006	Speed loop integral time constant	20 (Default values)	
P-009	Position loop proportional gain	40 (Default values)	
P-007	Torque filtering time constant	40 (Default values)	When the motor generates vibration or noise during operation, it can be appropriately adjusted to 10
P-019	Velocity detection filtering time constant	50 (Default values)	
P-021	Position loop feed-forward gain	0 (Default values)	Scope: 0~128
P-022	Position loop feed-forward filtering time	10 (Default values)	Unit: 1ms scope: 2~1000
P-040	Position command smoothing filter time	0 (Default values)	Unit: 1ms scope: 0~1000
P-024	Encoder pulse output polarity	0 (Default values)	Set the polarity of encoder pulse output: Set to 0 without inversion, set to 1 with inversion

(2) The speed control mode sets relevant control parameters according to the following table:

Table 3.2 Setting of key parameters of speed control mode

Parameter	name	setting value	default value
P-004	Control mode	1	Set to speed control mode
P025	Speed command Source	0	0
P046	Analog speed command gain	Set as needed	600
P047	Analog speed instruction zero offset compensation	Set as needed	0
P048	Speed instruction Direction	Set as needed	0
P060	Speed instruction Acceleration Time	100 (Default values) Set as needed	Unit: ms 0-1000r/min acceleration time, increase this parameter to reduce acceleration impact
P061	Speed instruction Deceleration time	100 (Default values) Set as needed	Unit: ms 1000r/min-0 deceleration time, increase this parameter can reduce deceleration impact
P-005	Speed loop proportional gain	50 (Default values)	In order to improve the rigidity, the P-005 can be appropriately adjusted to 5
P-006	Speed loop integral time constant	20 (Default values)	If the load inertia is large, adjust P-006 appropriately, with each adjustment of 5
P-007	Torque filtering time constant	40 (Default values)	When the motor generates vibration or noise during operation, it can be appropriately adjusted to 10
P-019	Velocity detection filtering time constant	50 (Default values)	

(3) The torque control mode sets relevant control parameters according to the following table:

Table 3.3 Setting of key parameters of torque control mode

Parameters	Name	Set value	Parameter description
P-004	Control mode	2	Set to torque control mode
P-026	Torque command source	0 (Default values)	0: Analog torque 1: Internal multi-stage torque < 4 optional P145~P148 settings >
P-053	Analog torque command gain	30 (Default values) Set as needed	Percentage of rated torque of motor corresponding to 1V analog voltage (unit: 1%/V)
P-054	Analog torque command zero bias compensation	0 (Default values) Set as needed	Unit: 0.1mv
P-055	Analog torque command direction	0 (Default values) Set as needed	0: Normal direction 1: Reverse direction
P-075	Maximum speed limit	Set as needed	Set over-speed protection value (Unit: r/min)
P-078	Speed limit in torque control	Set as needed Default values (3000)	The operating speed of the torque mode motor is limited within this parameter: 0~5000 (Unit: r/min)

After the above operations and settings are completed, the parameter saving operation must be performed. After the display operation is successful, the power supply shall be turned off. After the display of the driver panel is turned off, the power supply shall be turned on again, and the next functional debugging can be carried out.

3.3.2 Function debugging

1. **According to actual needs, after the above-mentioned necessary parameters are set, perform parameter writing operation (refer to E-Set Operation Instructions in Section 2.5 Parameter Management). After the parameters are saved, power off and restart the servo driver.**

2. **Speed control mode:** Given a small analog voltage command, and the servo enable input signal SON is ON, the motor should follow the command to Run. At this time, the "RUN" indicator on the panel is on, and whether the motor runs normally can be judged by monitoring the following variables:

   (1) By monitoring D-i, observe the magnitude of the motor current (unit: A). During normal steady speed operation, the displayed current value will not exceed the rated current of the motor;

   (2) By monitoring D-[S, observe analog quantity command (expressed by rotation speed, unit: r/min), and the displayed value is equal to the rotation speed displayed by D-SPd in normal conditions;

   (3) By monitoring rE-10 under the D-rE menu, observe the original analog quantity command (expressed by voltage, unit: mv), and normally the displayed value is equal to the command voltage value given by the upper computer. (Note: rE-9 is an command after zero offset compensation)

3. **After confirming that it is normal, slowly increase the analog voltage command to gradually increase the running speed of the motor. At the same time, monitor whether the motor runs with vibration and noise, whether the speed is stable, and whether the motor current will exceed the rated value.**

4. **When the motor runs normally from zero speed to positive maximum speed or from zero speed to negative maximum speed, the user can debug other functions.**

During the simulation command speed mode operation, the common abnormal phenomena and treatment methods are as follows:

S/N	Abnormal phenomena frequently encountered in debugging and running	Treatment
1	Given an simulation command, the display data of the monitoring window rE-3 does not correspond to the command voltage.	Check whether the upper computer command system and command cable are connected correctly.
2	After enabling, the monitoring window rE-10 has a corresponding command voltage value, while D-[S has no	1. Check the setting of "necessary parameters"; 2. Check the input I/O signal line. It is very convenient to conduct I/O check by observing

	corresponding command rotation speed, i.e. there is a voltage command and the motor does not run.	the contents displayed by D-Di (refer to the description of input terminal DI in Section 2.3)
3	The positive rotation direction of the motor is inconsistent with the requirements of the upper computer.	Modify parameter P048 to set whether the speed command is inverted: Set to 0 to negate, set to 1 to negate (effective immediately)
4	Abnormal conditions such as vibration and noise occur in the motor;	1. Check whether shielded wires are correctly wired; 2. Refer to Chapter 4 Performance Optimization and Adjustment.
5	When 0V command is given, the motor will move slightly.	Perform automatic zero adjustment of analog quantity, or manually adjust parameter P047

6. Position control mode: When the servo enable input signal SON is ON, given a lower frequency position pulse command, the motor should run. By monitoring D-i, observe the magnitude of motor current (unit: A) during normal steady speed operation, the displayed current value will not exceed the rated current of the motor; By monitoring D-Frq, the frequency of command pulses can be displayed in real time; After the driving unit executes a section of command, the number of pulses of the position command can be read out by monitoring D-[Po], which should be equal to the number of pulses displayed by D-Pos,

7. Slowly increase the position command speed, and gradually increase the running speed of the motor. At the same time, monitor whether the motor runs with vibration and noise, whether the speed is stable, and whether the motor current will exceed the rated value.

8. The user can debug other functions when the motor can follow the command within the rated rotation speed and the pulse number of the position command displayed by D-[Po] is equal to the pulse number displayed by D-Pos when the motor is stopped.

During the position control mode operation, the common abnormal phenomena and treatment methods are as follows:

S/N	Abnormal phenomena frequently encountered in debugging and running	Treatment
1	After enabling, given the position pulse command, D-[Po shows no change and the motor does not run.	Check whether the upper computer command system and command cable are connected correctly.
2	D-[Po shows change, motor does not run	1. Check the setting of "necessary parameters"; 2. Check the input I/O signal line. It is very convenient to conduct I/O check by observing the contents displayed by D-Di (refer to the description of input terminal DI in Section 2.3)

3	The positive rotation direction of the motor is inconsistent with the requirements of the upper computer.	Modify parameter P036 to set whether the position command is inverted: Set to 0 to negate, set to 1 to negate (effective immediately)
4	Abnormal conditions such as vibration and noise occur in the motor;	1. Check whether shielded wires are correctly wired; 2. Refer to Chapter 4 Performance Optimization and Adjustment.
5	The motor can only run in one direction.	1. Pay attention to the mode of detecting command source and check P035/P037 settings; 2. Check whether the position command input cable is connected normally.
6	D-[Po shows that the pulse number of position command is inconsistent with the pulse number of upper computer command source	1. Check the shielding of command signal lines; 2. Stay away from strong interference sources.

3.3.3 Electromagnetic brake

The electromagnetic brake (holding brake and power loss brake) is used to lock the vertical or inclined worktable connected with the motor to prevent the worktable from falling after the servo power supply is lost. To realize this function, a motor with a brake is required. Brakes can only be used to hold the worktable, not to slow down or stop the movement of the machine.

(1) Electromagnetic brake related parameters:

Parameters	Name	Parameter scope	Default values	Unit	Applicable
P165	Motor static speed detection point	0～1000	5	r/min	ALL
P166	Delay time of electromagnetic brake when motor is stationary.	0～2000	200	ms	ALL
P167	Waiting time of electromagnetic brake when motor is running.	0～2000	500	ms	ALL
P168	Operating speed of electromagnetic brake when motor is running.	0～3000	100	r/min	ALL
P169	Delay time for release of electromagnetic brake	0～3000	200	ms	ALL

(2) Use of electromagnetic brake:

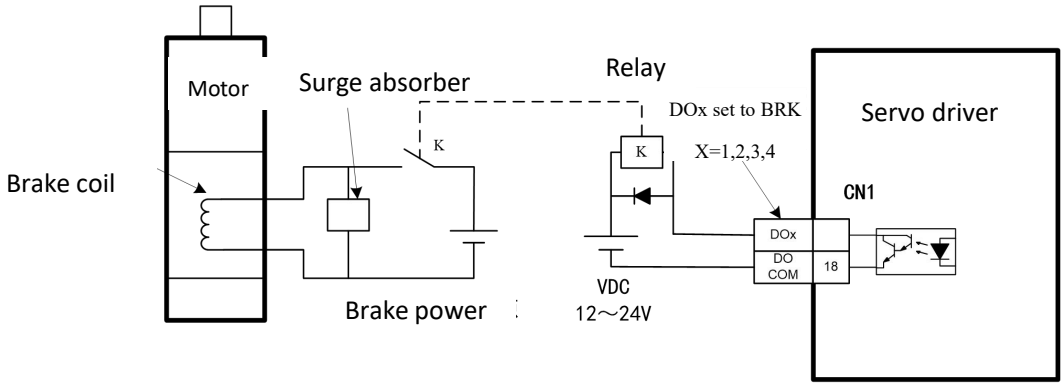
The following figure is the brake wiring diagram. The brake release signal BRK of the driver is connected to the relay coil, and the relay contact is connected to the brake power supply. The brake power supply is provided by the user and has sufficient capacity. It is recommended to install surge absorber to suppress surge voltage caused by relay on/off action. Diodes can also be used as surge absorbers. Attention should be paid to the slight braking delay.

After the motor is stopped and stationary (the speed is less than P-165), the servo is turned

OFF. At this moment, the motor continues to be energized to maintain its position. The brake is released to brake. After a period of stabilization (the time is determined by parameter P-166), the power supply of the motor is removed.

When the motor is running (the speed is higher than P-165) and servo is OFF, the current of the motor is cut off and the brake continues to be released. After a period of delay, the brake is braked. This is to reduce the speed of the motor from a high-speed rotating state to a low speed, and then actuate the mechanical brake to avoid damaging the brake. The delay time is the time required for the parameter P-167 or the motor speed to decelerate to the parameter P-168, whichever is the minimum.

P-169: When the system changes from the non-enabled state to the enabled state, the delay time from the opening of the motor current to the release of the electromagnetic brake (DO output terminal BRK ON) is defined.



3.3.4 Programmable digital input and output ports

All digital input and output ports DI/DO of the driver are software programmable, and customers can freely modify them as required. The specific usage is as follows:

Parameters	Name	Parameter scope	Default values	Unit	Applicable
P100	Digital input DI1 function	-21～21	1		ALL
P101	Digital input DI2 function	-21～21	2		ALL
P102	Digital input DI3 function	-21～21	3		ALL
P103	Digital input DI4 function	-21～21	4		ALL
P104	Digital input DI5 function	-21～21	20		ALL
P105	Digital input DI6 function	-21～21	10		ALL

- Digital input DIx function planning, absolute value of parameter represents function, symbol represents logic;
- Symbol indicates input logic, positive number indicates positive logic, negative number indicates negative logic, ON is valid, OFF is invalid:

Parameter value	DI input signals	DI result
Positive number	Open circuit	OFF
	Breakover	ON
Negative number	Open circuit	ON
	Breakover	OFF

- When multiple input channels have the same function selection, the function result is logical or relational. For example, if P100 and P101 are both set to 1(SON function), SON is valid when either DI1 or DI2 is ON.

Parameters	Name	Parameter scope	Default values	Unit	Applicable
P108	Digital input DO1 function	-12～12	2		ALL
P109	Digital output DO2 function	-12～12	3		ALL
P110	Digital output DO3 function	-12～12	8		ALL
P111	Digital output DO4 function	-12～12	5		ALL
P112	Digital output DO5 function	-12～12	0		ALL
P113	Digital output DO6 function	-12～12	0		ALL

- Digital output DIx function planning, absolute value of parameter represents function, symbol represents logic.
- 0 is mandatory OFF and 1 is mandatory ON. Symbols represent output logic, positive numbers represent positive logic, and negative numbers represent negative logic:

Parameter value	Corresponding function	DO output signal
Positive number	ON	Breakover
	OFF	As of
Negative number	ON	As of
	OFF	Breakover

(1) List of DI functions

S/N	Symbols	DI function	S/N	Symbols	DI function
0	NULL	No function	14	TRQ2	Internal torque select 2
1	SON	SVON	15	EMG	Emergency shutdown
2	ARST	Alarm Clear	16	CMODE	Control mode switch
3	CCWL	Forward drive	17	GAIN	Gain switch

		prohibited			
4	CWL	Reversal drive prohibited	18	GEAR1	Electronic gear select 1
5	TCCW	Forward torque limit	19	GEAR2	Electronic gear select 2
6	TCW	Reversal torque limit	20	CLE	Position deviation clearing
7	ZCLAMP	Zero speed clamp	21	INH	Pulse input disabled
8	CZERO	Zero command (stop)			
9	CINV	Command inversion	23	CCW	Forward run (Start)
10	SP1	Internal speed select 1	24	CW	Reverse operation
11	SP2	Internal speed select 2			
12	SP3	Internal speed select 3			
13	TRQ1	Internal torque select 1			

(2) List of DO functions

S/N	Symbols	DO function	S/N	Symbols	DO function
0	OFF	Has been invalid	8	BRK	Electromagnetic brake
1	ON	Has been valid	9	RUN	Servo operation
2	SRDY	Servo ready	10	NEAR	Positioning proximity
3	ALM	Alarm	11	TRQL	Torque limitation
4	ZSP	Zero speed	12	SPL	Speed limit
5	COIN	Positioning finished	14	PtoS	Position/Speed mode switching completed
6	ASP	Speed arrival	15	PtoT	Position/Torque mode switching completed
7	ATRQ	Torque arrival	16	StoT	Speed/Torque mode switching completed
			20	DO3_ZOUT	Return to zero Z signal output (only DO3 supports this function)

3.4 Full closed loop control (Double Encoder Debugging)

(1) Function Instruction

In order to overcome the influence of mechanical transmission gap and error on control performance and improve the accuracy of position control, the function of position control is called full closed loop control according to the real-time position feedback signal of encoder (second position encoder) of mechanical load terminal. Relevant parameters are described as follows:

S/N	Parameter name	Scope	Default values	Unit	Applicable
P023	Selection of position loop feedback encoder	0~1	0		P

- The position feedback signal source when setting the position control mode;

- Parameter meaning: 0: Motor encoder (first encoder) 1: A second encoder;
- This parameter setting requires power failure and restart to take effect.

P085	Second encoder control parameters	Scope	Default values	Unit	Applicable
		0～11111	0		ALL

- Setting the polarity of the A/B signal of the second encoder;
- Parameter meaning: 0: A/B Not reverse 1: A/B Reverse
- This parameter setting requires power failure and restart to take effect.

S/N	Parameter name	Scope	Default values	Unit	Applicable
P014	The resolution of the second encoder is 4 bits lower.	0~9999	0	Pulse	P
P015	The resolution of the second encoder is 4 bits higher.	0~9999	1	Pulse	P

- Setting the resolution of the second encoder (the number of pulses corresponding to the second encoder after one revolution of the motor after four times of frequency multiplication);
- Parameter meaning: Resolution = (P015 * 10000) + P014;
- This parameter setting requires power failure and restart to take effect.

(2) Operation process

First, carry out semi-closed loop position control (using the motor encoder as the position signal feedback source) to determine whether the encoder position signals of the motor encoder and the load terminal are normal, and whether the polarities are consistent. After the semi-closed loop position control operates normally, carry out full closed loop debugging (using the second encoder as the position signal feedback source). The debugging process is as follows:

1. Set P-023 to 0, select the motor encoder as the position feedback signal source, correctly set the resolution parameters P-014 and P-015 of the second encoder (which can be converted by calculation or run in JOG mode (stroke exceeds 2 turns), observe RE-12 and RE-11, fill the RE-12 value into P-015, fill the RE-11 value into P-014), save the parameters and restart after power failure;

2. After power-on, make the motor rotate at a low speed in a fixed direction in a semi-closed loop manner (the upper computer gives a low-speed position rotation command). After confirming normal operation, observe whether the change directions of D-Apo (absolute position of motor encoder) and D-AP2 (absolute position of second encoder) are consistent (i.e., both change from small to large or both change from large to small). If not, set P-085 to 1 (the second encoder A/B is in reverse phase);

3. Set P-023 to 1 to open the full closed-loop control switch, select the second encoder as the position feedback signal source, save the parameters and restart the power supply to take effect;

4. After the above-mentioned process is completed, power is applied again, and the servo driver works in the full closed loop control mode. The upper computer gives an enable signal, and the

servo driver uses the second encoder as the source of the position feedback signal for position control.

4. Performance optimization and adjustment

4.1 Control loop gain parameters

The position mode and speed mode gain parameters are as follows:

Parameters	Name	Default values	Unit	Parameter description
P005	Speed loop gain	50	Hz	In order to improve the servo rigidity, the parameter value should be increased, but it is too large to cause vibration and noise, and each adjustment is 5
P006	Speed loop integral time	20	ms	The larger the load inertia is, the value of this parameter should be appropriately increased, but the rigidity of the speed response will be reduced by 5 for each adjustment.
P009	Position loop gain	40	1/s	In order to improve the servo rigidity, the following error should be decreased, but it is too large to cause vibration and noise, and each adjustment is 5
P007	Torque filtering time	40	0.1 ms	In order to eliminate the vibration and noise of the motor during operation, these two parameter values should be appropriately increased. In the absence of obvious vibration and noise, the smaller the parameter value, the better, with each adjustment of 10; **Priority should be given to increasing P019 and P007 when noise and vibration cannot be completely eliminated.**
P019	Velocity detection filtering time	50	0.1 ms	

4.2 Performance optimization

① Gain parameter adjustment steps:

The choice of position and speed bandwidth must be determined by the rigidity of the machine and the application occasion. The conveying machine connected by the belt has low rigidity and can be set to a lower bandwidth (P-009: 10 ~ 40); The mechanical rigidity of the gear box driven by the reducer is medium, which can be set to medium bandwidth (P-009: 30 ~ 50); Direct drive screw has high rigidity and can be set to high bandwidth (P-009:> 50). If the mechanical characteristics are unknown, the gain can be gradually increased to increase the bandwidth until resonance, and then the gain can be reduced.

In servo gain, if one parameter is changed, other parameters also need to be readjusted. Please do not make large changes to only one parameter. Regarding the servo parameter change procedure, please generally observe the following principles:

Improve response	Reduce response, suppress vibration and overshoot
1. Increase the speed loop gain K_v (P005) by 5 for each adjustment; 2. Reduce the integration time constant T_i(P006) of the speed ring, with each adjustment of 5; 3. Increase the position loop gain K_p(P009) by 5 for each adjustment.	1. Reduce the position loop gain K_p(P009) by 5 for each adjustment; 2. Increase the integration time constant T_i(P006) of the speed ring, with each adjustment of 10; 3. Reduce the speed loop gain K_v (P005) by 5 for each adjustment;

② Noise and resonance suppression methods:

If the gain cannot be increased due to mechanical system resonance and other reasons, and the desired responsiveness cannot be obtained, the speed detection filtering time (P019 adjustment amount is 10 per time) can be appropriately increased first, and if there is no obvious effect, then the torque low-pass filtering time (P007 adjustment amount is 10 per time) can be appropriately increased to inhibit resonance.

5、Debug problems and processing method

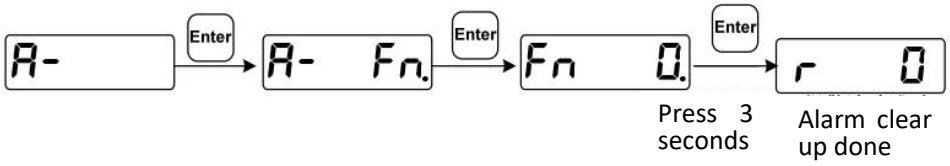
5.1 Alarm Code

Alarm Code	Alarm name	Alarm content	Alarm Clear
Err--	No alarm	Working normally	
Err 1	Speeding	Motor speed exceeds maximum limit	YES
Err 2	Power main circuit over voltage	Main circuit power supply voltage exceeds the specified maximum value	NO
Err 3	Power main circuit under voltage	Main circuit power supply voltage is lower than the specified minimum value	NO
Err 4	Position following-deviation too large	The value of the position deviation counter exceeds the set value	YES
Err 5	Position command over clocking	Position command frequency exceeds the highest frequency	YES
Err 6	Motor stall	The motor shaft is blocked, or the wiring is incorrect, or the pole pair setting is incorrect, or the encoder line number is set incorrectly.	YES
Err 8	Speed response failure	Excessive spindle load makes the speed deviation too large, or the pole pair setting is incorrect, or the encoder line number is set incorrectly.	YES
Err 9	Incremental encoder ABZ signal error	Motor encoder ABZ signal has interference or disconnection	NO
Err10	Incremental encoder UVW signal error	Motor encoder U V W signal has interference or disconnection	NO
Err11	IPM module over current	Main power circuit IPM inverter module over current or over heat.	NO
Err12	Over current	Servo driver instantaneous current is too large.	NO
Err13	Over load	Motor average load current is too large	NO
Err14	Brake peak power overload	Brake instantaneous load is too large	NO
Err16	Motor thermal overload	Motor heating value exceeds the set value (I^2t detection)	NO
Err17	Brake average power overload	Brake long-term average load is too large	NO
Err18	Power module overload	Power module output average load is too large.	NO
Err20	EEPROM error	EEPROM read and write error	NO
Err21	Logic circuit error	Processor peripheral logic circuit error	NO

Err23	AD conversion reference voltage error	AD sampling circuit voltage reference is not a standard value	NO
Err24	AD conversion channel is asymmetrical or zero drift too large	AD sampling amplification conditioning circuit is abnormal.	NO
Err25	Motor code error	Motor code setting is not suitable	NO
Err29	User torque overload alarm	Motor load exceeds user-set value and duration	YES
Err30	Encoder Z signal loss	Encoder Z signal does not appear	NO
Err31	Encoder Z signal detection is abnormal	Encoder Z signal has interference or signal instability	NO
Err32	Encoder UVW signal illegal coding	The motor encoder UVW signal is missing, and the Z signal can be manually turned off to cancel the alarm.	YES
Err34	Spindle orientation failure	Spindle orientation function is running incorrectly	YES
Err35	Spindle encoder (second encoder) error	Spindle encoder AB polarity error	NO
Err36	Spindle encoder (second encoder) line is broken	Spindle encoder line is broken or there is interference	NO

5.2 Alarm Cleanup method

When the spindle drive has a fault alarm occurred, after troubleshooting the cause, in the case of continuous power, alarm removal can be achieved through the drive operating panel, the specific operation method is as follows:



Note: Some hardware failure alarms cannot be cleared, please consult our technicians.

5.3 Common problems and countermeasures

① **When restoring the default parameter operation, an error is reported.**

a. Confirm whether the operation password (P-000) is set correctly;

b. Restore the default operation must be in the case of the driver is not enabled;

② **The upper computer is enabled, and the green light of the driver (Run) is not on.**

a. Check whether the power supply R/S/T voltage is low;

b. Check CN1 interface 31 feet, +24V is whether correct;

c. Check whether the SON signal is connected to 0V at pin 16 of CN1 interface;

d. Through the above measures, if the (Run) enable green light is not on, the internal enable (P098 set to 1) can be used to try again.

③ **"Err-9/Err-10/Err-30/Err-31/Err-32/Err-33" fault alarm occurs**

Note: The photoelectric encoder at the tail end of servo motor is a typical vulnerable component, and special attention should be paid to protection !

a. The above alarm indicates that there is a problem with the encoder or the encoder connection cable;

b. Check whether both ends of the shielding layer are well grounded and whether there is water or impurities in the plug;

c. Whether too long connecting line will cause attenuation to 5V encoder power supply;

d. Confirm whether it is interference problem, whether there are strong magnetic and strong electric lines nearby, and if so, isolate them as much as possible.

④ **Noise or vibration (high frequency) during servo motor operation**

a. Appropriately increase the filter coefficients P-007 and P-019 by 5 per adjustment;

b. If the effect of increasing the filter coefficient is not obvious, the speed loop proportional gain and the position loop proportional gain need to be reduced, i.e. P-005 and P-009 need to be decreased, and each adjustment amount is 5;

c. If the above measures are not significantly improved, please check whether there is interference in the encoder connection line and whether both ends of the shielding layer are well grounded.

⑤ **Jitter (low frequency) in servo motor operation**

a. Determine whether the load and inertia of the servo motor are within the allowable range of the motor. If the load and inertia exceed the rated multiple of the motor too much (the load torque is greater than 3 times, and the inertia is greater than 5 times), please select a motor with larger specifications again;

b. Appropriately adjusting the proportional gain P-005 of the speed ring, with each adjustment amount of 5;

c. If the effect of increasing P-005 is not obvious, the filter coefficient P-007/P-019 can be appropriately decreased, with each adjustment of 5;

d. If the effect of reducing the filter coefficient is not obvious, the position loop gain P-009 can be appropriately reduced, with each adjustment amount of 5;

c. If the above measures are not significantly improved, please check whether there is interference in the encoder connection line and command connection line whether both ends of the shielding layer are well grounded.

⑥ **The driver has Err-2 or Err-11 alarm**

Judge whether the driver will give an alarm upon power-up or when large inertia frequently

accelerates or decelerates:

a. If the power is on, the alarm can confirm that the hardware circuit of the driver has failed;

b. If the alarm is given during frequent acceleration and deceleration of large inertia, first check the monitoring menus d-I and d-pI to see if the instantaneous value and maximum value of current exceed the allowable range of driver and motor. If the instantaneous value and maximum value exceed the allowable range, reduce inertia acceleration accordingly (speed mode: increase the acceleration time P-060 and deceleration time p-061; Position mode: increase the acceleration and deceleration time of the upper computer controller) to control the current within the allowable range of the driver and motor, and check whether the fault disappears.

⑦ **"Err-5/Err-12" appears in the driver when the servo motor is started.**

a. "Err-5" indicates that the frequency of the upper computer's pulse command is too fast and exceeds the response capability of the servo motor. It is suggested to increase the acceleration and deceleration time of the upper computer or appropriately increase the position command smoothing time P-040, with an adjustment amount of 10 per time.

b. The above measures are invalid or the upper computer cannot be modified. Please set P-116 to 32 to shield "Err-5" alarm (power failure and restart are required to take effect);

c. If the "Err-12" overcurrent alarm appears on the actuator during startup, indicating that the motor is overloaded during startup, please check whether the driver type is small or damaged.

⑧ **"Err-4" appears in the driver during servo motor operation**

a. If the low-speed operation is normal and "Err-4" appears in the high-speed operation, please first check whether the maximum rotation speed limit of P-075 is low, then appropriately adjust the position loop gain P-009 (each adjustment is 5), or appropriately adjust the position overshoot detection range p-080;

b. If only the position command is given, no matter what the rotation speed, Err-4 will appear as soon as the motor is running, please make sure whether the motor is locked or damaged, and whether the strong current circuit of the driver is damaged; ;

c. If "Err-4" appears when accelerating rapidly during operation, please confirm whether the selection of driver and motor is too small;

d. If "Err-4" appears occasionally during operation, please check whether there is interference between encoder connection line and command connection line, and whether both ends of shielding layer are well grounded.

⑨ **The driver is running normally, and the upper computer has "too large position tracking error"**

a. Determining a detection threshold value of an upper computer position tracking error

overrun, setting the actuator position overrun detection range P-080 to a value smaller than the threshold value, and observing whether "Err-4" appears in the driver during operation;

b. If "Err-4" does not appear in the driver, it indicates that there is interference in the encoder signal sent back to the upper computer on the command connection line. Please check whether the connection line is welded reliably and whether both ends of the shielding layer are well grounded.

c. If "Err-4" appears in the actuator, it indicates the response problem of the actuator and the motor. Please first confirm the integrity of the driver and the motor, and then adjust the gain of the position ring and speed ring P-009/P-005;

d. If the above measures have no obvious effect, you can consider selecting larger size driver and motors.

6. Driver specifications and motor adaptation table

6.1 Type specifications and performance parameters

Table 6.1 Driver model specifications

Model		LZ3_-20L	LZ3_-30L	LZ3_-40L	LZ3_-50L	LZ3_-75L	LZ3_-25H	LZ3_-50H	LZ3_-75H
Input power supply	Main power supply	Single-phase/three-phase 220VAC -15%+10% 50/60Hz					Three-phase 380VAC -15%+10% 50/60Hz		
Environment	Temperature	Operation: 0℃ ～ 40℃ Storage: -40℃ ～ 50℃							
	Humidity	Operation: 40% ~ 80% (no condensation) storage: Lower than 93% (without moisture condensation)							
	Atmospheric pressure	86kPa ～ 106 kPa							
Protection grade		IP20							
Control mode		Position, speed, torque, position/speed, speed/torque, position/torque							
Digital input		8 programmable input terminals (photoelectric isolation)							
Digital output		6 programmable output terminals (photoelectric isolation)							
Encoder signal output	Signal type	A, B, Z differential output, Z signal open collector output							
Position	Input frequency	Differential inputs: ≤500kHz (kpps): Single-ended input: ≤200kHz (kpps)							
	Command mode	Pulse + symbol; Forward/reverse pulse; Orthogonal pulse							
	Electronic gear ratio	1～32767/1 ～ 32767							
Speed	Simulation command input	±10VDC, input impedance 10kΩ							
	Command acceleration and deceleration	Parameter setting P-060/P-061							
	Command source	Analog quantity, internal speed command							
Torque	Simulation command input	-10V ～ +10V, input impedance 10kΩ							
	Torque limitation	Parameter setting P-065/P-066							
	Command source	Analog quantity, internal torque command							
Monitoring function		Rotate speed, current position, position deviation, motor torque, motor current, command pulse frequency, etc.							
Protection functions		Over-speed, over-voltage, over-current, overload, brake abnormality, encoder abnormality, position overshoot, command overclocking, etc.							
Features	Velocity frequency response	≥800Hz							
	Velocity fluctuation rate	＜±0.03% (load 0～100%); ＜±0.02% (power -15% ～ +10%)							

6.2 Motor Adaptation Table (Optical-electricity Encoder, Encoder type:O)

Model of LZ3a-20L/30L driver adapted motor

(Motor series code P-099: F1-MG)

Motor model code (P-002)	Match driver (AC 220V)	Servo motor model (220V)	Rated power (kW)	Rated current (A)	Rated torque (Nm)	Multiples of overload
20	LZ3a(b)-20L	40LZ-M00130	0.05	0.4	0.16	3
20		40LZ-M00330	0.1	0.6	0.32	3
21		60LZ-M00630	0.2	1.2	0.6	3
22		60LZ-M01330	0.4	2.8	1.3	3
23		60LZ-M01930	0.6	3.5	1.9	3
27		80LZ-M01330	0.4	2.6	1.3	3
28		80LZ-M02430	0.75	3.0	2.4	2.5
29		80LZ-M03330	1.0	4.2	3.3	2.5
30		80LZ-M04025	1.0	4.4	4	2.5
31		90LZ-M02430	0.75	3	2.4	3
32		90LZ-M03520	0.73	3	3.5	3
33		90LZ-M04025	1.0	4	4	2.5
34	LZ3a(b)-20L/30L	110LZ-M02030	0.6	4	2	2.5/3
35	LZ3a(b)-20L/30L	110LZ-M04030	1.2	5	4	2/3
39	LZ3a(b)-20L/30L	110LZ-M04020	0.8	3.5	4	3/3
36	LZ3a(b)-30L	110LZ-M05030	1.5	6	5	2.5
37	LZ3a(b)-30L	110LZ-M06020	1.2	6	6	2.5
38	LZ3a(b)-30L	110LZ-M06030	1.6	8	6	1.8
43	LZ3a(b)-30L	110LZ-M10020	2	8.5	10	1.7
44	LZ3a(b)-20L/30L	130LZ-M04025	1	4	4	2.5/3
45	LZ3a(b)-20L/30L	130LZ-M05025	1.3	5	5	2/3
46	LZ3a(b)-30L	130LZ-M06025	1.5	6	6	2.5
47	LZ3a(b)-30L	130LZ-M07720	1.6	6	7.7	2.5
47	LZ3a(b)-30L	130LZ-M07725	2.0	7.5	7.7	2
48	LZ3a(b)-30L	130LZ-M07730	2.4	9	7.7	1.6/2
40	LZ3a(b)-20L/30L	130LZ-M10010	1.0	4.5	10	2.2/3
49	LZ3a(b)-30L	130LZ-M10015	1.5	6	10	2.5
50	LZ3a(b)-30L	130LZ-M10025	2.6	10	10	1.5
51	LZ3a(b)-30L	130LZ-M15025	3.8	13.5	15	1.3
52	LZ3a(b)-30L	130LZ-M15015	2.3	9.5	15	1.6

Notes 1: Model code 24/25/26 is configured with line-saving photoelectric encoder by default. If line-saving encoder is selected for other models of motors, the parameter P-081 needs to be manually set to 1 after restoring the default parameters (see section 3.1 for details).

6.3 Motor Adaptation Table (Magnetic Encoders,Encoder type:M)

Table 6.3 Model of LZ3a-20L/LZ3a-30L driver adapted motor

(Motor series code P-099: F4-WG)

Motor model code (P-002)	Match driver (AC 220V)	Servo motor model (220V)	Rated power (kW)	Rated current (A)	Rated torque (Nm)	Multiples of overload
20	LZ3a(b)-20LN	40LZ-M00130	0.05	0.4	0.16	3
20		40LZ-M00330	0.1	0.6	0.32	3
21		60LZ-M00630	0.2	1.2	0.6	3
22		60LZ-M01350	0.4	3.6	1.3	3
23		60LZ-M01930	0.6	3.5	1.9	3
27		80LZ-M01330	0.4	2.6	1.3	3
28		80LZ-M02430	0.75	3.0	2.4	3
29		80LZ-M03230	1.0	5.0	3.2	2.5
30		80LZ-M04025	1.0	4.4	4	2.5

Notes 1: All of the above motors are equipped with 2500-wire magnetic encoders. You must first set P-000 to 385, then select the motor series parameter P-099 to F4-WG, then set the motor code parameter P-002 according to the motor model, and perform the operation E-DEF to restore the motor default parameter to ensure better control performance. Please follow the above steps to correctly set the motor series parameter and model code parameter!