SZGH E7A Bus series

AC Servo Driver

Design and debugging Manual

CE

ISO9901

Contents

Safety Notice

Personnel

■This product is a high-voltage, high-current product, ensuring that people are in a safe area ofthe movement mechanism when power is on.

■This product is a high-voltage, high-current product. Wrong operation may cause arc burns and electric shocks.

■It is forbidden to power on the wiring without following the instructions.

Conditions

■This product is a high-voltage, high-current product. It is forbidden to use it in flammable gas and corrosive gas, otherwise it may cause fire and explosion.

■ It is forbidden to energize where flammable and explosive materials drip, which may cause fire and explosion.

■It is forbidden to use it under the conditions of high humidity, moisture and metal powder, etc., which may cause electric shocks and other dangerous situations.

Product and equipment

■This product is a high-voltage, high-current product, wrong connection will cause damage to the product.

■The PE terminal must be grounded and the grounding wire must be reliably grounded.

■ This product L series is suitable for AC220V power supply; H series is suitable for AC380V power supply, please do not connect it wrongly.

■The U, V, and W terminals of the product should be connected to the motor for output, please do not connect to input power.

■。The U, V, and W terminals of the product are three-phase output. Do not connect them in the wrong order. Incorrect connections may cause motor runaway, equipment damage, and overcurrent damage to the product.

■Fasten all terminals, and select materials strictly according to power for all wiring specifications.

■It is forbidden to distribute power or touch the terminals when the drive is powered on.

■Do not touch the terminals within 5 minutes after power off.

■It is forbidden to touch the motor and cables when the motor is running to prevent accidental injuries such as scalds and sprains.

Chapter 1 Installation

1.1 External dimensions of servo driver (unit :mm)

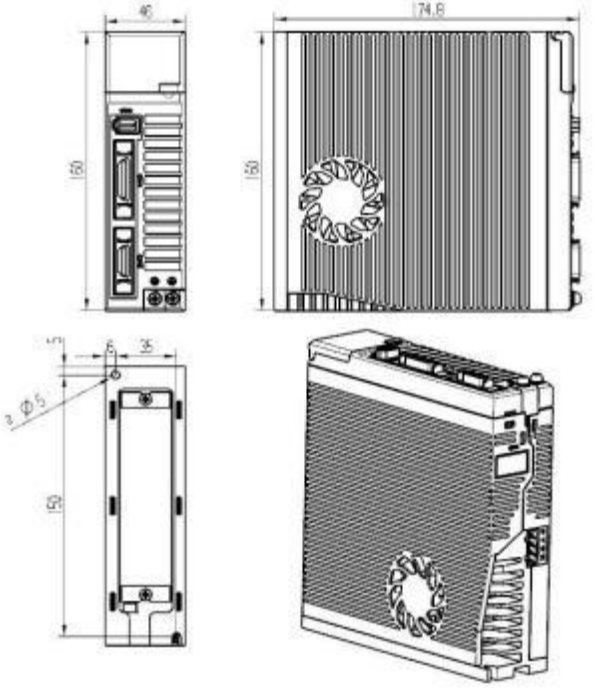


Figure 1.1.1 Dimensions of 10A/22A/32A

1.2 Installation dimension of Servo drive (unit: mm)

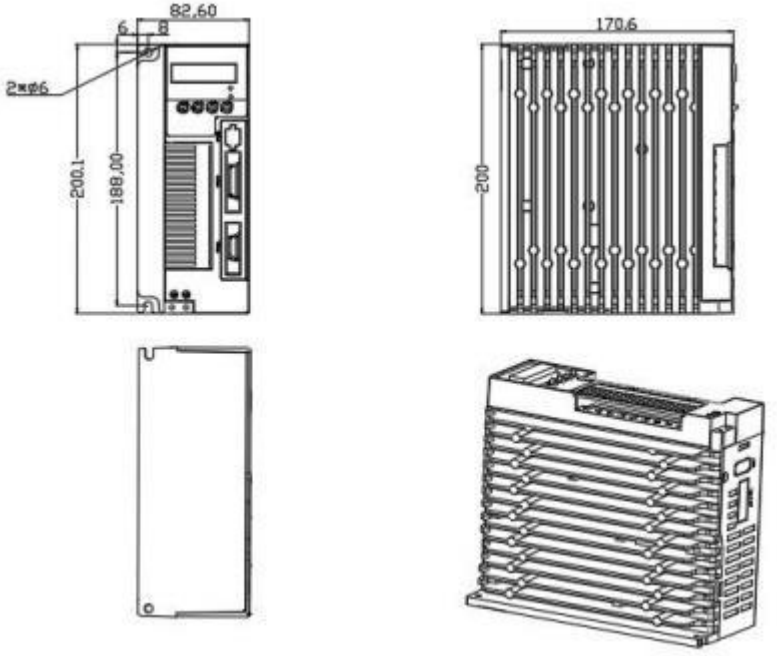


Figure 1.1.2 Dimensions of20A/30A

1.3 Installation dimension of Servo drive (unit: mm)

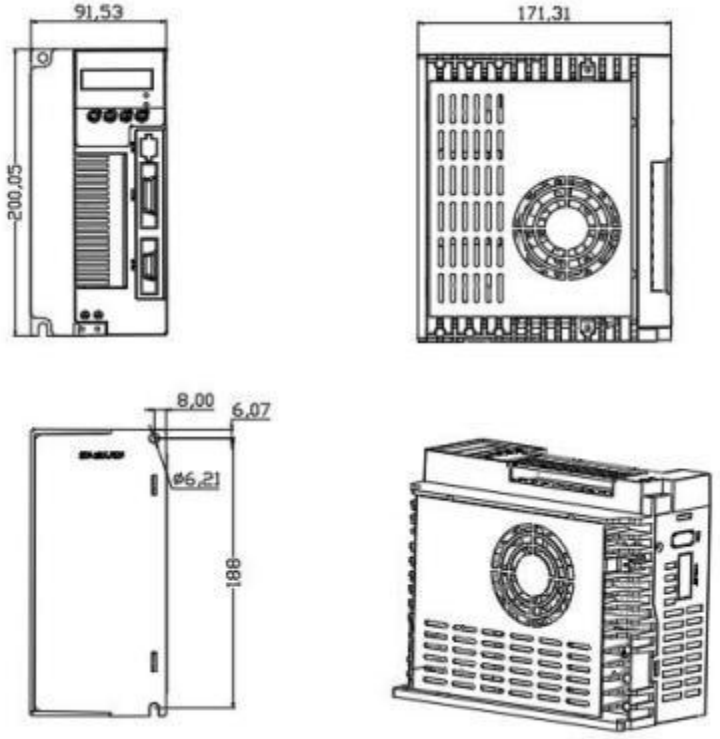


Figure 1.1.3 Dimensions of 35A

1.4 Installation dimension of Servo drive (unit: mm)

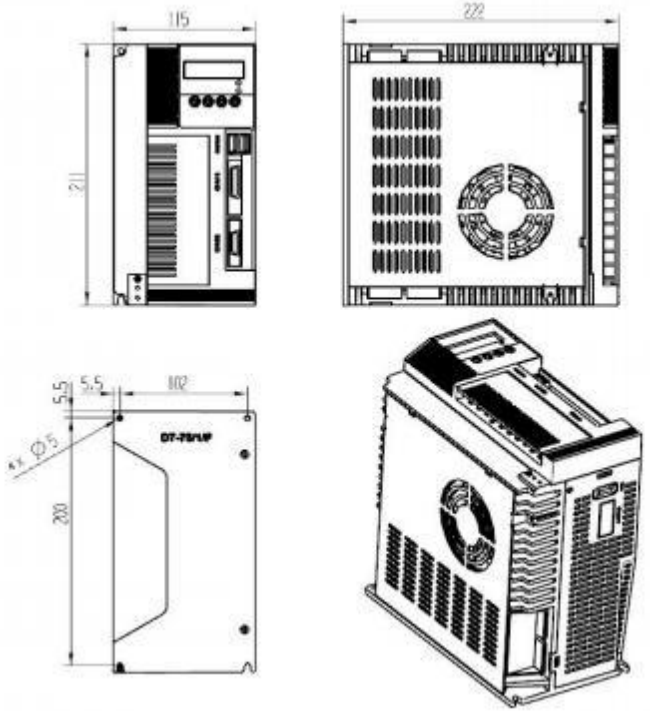


Figure 1.1.4 Dimensions of25A/50A/75A

1.5 Installation dimension of Servo drive (unit: mm)

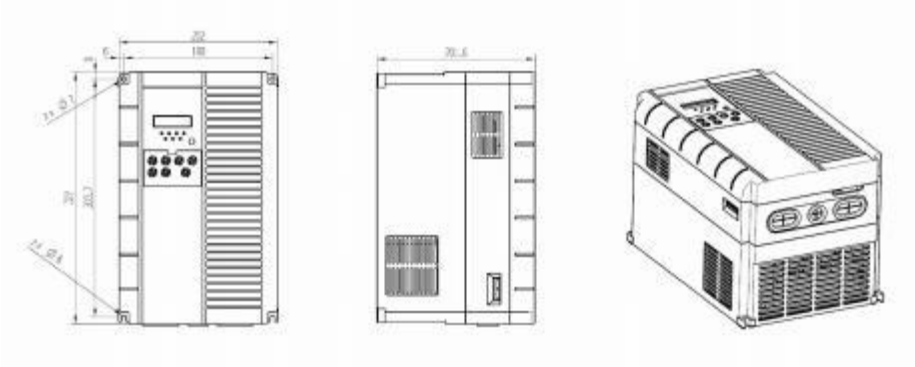


Figure 1.2.1 Installation dimension of 100A

1.6 Installation dimension of Servo drive (unit: mm)

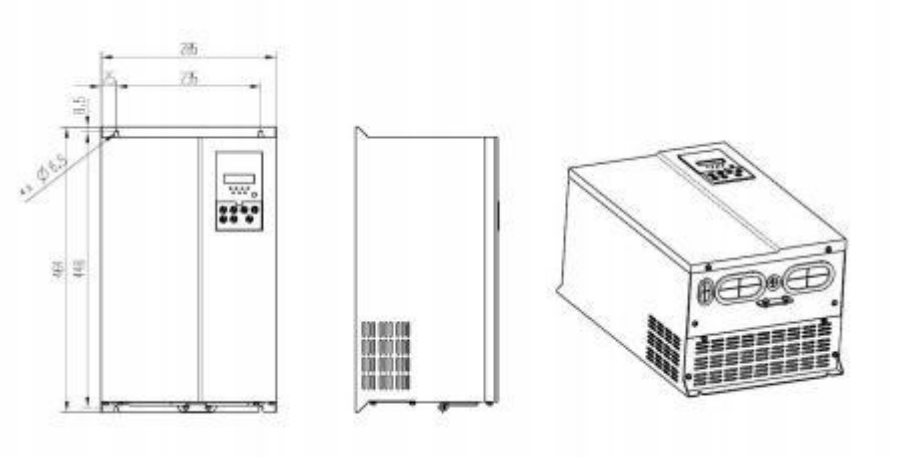


Figure 1.2.2 Installation dimension of 150A

1.3 Installation conditions

一、In order to ensure the normal operation of the drive, it is necessary to ensure that the surrounding temperature of the drive is below 50°C and the relative humidity is below 90%. The long-term safe working temperature is below 40°C.

二、Servo drives are prone to failures when used in harsh environments with corrosive gases, humidity, metal dust, water and processing liquids. Therefore, the working environment of the drive should be fully considered during the installation process.

三、For the equipment directly or indirectly connected with the servo drive, the vibration must be kept below 0.5G (4.9m/S2) or less to ensure the long-term stable operation of the servo drive.

四、Servo drives may also be interfered when they interfere , so be sure to pay attention to the wiring of strong and weak currents when installing electrical cabinets or complete sets of equipment. Because the external interference signal is very strong , the power line and control signal of the servo drive will be severely affected , which will cause the drive to fail to work normally, or cause the drive to malfunction . In the case of poor wiring , control equipment such as the host computer will also work unstable under the interference of the drive . Attention should be paid to installing sound and magnetic rings , filters , isolation transformers , etc . at the interference source and the interfered place . Special attention should be paid to the control signal line of the driver which is easy to be interfered.Reasonable wiring and shielding measures should be taken .

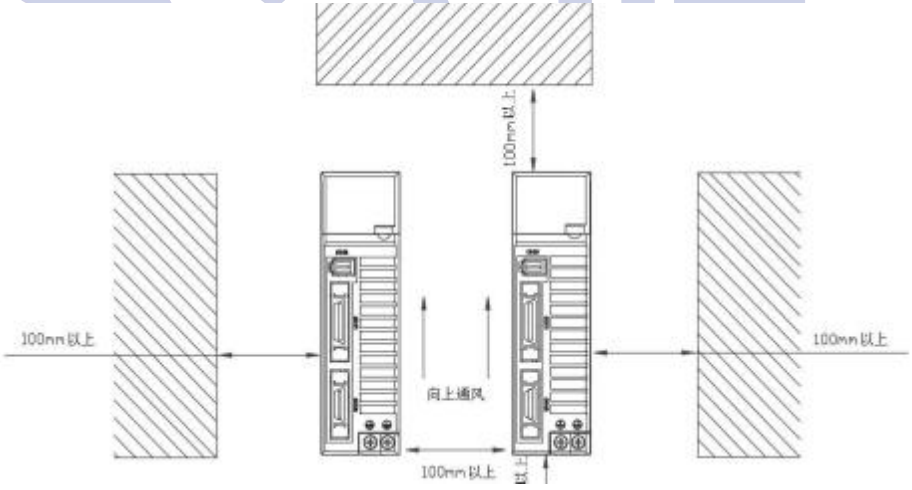
1.4 Installation direction and space

一、Pay attention to the installation direction (refer to Figure 1.4).

二、Pay attention to the installation distance (see Figure 1.4).

三、Four M5 screws can be fixed, and spring washers are required.

四、The servo must be installed in a relatively confined space. Keep ventilation in the electric cabinet. Install a filter at the vent to prevent dust from entering, and clean it regularly to prevent blocking the airflow.



Chapter 2 Function Overview

2.1 Basic functions of servo E7A bus series

Model		E7A Bus
Control power supply and main circuit power supply		L: Single-phase or three-phase AC220V power supply; B: Three-phase AC220V power supply; H: Three-phase AC380V power supply; Voltage fluctuation: -15~+ 10%, 50/60Hz
environment	temperature	Working: 0~55°C Storage: -40°C ~80°C
	humidity	Not more than 90% (no condensation)
	Air index	No dust in the electric cabinet (conductive medium such as iron powder)
Control mode		1: Position control 2: SR test run 3: JOG run
External I/O		1: contracting brake
Encoder		131072p/r (standard); 8388608p/r (optional)

feedback	
communication method	1：MECHATROLINK Ⅱ MECHATROLINK Ⅲ EtherCAT
Load inertia	Less than 5 times of motor inertia
Monitoring function	Speed, current position, command pulse accumulation, position deviation, motor current, Operating status, input and output terminals, etc.
Protective function	Overvoltage, overcurrent, overspeed, overload, feedback error, etc.
Alarm function	When the servo works abnormally, there will be an alarm output, the LED flashes, and the red light is on
Gain adjustment	When the motor is running or stopped, the gain can be adjusted to match the motor performance
Adapted motor	Refer to Table 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.5,

Table 2.1 List of functions

- The **E7A** bus series driver is matched with the Tamagawa multi-turn bus encoder, and must be connected with the servo motor equipped with the Tamagawa bus encoder;
- The **E7A** bus series driver automatically recognizes the motor model to control the operation, and no longer continues the habit of incremental encoders which needs to change the model code to match the servo motor. The parameters of the control motor are all read from the servo motor bus encoder when it is powered on.
- When the customer uses the **E7A** bus series, the drive restoration model code will no longer take effect. But the motor manufacturer still needs to write the motor parameters into the encoder. In this step, you must use the drive's advanced commands to perform parameter writing (Refer to 2.2.1~2.2.5) and absolute position zero adjustment to the motor encoder.
- The **E7A** bus series driver adds the MECHATROLINK/EtherCAT communication protocol as a standard configuration, which can be matched with the upper computer that supports the same protocol.

Chapter 3 Wiring

3.1 Precautions

■ The servo drive is a high-voltage, high-current product, and misconnection may cause personal injury and equipment damage.

■ The PE terminal must be grounded, and the grounding wire must be reliably grounded

■ This product L series is suitable for AC220V power supply; H series is suitable for AC380V power supply, please do not connect it wrongly.

■ The U, V, and W terminals of the product should be connected to the motor for output, please do not connect to input power.

■ The U, V, and W terminals of the product are three-phase output. Do not connect them in the wrong order. Incorrect connections may cause motor runaway, equipment damage, and overcurrent damage to the product.

■ Fasten all terminals, and select materials strictly according to power for all wiring specifications.

■ It is forbidden to distribute power or touch the terminals when the drive is powered

on.

■ Do not touch the terminals within 5 minutes after power off.

■ It is forbidden to touch the motor and cables when the motor is running to prevent accidental injuries such as scalds and sprains.

3.2 Wiring requirements

■ It is best to use a three-phase isolation transformer for power supply.

■ The diameter of R, S, T, U, V, W, PE wire must be ≥ 1.5 mm2.

■ All power terminals require cold-pressed terminals to ensure firmness and reliability.

■ CN1 and CN2 are high-density signal plugs that require shielded cables.

■ The PE terminal connection requires the diameter of the yellow and green wires to be ≥2.5 mm2.

3.3 Wiring method

■ It is best to use a three-phase isolation transformer for power supply.

■ The diameter of R, S, T, U, V, W, PE wire must be ≥ 1.5 mm2.

■ All power terminals require cold-pressed terminals to ensure firmness and reliability.

■ CN1 and CN2 are high-density signal plugs, and the shielding layer should be grounded at both ends and connected to the shell.

■ The PE terminal shall be connected to frame GND and connected to the ground.

3.4 Typical wiring

3.4.2 Wiring diagram of Bus type

motor encoder

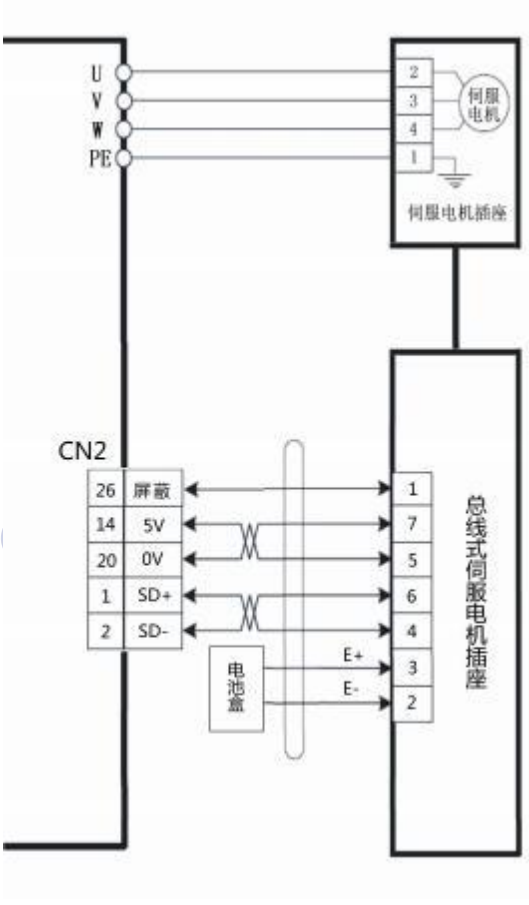


Figure 3.4.2 Wiring diagram of Tamagawa multi-turn absolute encoder

3.4.3 MECHATROLINK Ⅱ Wiring diagram of MECHATROLINK II

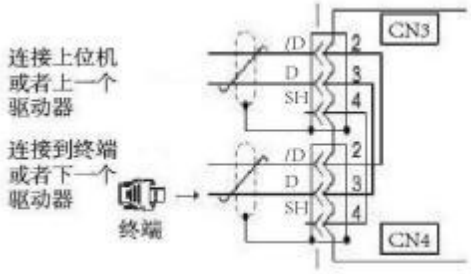


Figure 3.4.3 Bus wiring diagram

3.4.4 Wiring diagram of MECHATROLINK III / EtherCAT

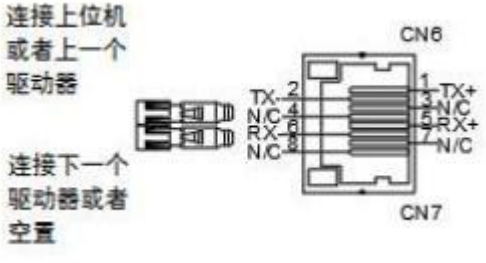


Figure 3.4.4 Wiring diagram of MECHATROLINK III / EtherCAT

3.5 Servo motor brake wiring diagram

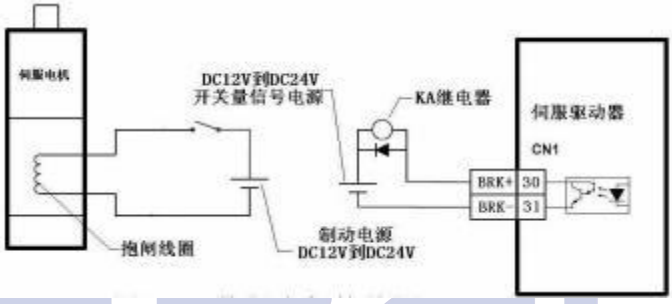


Figure 3.5 Wiring diagram of brake motor

Pin No.	Pin Code	Function Description
1	DC+	power supply positive DC24V+
2	DC-	power supply negative 0V
3	PE	Frame GND

Table 3.5 Servo motor brake socket

■ The brake power supply is required to be separated from the host computer and drive DC power supply to prevent interference.

■ The brake power supply of the holding brake has positive and negative poles, and cannot be connected reversely to prevent short circuit.

■ In order to improve the braking effect and response, a freewheeling diode (meaning positive and negative polarity) can be added to both ends of the brake coil.

Interface

4.1 Definition of Servo control power supply and strong current terminal

Code	Signal	Function
R	Control circuit, main circuit power supply (Connected by isolation transformer)	R, S, T can be connected to any two-terminal 220V 50HZ power supply of three-phase or single-phase. The control power supply of this machine and the main loop power supply are integrated design. Note that it cannot be connected to U, V, W ofthe motor
S		
T		
PE	Power ground wire	It is connected to the equipment housing and GND of the main power supply of the workshop.
B1	Two-way braking resistor	Usually not used, because the drive has a
B2		

		built-in resistor, an external braking resistor should be used when encountering a large inertia load.
U **V** **W**	Output to servo motor	The U, V, and W on the servo terminal must correspond to those on the servo motor, and they cannot be misaligned. If the connection is wrong, the motor will jump and the servo will alarm, which may damage the servo and the motor. Note that it cannot be connected to power supply R, S, T.
PE	Motor grounds wire	Connect with the servo motor housing PE.

Table 4.1

4.2 CN1 interface,Definition of control signal input/output

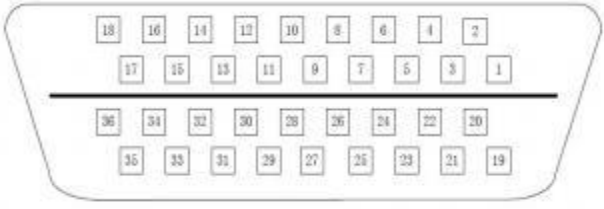


Figure 4.2 Looking at the solder lug of CN1 36-pin plug

Pin	Code	Signal	Function
30	BRK+	The tightness of the mechanical brake (internal contracting brake)	Example: Pin 30 is connected to +24V, pin 31 is connected to the positive of the relay coil. When the motor is enabled, the intermediate relay coil can receive +24V level, otherwise +24V will be disconnected from the intermediate relay coil. Example: Pin 31 is connected to 0V, pin 30 is connected to the negative of the relay coil. When the motor is enabled, the intermediate relay coil can receive 0V level, otherwise 0V is disconnected from the intermediate relay coil. ■The level can be reversed or switched normally on or normally off by the parameter PA57 ■PA47 sets power on-delay ■PA48 enables power off-delay
31	BRK−		

Table 4.2

4.3 CN2 interface, Definition of encoder input signal

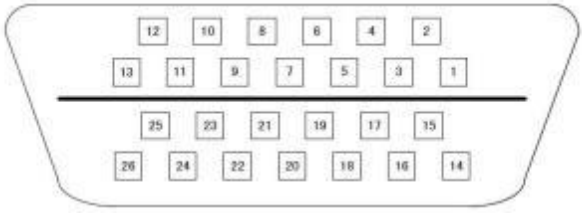


Figure 4.3. CN2 26-pin plug welding lug

Pin No.	Code	Signal	Function
14	+5V	Encoder +5V power supply	Provide power for encoder, use shielded cable
20	0V	Encoder 0V ground wire	
1	SD+	Encoder positive input	Connect with the servo motor encoder SD+
2	SD−	Encoder negative input	Connect with the servo motor encoder SD-
26	PE	Shielding ground wire	Connect it to the metal casing. Ensure that it is reliably connected to the earth.

4.4 CN3/CN4 指令总线接口 CN3/CN4 command bus interface

MECHATROLINK Ⅱ连接器插座引脚定义 Connector socket pin definition：

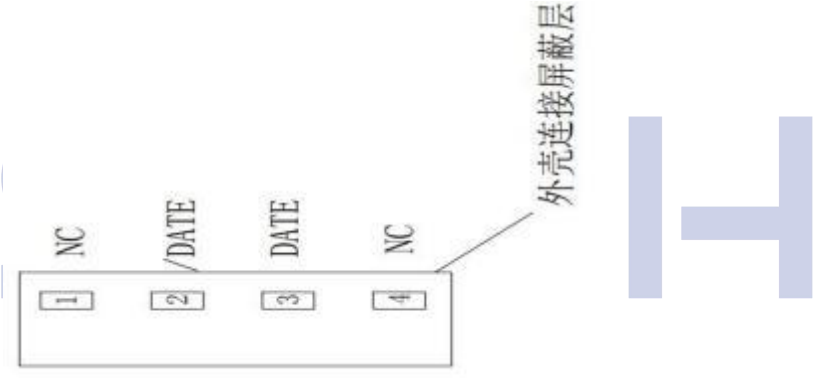


Figure 4.4 CN3/CN4 plug welding lug

Pin No.	Code	Signal	Function
1	NC	Reserve	

2	/DATA	Serial communication data-	Data communication, serial bus
3	DATA	Serial communication data+	
4	NC	Reserve	

Table 4.4 CN3/CN4 interface definition

4.5 CN6/CN7 command bus interface

MECHATROLINK Ⅲ/EtherCAT Connector socket pin definition：

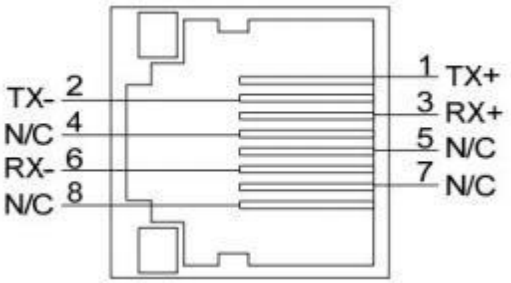


Figure 4.5 CN6/CN7 plug welding lug

Pin No.	Code	Signal	Function
1	TX+	100M differential pair transmission	Data communication, serial bus
2	TX-		
3	RX+	100M differential pair transmission	
6	RX-		
4,5,7,8	NC	Reserve	

Table 4.5 CN6/CN7 interface definition

MECHATROLINK Ⅲ/EtherCAT

Definition of MECHATROLINK Ⅲ /EtherCAT network port indicator:

Indicator	Indication	Description

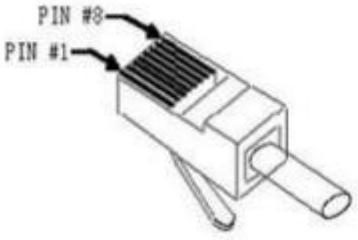
Green	LINK indicator	When the CNC system and the PHY chip of the driver are connected normally, this light is always on;
Yellow	Communication indicator	When the communication between the CNC system and the drive is normal, the light is always flashing fast; when the drive reports ERR78, the drive is flashing slowly

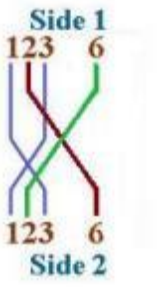
▲ When the driver and the CNC system are connected through the network cable for the first time, the Green light must always be on regardless of whether the communication is normal; if the Green light is not on, it means that there is a problem with the network cable or the relevant circuit of the driver PHY chip;

▲ When the driver and the CNC system are connected normally, that is, when the Yellow light is flashing, disconnect the network cable. At this time, the Green light is not on, but the Yellow light is flashing, and this state is normal;

▲In normal use, the GREEN light is always on and the Yellow light is always flashing;

Network port connection





■ Crossover network cable, namely 1-3, 2-6 cross connection;

■ The shielding layer must be connected to the metal shell of the RJ45 plug;

4.6 Principle of switch

input interface

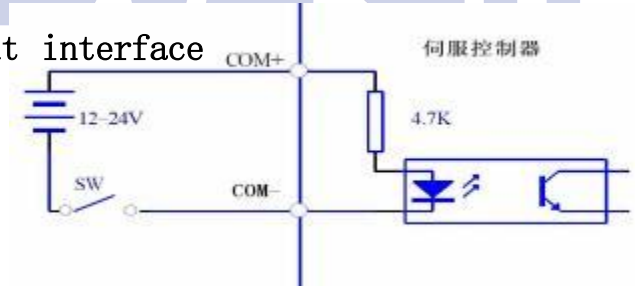


Figure 4.6 Switch input interface

■ An external DC12V-24V power supply is required, with current ≥105MA.

■ If the positive and negative connections are reversed, the drive will be damaged and it will not work properly.

4.7 Switch output interface

principle

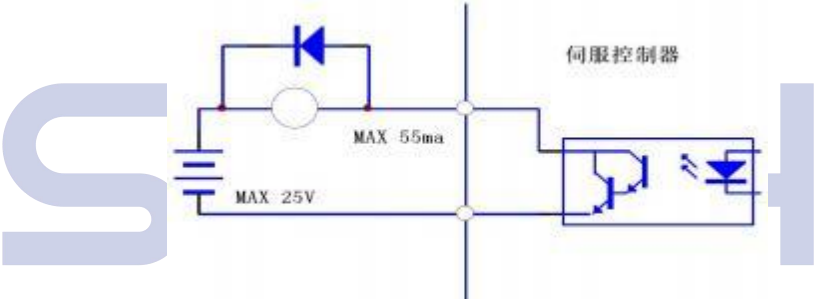


Figure 4.7 Switch output interface

■ The maximum output voltage is 25V, and the maximum current is ≤55MA.

■ If the positive and negative connections are reversed, the driver will be damaged and malfunction.

■ The output load is an inductive component, and a freewheeling diode must be connected in reverse parallel.(the polarity must be connected correctly, otherwise the driver will be damaged, which is equivalent to a short circuit).

Chapter 5 Display and Operation

5.1 Panel operation

The panel has 6 LED digital tube displays and 4 buttons " ↑, ↓, ←, Enter"

A red light "Alm" and a green light "Run" are used to display various states of the system, setting parameters, etc.

Figure 5.1 Operation panel

The operation is a hierarchical structure, as follows:

The ← key means back, exit, and cancel of the level;

"Enter" key means level advance, enter,

confirm;

The ↑ and ↓ keys indicate to increase or decrease the serial number or numerical value.

The Alm red indicator light is on to indicate an alarm, and the digital tube also has an alarm display.

Run

The green indicator of Run means that the motor is in the enabled working state.

■ When the decimal in the lower right corner of the digital tube lights up, it indicates that the current parameter value is in a state of modification.

■ If the Alm red light is on and the alarm number "Err--xx" is flashing, it is a drive alarm. It is necessary to cut off the power in time and find out the cause of the alarm.

5.2 Parameter structure composition

There are 10 modes in total for the first layer selection operation mode. Press ← to return to the main menu, use ↑, ↓ to select the mode, press Enter to enter the second layer of the selected mode, and press ← to return to the first layer.

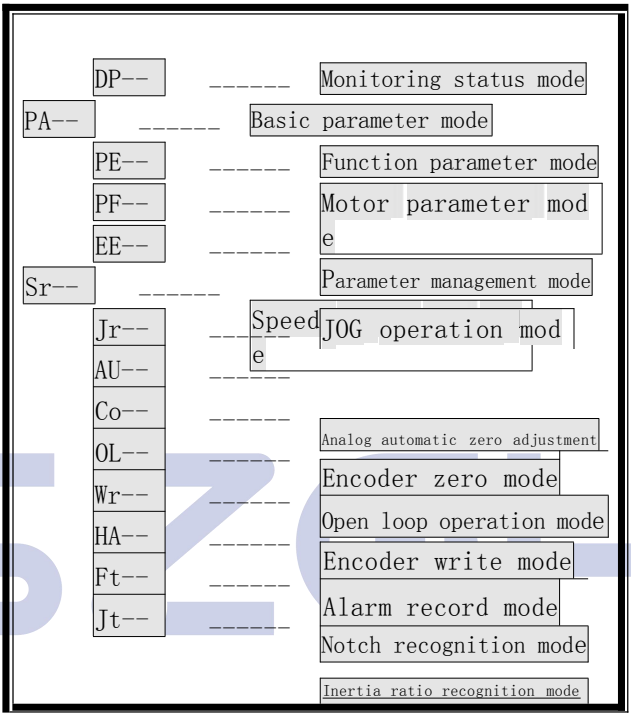


Table 5.2.1 Mode operation tabl

5.2.1 Parameter monitoring mode (DP- -)

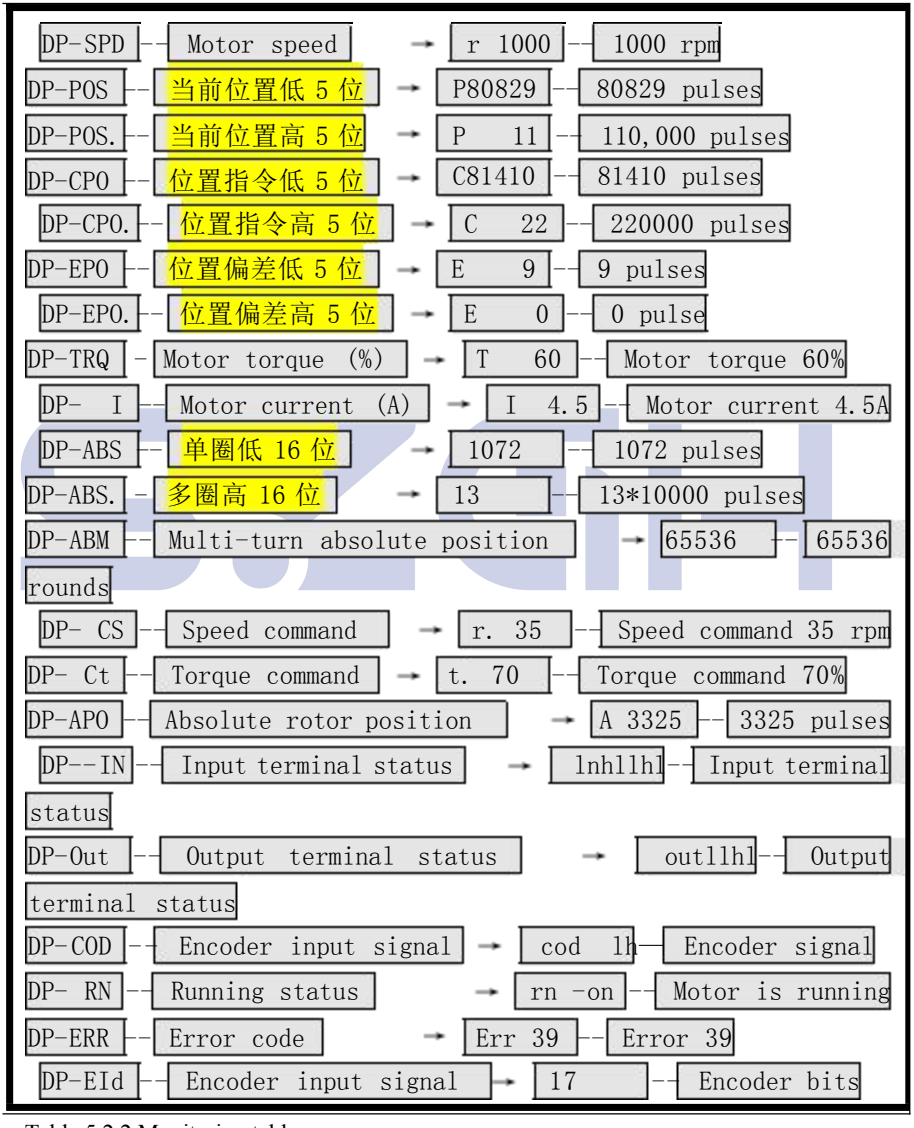


Table 5.2.2 Monitoring table

■ The input pulse quantity is the pulse amplified by the input electronic gear;

■ The pulse unit is the internal pulse unit of the servo, 131072 pulses/round;

■ The absolute position of the motor for one revolution is expressed in decimal with single-turn high position [DP-ABS] and low position [DP-ABS.];

■ The multi-turn signal of the motor is represented by the DP-ABM decimal system. It is necessary to ensure that the battery power supply is normal, and it will be automatically cleared when there is no battery.

1、The input terminal status display, as shown in the figure below:

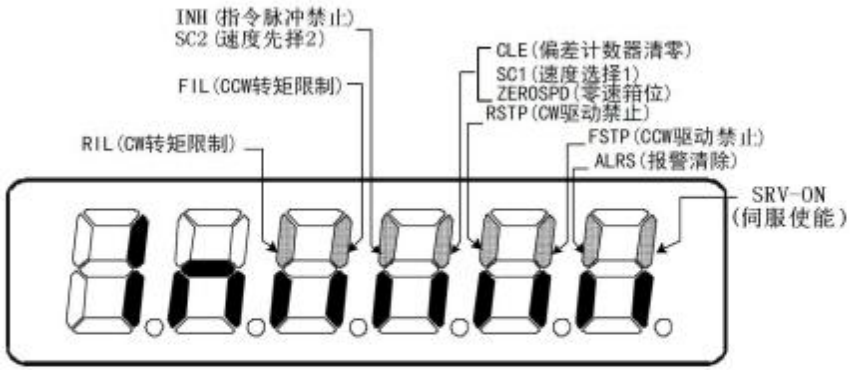


Figure 5.2.1 Input terminal status display

(When the indicator light is on, it means there is a signal input, the state is ON, and the indicator light is off, it means disconnection is OFF.)

2. The output terminal status display, as shown in the figure below:

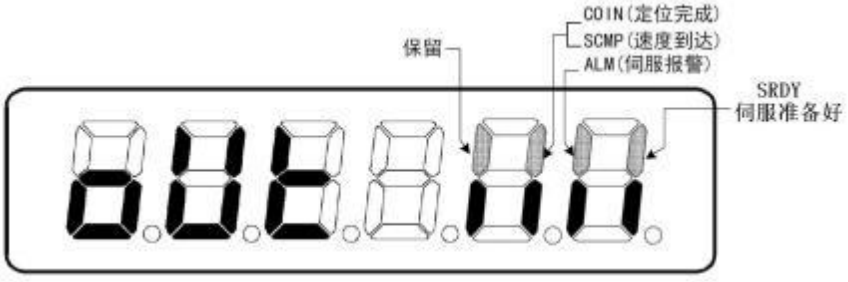


Figure 5.2.2 Output terminal status display

(When the indicator light is on, it means there is a signal input, the state is ON, and the indicator light is off, it means disconnection is OFF.)

3、Encoder status display, as shown in the figure

below:

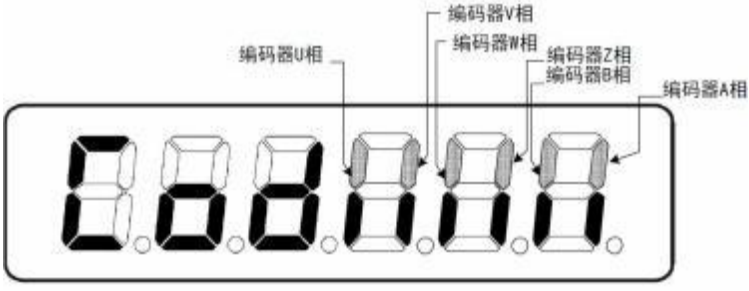


Figure 5.2.3 Status display of encoder feedback signal

(When the indicator light is on, it means there is a signal input, the state is ON, and the indicator light is off, it means disconnection is OFF.)

5.2.2 ）Parameter modification mode (PA--)

Press the "Enter" key to enter the "PA--" parameter modification mode. Press the ↑, ↓

keys to add or subtract the parameter number, and press the "Enter" key to enter to modify the parameter value. When the parameter is modified, the decimal point in the lower right corner of the nixie tube will light up, press the "Enter" key again to confirm and then the decimal point will go out, press ← key to return.

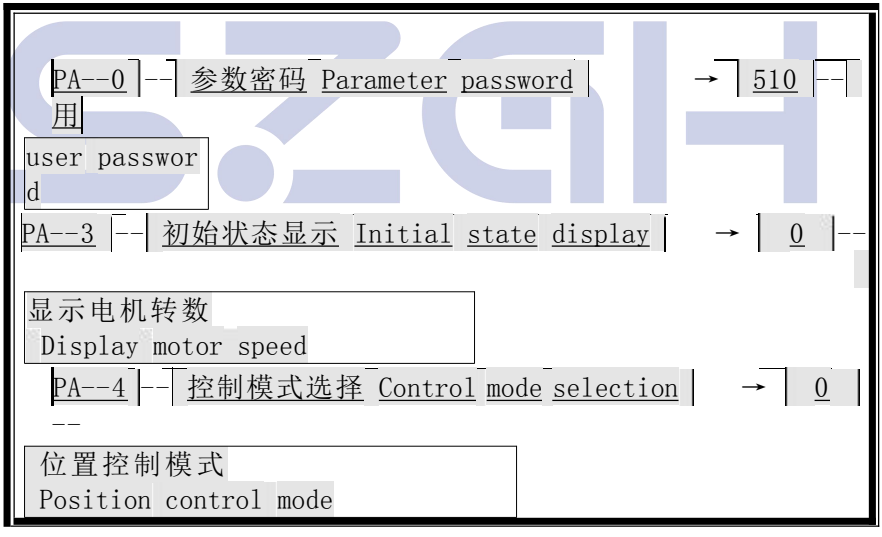


Table 5.2.3 Operation of Parameter modification mode

5.2.3 Parameter management mode (EE- -)

Press the "Enter" key to enter the "EE--" parameter management mode. Press the ↑, ↓ keys to add or subtract parameter items. Find the menu that should be saved or restored, press the "Enter" key for more than 3 seconds, and "Finish" will appear to indicate that the operation is successful, and it will take effect after power off. If it fails or the password is incorrect, "Error--" will appear.

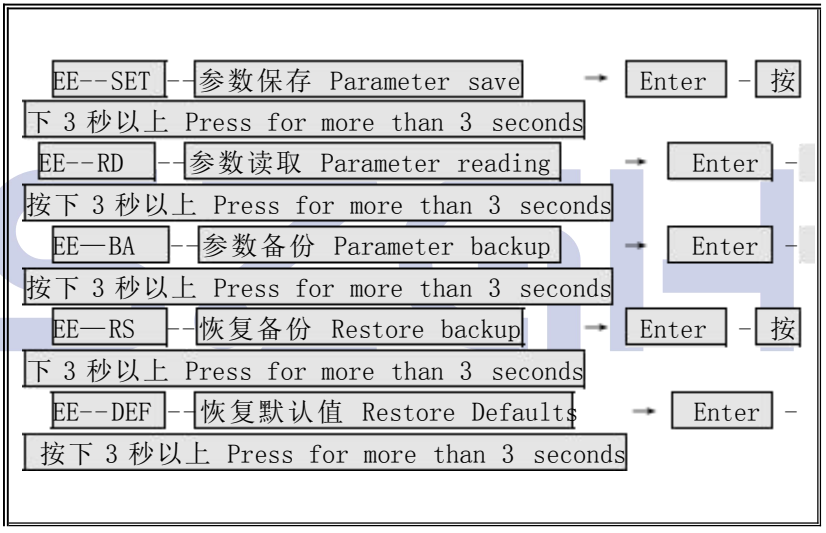


Table 5.2.4 Operation of Parameter management mode

1、EE—SET parameter writing, the password of parameter PA-0 should be 315, which is mainly to save the parameters permanently. When the saving is completed, it will not be affected by the power failure. The modified parameters can be used after power-on again.

2、EE—BD parameter backup is to write the better parameters in the existing servo state into the EEPROM backup area, and it is used in conjunction with the recovery backup.

3、EE— RS recovery backup is to restore the parameters backed up in the backup area from the EEPROM to the parameter table

4、EE-DEF restores the default value. In the process of drive commissioning, or when the parameter is confused, etc., when the content of the modified parameter is not clearly remembered, the operation of restoring the default value (ie the factory value) can be performed.

■ This recovery will not affect the motor parameters, the servo motor parameters are read by the encoder;

5.2.4 Restore default setting

步 骤 Step	面板显示 Panel display	按键 Button	操作 Operating
1		↑ ↓ ←Enter	按两次←键选择功能，若参数编号显示的不是EE，则按 ↑ ↓。 Press the ← key twice to select the function, if the parameter number is not EE, press ↑ ↓.
2		↑ ↓ ←Enter	按Enter再按↑ ↓键显示“EE-DEF”。 Press Enter and then ↑ ↓ to display "EE-DEF"
3		↑ ↓ ←Enter	长按 Enter键3秒后显示”FINISH”。 Press and hold the Enter key for 3 seconds and "FINISH" will be displayed.

Table 5.2.5 Restore default settings

5.2.5 Parameter save setting

步 骤 Step	面板显示 Panel display	按键 Button	操作 Operating
1		↑ ↓ ←Enter	按两次←键选择功能，若参数编号显示的不是EE，则按 ↑ ↓ 。 Press the ← key twice to select

			the function, if the parameter number is not EE, press ↑ ↓
2		↑ ↓ ←Enter	按Enter再按 ↑ ↓ 键显示“EE-SET”。 Press Enter and then ↑ ↓ to display "EE-SET".
3		↑ ↓ ←Enter	长按Enter键3秒后显示"FINISH"。 Press and hold the Enter key for 3 seconds and "FINISH" is displayed.

Table 5.2.6 Parameter save setting

5.2.6 Speed trial run mode (Sr- -)

步 骤 Step	面板显示 Panel display	按键 Button	操作 Operating
1		↑ ↓ ←Enter	按两次←键选择功能，若参数编号显示的不是“PA”，则按 ↑ ↓。 Press the ← key twice to select the function, if the parameter number does not display "PA", press ↑ ↓.

2		↑ ↓ ←Enter	按**Enter**再按 ↑ ↓键显示“PA-4”。 Press Enter and then ↑ ↓ to display "PA-4".
3		↑ ↓ ←Enter	按**Enter**键将值“0”按 ↑ ↓键设定为“2”，按**Enter**键确认。 Press Enter to set the value "0" to "2" by pressing ↑ ↓, and press Enter to confirm.
4		↑ ↓ ←Enter	按←键选择功能。 Press ← key to select function.
5		↑ ↓ ←Enter	按 ↑ ↓键显示“PA-53”。 Press ↑ ↓ to display "PA-53".
6		↑ ↓ ←Enter	按**Enter**键将值“0”设为“1”，按**Enter**键确认。 Press Enter to set the value "0" to "1", and press Enter to confirm.
7		↑ ↓ ←Enter	按两次←键选择功能，按 ↑ ↓键选择“Sr” 按**Enter**确认。 Press ← key twice to select function, press ↑ ↓ key to select "Sr" and press Enter to confirm.
8		↑ ↓ ←Enter	按 ↑ ↓键对电机进行加减速。 Press ↑ ↓ key to accelerate and

			decelerate the motor.

Table 5.2.7 Operation of Speed trial run mode

5.2.7 Encoder automatic zero adjustment mode (CO- -)

一、 Encoder automatically checks the zero position

When the parameter PA0=510: only used to check the zero adjustment accuracy of the motor, press "Enter" to enter the "CO--" encoder zero mode, and then press the "Enter" key for 3 seconds, if it displays "A.2000" Indicates that it is in the process of locking. The servo motor is locked, and the zero deviation of the motor is displayed after completion;

- This function cannot clear the zero point of the bus encoder, it is only used to check the zero point position.

二、 Encoder automatically checks the zero position (this function is only used by the motor factory)

When the parameter PA0=620: Set the position of the bus encoder to zero, press the "Enter" key to enter the "CO--" encoder zero mode, and then press the "Enter" key for 3 seconds, when it displays "A.2000", it means it is in During the locking process. After the servo motor is locked, the zero deviation of the motor is displayed and set to zero immediately;

- Several cycles of operation for each motor can improve the zero-setting accuracy ofthe motor. This function adjusts zero and clears.

三、 Zero adjustment mode related settings

PA4=4 zero adjustment mode, PA53=0001 internal enable.

CO--	-	编码器自动调零 Encoder automatic zero adjustment	→	Enter	-	A.2000

Table 5.2.8 Operation of Encoder automatic zero adjustment mode

5.2.8Open loop operation mode (OL- -)

一、 Open loop operation

Press the "Enter" key to enter the "OL--" open loop operation mode, and then press the "Enter" key for more than 3 seconds, the open loop operation mode starts and the motor rotates. This function is not suitable for long-term operation

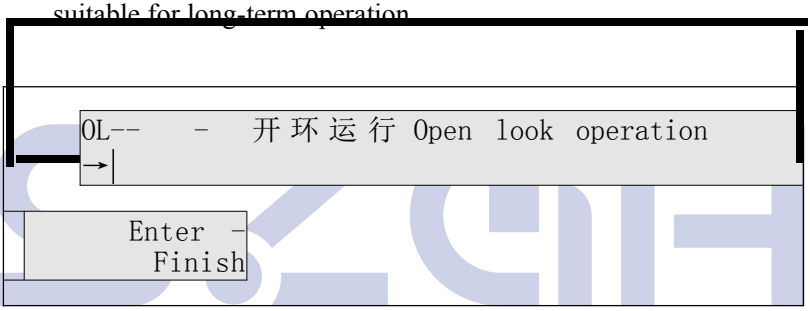


Table 5.2.9 Operation of Open loop operation mode

5.2.9 Encoder write mode (WR- -)

一、 Write the motor code

into the encoder (refer to the code table in Chapter 2)

Parameter PA0=620, PF0-PF20 set the corresponding parameters of the

motor (corresponding to the relevant parameters of the motor)

Press the "Enter" key to enter the "WR--" encoder write mode, and then press the "Enter" key for more than 3 seconds, "Finish" will appear to indicate that the operation is successful, and it will take effect after power off. If it fails or the password is incorrect, "Error--" will appear.

Table 5.2.10 Encoder write mode

Chapter 6 Parameters

6.1 [PA basic parameter table]

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
0	参数密码 Parameter password	*	0~9999	510
1	增量编码器电机型号 Incremental encoder motor model	*	*	*
2	软件版本号 Software version number	*	*	*
3	初始状态显示 Initial state display	*	0~21	21
4	控制方式选择 Control method selection	*	0~6	0
5	速度比例增益 Speed proportional gain	Hz	50~2000	150
6	速度积分时间常数 Speed integral time constant	mS	1~1000	100
7	转矩滤波器 Torque filter	%	20~3000	40
8	速度检测滤波器 Speed detection filter	%	20~3000	40

9	位置比例增益 Position proportional gain	1/S	1~500	80
10	位置前馈增益 Position feedforward gain	%	0~100	0
11	位置前馈滤波器截止频率 Position feedforward filter cut-off frequency	Hz	1~1200	300
12	位置指令脉冲分频分子 Position command pulse division numerator	*	1~32767	1
13	位置指令脉冲分频分母 Position command pulse division denominator	*	1~32767	1
14	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
15	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
16	定位完成范围 Positioning completion range	脉冲	0~30000	20
17	位置超差检测范围 Position tolerance detection range	×100 脉冲	0~30000	400
18	位置超差错误无效 Invalid position error	*	0~2	0
19	位置指令平滑滤波器 Position command smoothing filter	0.1mS	0~30000	0

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
20	驱动禁止输入无效 Invalid drive prohibition input	*	0~2	1
21	JOG 运行速度 JOG running speed	r/min	-3000~3000	120
22	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
23	最高速度限制 Maximum speed limit	r/min	0~6000	3600
24	内部速度 1 Internal speed 1	r/min	-3000~3000	0
25	内部速度 2 (电机调零电流) Internal speed 2 (motor zero current)	r/min	-3000~3000	100
26	内部速度 3 Internal speed 3	r/min	-3000~3000	300
27	内部速度 4 Internal speed 4	r/min	-3000~3000	-100
28	到达速度 Arrival speed	r/min	0~3000	500
29	保留（不允许修改） Reserved (modification is not allowed)	*	*	*

30	用户转矩过载报警值 User torque overload alarm value	%	50~300	200
31	用户转矩过载报警检测时间 User torque overload alarm detection time	mS	10~30000	0
32	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
33	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
34	内部 CCW 转矩限制 Internal CCW torque limit	%	0~300	300*
35	内部 CW 转矩限制 Internal CW torque limit	%	-300~0	-300*
36	转矩限制时转矩到达检测范围 Torque reaches the detection range during torque limit	0.1A	1~300	5
37	转矩限制时转矩到达检测时间 Torque reaches the detection time during torque limit	5ms	1~6000	5
38	外部 CCW， CW 转矩限制 External CCW, CW torque limit	%	0~300	100
39	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
40	加速时间常数 Acceleration time constant	mS	1~10000	100

41	减速时间常数 Deceleration time constant	mS	1~10000	100
42	多功能端子切换 Multi-function terminal switch	二进制 Binary	0000~1111	0001
43	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
44	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
45	保留（不允许修改） Reserved (modification is not allowed)	*	*	*

参数号 Parameter No.	**参数名称 Parameter name**	**单位 unit**	**参数范围 Parameter range**	**默认值 Defaults**
46	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
47	电机使能时抱闸延时导通设定 The brake delay turn-on setting when the motor is enabled	×10mS	0~200	80
48	电机抱闸关时使能延时断设定 Enable delay time setting when the motor brake is closed	×10mS	0~200	0
49	保留（不允许修改） Reserved (modification is not allowed)	*	*	*

50	转矩控制时速度限制 Speed limit during torque control	r/min	0~5000	3600
51	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
52	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
53	低 4 位输入端子强制ON 输入 Low 4-bit input terminal forced ON input	二进制 Binary	0000~1111	0000
54	高 4 位输入端子强制 ON 输入 High 4-bit input terminal forced ON input	二进制 Binary	0000~1111	0000
55	低 4 位输入端子取反设定 Low 4-bit input terminal reverse setting	二进制 Binary	0000~1111	0000
56	高 4 位输入端子取反设定 High 4-bit input terminal reverse setting	二进制 Binary	0000~1111	0000
57	输出端子取反控制字 Output terminal reverse control word	二进制 Binary	0000~1111	0010
58	演示模式2 的时间设置 Time setting of demo mode 2	0.1S	1~30000	600
59	演示模式选择 Demo mode selection	*	0~2	0
60	电流环比例增益	*	*	800

	Current loop proportional gain			
61	电流环积分时间常数 Current loop integral time constant	*	*	5
62	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
63	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
64	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
65	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
66	编码器类型选择 Encoder type selection	*	0~2	2
67	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
68	速度比例增益系数 Speed proportional gain factor	*	0~500	100
69	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
70	功能选择应用开关2 Function selection application switch 2	十进制 Decimal	-32768~32767	0

71	命令数据分配 Command data distribution	十进制 Decimal	-32768~32767	0

参数号 **Parameter No.**	**参数名称** **Parameter name**	**单位** **unit**	**参数范围** **Parameter range**	**默认值** **Defaults**
72	功能选择开关 1 Function selection application switch 1	二进制 Binary	0000~1111	0010
73	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
74	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
75	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
76	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
77	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
78	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
79	增量式编码器不使能	*	0～1	1

	Incremental encoder is not enabled			
80	总线通讯轴地址设定 Bus communication axis address setting	十进制 Decimal	1～32	1
81	ERR39 检测阈值 ERR39 Detection threshold	十进制 Decimal	0~200	200
82	是否屏 ERR71,ERR80,ERR85 故障 Whether the screen ERR71, ERR80, ERR85 is malfunctioning	二进制 Binary	0000~1111	0111
83	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
84	是否屏蔽绝对值编码器电池故障(单圈绝对值时使用) Whether to shield the battery failure of the absolute encoder (Used for absolute value of single lap)	*	0~1	0
85	允许3 号报警 Allow No. 3 alarm	*	0～1	0
86	保留（不允许修改） Reserved (modification is not allowed)	*	*	*

87	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
88	位置比例增益系数 Position proportional gain factor	百分比 percentage	20~300	100
89	保留（不允许修改） Reserved (modification is not allowed)	*	*	*
90	编码器单圈值低 16 位存储器 Low 16-bit memory of encoder single-turn value	十进制 Decimal	0~65536	0
91	编码器单圈值高 16 位存储器 High 16-bit memory of encoder single-turn value	十进制 Decimal	0～1	0
92	编码器多圈值低 16 位存储器 Low 16-bit memory of encoder multi-turn value	十进制 Decimal	0~65536	0
93	速度比例增益系数缩放倍数 Zoom factor of Speed proportional gain factor	百分比 percentage	20~300	100

参数号 Parameter No.	**参数名称 Parameter name**	**单位 unit**	**参数范围 Parameter range**	**默认值 Defaults**
94	电流环比例增益缩放倍数 Current loop proportional gain	百分比 percentage	20~300	100

	zoom factor			
95	ERR85 检测阈值 ERR85 detection threshold	*	0~100	20
96	功能开关 Function switch	*	0~15	0
97	DIN 输入功能是否无效 Whether DIN input function is invalid	十进制 Decimal	0~1	1
98	电流环积分时间常数缩放倍数 Current loop integral time constant zoom factor	百分比 percentage	20~300	100
99	复位 40 号报警（电池失电） Reset alarm No. 40 (battery power failure)	*	0～1	0

6.2 [PE function parameter table]

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
0	保留 Reserved	*	*	*
1	保留 Reserved	*	*	*
2	保留 Reserved	*	*	*
3	保留 Reserved	*	*	*
4	保留 Reserved	*	*	*
5	保留 Reserved	*	*	*
6	保留 Reserved	*	*	*
7	保留 Reserved	*	*	*
8	保留 Reserved	*	*	*
9	保留 Reserved	*	*	*
10	陷波器功能开关 Notch filter function switch	二进制 Binary	0000～0101	0000

11	陷波器自动调整开关 Automatic adjustment switch of notch filter	二进制 Binary	0000～0101	0101
12	第 1 段陷波滤波器频率 1st band notch filter frequency	Hz	50～4000	0
13	第 1 段陷波滤波器品质因数 Quality factor of the first notch filter	0.01	50～500	80
14	第 1 段陷波滤波器深度 Depth of the 1st notch filter	0.001	0～1000	0
15	第 2 段陷波滤波器频率 2nd band notch filter frequency	Hz	50～4000	0
16	第 2 段陷波滤波器品质因数 Quality factor of the second stage notch filter	0.01	50～500	80
17	第 2 段陷波滤波器深度 Depth of the 2nt notch filter	0.001	0～1000	0
18	自动陷波器速度偏差阀值 Automatic notch filter speed deviation threshold	rpm	0～2000	50
19	保留 Reserved	*	*	*
20	保留 Reserved	*	*	*
21	保留 Reserved	*	*	*
22	保留 Reserved	*	*	*
23	保留	*	*	*

	Reserved			
24	保留 Reserved	*	*	*

参数号 **Parameter No.**	**参数名称** **Parameter name**	**单位** **unit**	**参数范围** **Parameter range**	**默认值** **Defaults**
25	保留 Reserved	*	*	*
26	保留 Reserved	*	*	*
27	保留 Reserved	*	*	*
28	保留 Reserved	*	*	*
29	保留 Reserved	*	*	*
30	保留 Reserved	*	*	*
31	保留 Reserved	*	*	*
32	保留 Reserved	*	*	*
33	保留 Reserved	*	*	*
34	保留 Reserved	*	*	*
35	第 1 段抑振滤波器抑振频率	Hz	10～1000	150

	Vibration suppression frequency of 1st stage vibration suppression filter			
36	第 1 段抑振滤波器抑振增益 Vibration suppression gain of 1st stage vibration suppression filter	%	1～1000	100
37	第 1 段抑振滤波器抑振阻尼系数 Vibration suppression damping coefficient of the first stage vibration suppression filter	%	0～300	0
38	第 1 段抑振滤波器时间补偿值 1 Time compensation value 1 of the first-stage vibration suppression filter 1	0.01ms	0～1000	0
39	第 1 段抑振滤波器时间补偿值2 Time compensation value 2 of the first-stage vibration suppression filter 1	0.01ms	0～1000	0
40	双环测馈/摩擦补偿功能开关 Double loop measuring feed/friction compensation function switch	*	0000～1111	1000
41	摩擦补偿增益 Friction compensation gain	%	10～1000	100
42	保留 Reserved	*	*	*
43	摩擦补偿系数 Friction compensation factor	%	0～100	0
44	摩擦补偿频率补偿值	0.1Hz	-10000～10000	0

	Friction compensation frequency compensation value			
45	摩擦补偿增益补偿值 Friction compensation gain compensation value	%	1～1000	100
46	双环测馈增益 Double loop test feed gain	Hz	1～500	40
47	双环测馈增益补偿值 Double loop feedback gain compensation value	%	0～1500	150
48	保留 Reserved	*	*	*

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
49	保留 Reserved	*	*	*
50	惯量辨识时电机运行圈数 Number of Motor running laps during inertia identification	0.1 圈 R	1～300	30
51	惯量辨识时电机运行速度 Motor running speed during inertia identification	r/min	1～300	1000
52	惯量辨识时电机运行加速度 Motor running acceleration during inertia identification	r/min/1ms	1～300	10

53	惯量辨识运行停顿时间 Inertia identification running pause time	0.01S	0～1000	0
54	惯量辨识时初始转动惯量比 Initial moment of inertia ratio during inertia identification	%	0～1000	200
55	惯量辨识时速度环比例增益 Speed loop proportional gain during inertia identification	rad/s	10～3000	150
56	惯量辨识时速度环积分时间常数 Speed loop integral time constant during inertia identification	0.1ms	2～5000	200
57	惯量辨识时位置前馈增益 Position feed-forward gain during inertia identification	%	0～100	100
58	惯量辨识时速度偏差阀值 Speed deviation threshold during inertia identification	rpm	0～3000	500
59	惯量辨识时位置环比例增益 Position loop proportional gain during inertia identification	1/s	1～1000	40

6.3 [PF motor parameter table]

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
0	电机电压等级 Motor voltage level	0-220V 1-380V	0~3	*
1	电机额定功率 Motor rated power	0.01Kw	0~32767	*
2	电机额定电流 Motor rated current	0.01A	0~32767	*
3	电机额定转矩 Motor rated torque	0.01Nm	0~32767	*
4	电机最大转矩 Motor torque	0.01Nm	0~32767	*
5	电机额定转速 Motor rated speed	1rpm	0~32767	*
6	电机最高转速 Maximum motor speed	1rpm	0~32767	*
7	电机转动惯量	10-6Kgm2	0~32767	*

	Motor moment of inertia			
8	电机磁极对数 Number of motor pole pairs	*	0~32767	*
9	电机相电阻 Motor phase resistance	0.001 Ω	0~32767	*
10	电机 d 轴电感 Motor d-axis inductance	0.01mH	0~32767	*
11	电机 q 轴电感 Motor q axis inductance	0.01mH	0~32767	*
12	电机反电动势常数 Motor back electromotive force constant	0.01V/Krpm	0~32767	*
13	电机转矩常数 Motor torque constant	0.001Nm/A	0~32767	*
14	电机电气时间常数 Motor electrical time constant	0.01ms	0~32767	*
15	电机机械时间常数 Motor mechanical time constant	0.01ms	0~32767	*
16	电机零位偏移量低 16 位	*	0~32767	*
17	电机零位偏移量高 16 位	*	0~32767	*
18	电机编码器类型 Motor encoder type	*	0~32767	*
19	电机编码器线数低 16 位	*	0~32767	*
20	电机编码器线数低高位	*	0~32767	*
21	电机编码器数据写入控制字	*	0~3	*

	Motor encoder data write control word			

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
22	保留 Reserved	*	*	*
23	保留 Reserved	*	*	*
24	保留 Reserved	*	*	*
25	保留 Reserved	*	*	*
26	保留 Reserved	*	*	*
27	保留 Reserved	*	*	*
28	保留 Reserved	*	*	*
29	保留 Reserved	*	*	*
30	位置指令电子齿轮分子调整因子 Position command electronic gear numerator adjustment	*	0~32767	1

	factor			
31	位置指令电子齿轮分母调整因子 Position command electronic gear denominator adjustment factor	*	0~32767	1
32	位置反馈电子齿轮分子调整因子 Position feedback electronic gear numerator adjustment factor	*	0~32767	1
33	位置反馈电子齿轮分母调整因子 Position feedback electronic gear denominator adjustment factor	*	0~32767	1
34	速度反馈滤波因子 Speed feedback filter factor	*	0~16	0
35	保留 Reserved	*	*	*
36	保留 Reserved	*	*	*
37	保留 Reserved	*	*	*
38	保留 Reserved	*	*	*
39	保留 Reserved	*	*	*
40	保留	*	*	*

	Reserved			
41	保留 Reserved	*	*	*

参数号 Parameter No.	参数名称 Parameter name	单位 unit	参数范围 Parameter range	默认值 Defaults
42	保留 Reserved	*	*	*
43	保留 Reserved	*	*	*
44	保留 Reserved	*	*	*
45	保留 Reserved	*	*	*
46	保留 Reserved	*	*	*
47	保留 Reserved	*	*	*
48	保留 Reserved	*	*	*
49	保留 Reserved	*	*	*
50	保留 Reserved	*	*	*
51	保留	*	*	*

	Reserved			
52	保留 Reserved	*	*	*
53	保留 Reserved	*	*	*
54	保留 Reserved	*	*	*
55	保留 Reserved	*	*	*
56	保留 Reserved	*	*	*
57	保留 Reserved	*	*	*
58	保留 Reserved	*	*	*
59	保留 Reserved	*	*	*

6.4 [Detailed explanation of PA basicparameters]

Parameter No.	Parameter Name	Detailed function	Parameter range [Defaults]
0	参 数 密码 Parameter password	**a，** 用户密码为 315； The user password is 315; **b，** 电机厂家密码 510（谨慎使用）；Motor manufacturer password 510 (use with caution); **c，** 驱动厂家密码 620（谨慎使用）；Driver manufacturer password 620 (use with caution);	**0~9999 [510]**
1	型 号 代码 Model code	**a，** 增量编码器时使用此功能； Use this function for incremental encoder; **b，** 总线编码器里屏蔽此功能；Block this function in the bus encoder;	**0~9999 [-1]**
2	软 件 版本 Software version	**a，** 只显示软件版本号，只读参数；Only display the software version, read-only parameters; **b，** 此参数为软件硬件的综合编号；This parameter is the comprehensive number of the software and hardware;	**0~999999 [071944]**

3	初始状态显示 Initial state display	驱动器上电时数码管的最初始的显示状态。 The initial display state of the digital tube when the drive is powered on. 0：显示电机转速； Display motor speed; 1：显示当前位置低 5 位； 2：显示当前位置高 5 位； 3：显示位置指令(指令脉冲积累量)低 5 位； 4：显示位置指令(指令脉冲积累量)高 5 位； 5：显示位置偏差低 5 位； 6：显示位置偏差高 5 位； 7：显示电机转矩； Display motor torque; 8：显示电机电流； Display motor current; 9：显示单圈绝对值低 5 位； 10：显示单圈绝对值高 5 位； 11：显示多圈圈数； Display the number of laps; 12：显示速度指令； Display speed command; 13：显示转矩指令； Display torque command; 14：显示一转中转子绝对位置；Display the absolute position ofthe rotor in one revolution; 15：显示输入端子状态；Display input terminal status; 16：显示输出端子状态；Display output terminal status; 17：显示编码器输入信号； Display the encoder input signal; 18：显示运行状态；Display running status; 19：显示报警代码; Display the alarm code; 20: 显示绝对值编码器 ID; Display the absolute encoder ID; 21: 显示轴地址; Display axis address;	**0~21** **[21]**

Parameter No.	Parameter Name	Detailed function	Parameter range [Defaults]
4	控制方式选择 Control mode selection	0：位置控制方式；Position control mode; 1：速度控制方式； Speed control mode; 2：试运行控制方式；Trial run control mode; 3：JOG 控制方式； JOG control mode; 转速由参数 PA21 设定。The speed is set by parameter PA21. 4：编码器调零方式；用于电机出厂调整编码盘零点。Encoder zero adjustment mode; It is used to adjust the zero point of the encoder disk at the factory. 5：开环运行方式；用于检测电机及编码器 Open loop operation mode; Used to detect motors and encoders	**0~6** **[0]**
5	速度比例增益 Speed proportional gain	**a**，增强刚性设定速度环调节器的比例增益；Enhance the proportional gain of the rigid setting speed loop regulator; **b**，设置值越大，增益越高，刚度越大。 The larger the setting value, the higher the gain and the greater the stiffness. 参数数值根据具体 的伺服驱动系统型号和负载情况确定，一般情况下，负载惯量越大，设定值越大； The parameter values are determined according to the specific servo drive system model and load conditions. Generally, the greater the load inertia, the greater the set	**50~3000** **[150]**

		value; **c**，在系统不产生振荡的条件下，尽可能设定较大值； Under the condition that the system does not produce oscillation, set a larger value as much as possible;	
6	速度积分时间常数 Speed integral time constant	**a**， 设定速度环调节器的积分时间常数； Set the integral time constant of the speed loop regulator； **b**， 可以抑制电机过冲，设置值越小，积分速度越快太小容易产生超调，太大使响应变慢； The motor overshoot can be suppressed. The smaller the set value, the faster the integral speed. Too small will easily cause overshoot, and too large will slow down the response; **c**，根据具体的驱动型号和负载惯量设置，负载惯量越大，设定值越大；Set according to the specific drive model and load inertia. The greater the load inertia, the greater the set value；	**1~1000** **[100]**
7	转矩滤波器 Torque filter	**a,** 去噪音设定转矩指令滤波器特性；De-noise setting of torque command filter characteristics; **b**， 用来抑制由转矩产生的谐振；Used to suppress the resonance generated by the torque; **c**， 数值越大，截止频率越大，电机产生的振动和噪声越小。如果负载惯量很大，可以适当增大设定值。数值太大，造成响应变慢，可能会引起振荡；The larger the value, the larger the cut-off frequency, and the smaller the vibration and noise generated by the motor. If the load inertia is large, the set value can be appropriately increased. If the value is too large, the response will become slower and may cause oscillation;	**20~3000** **[40]**

		d， 数值越小，截止频率越小，响应越快。如果需要较高的转矩响应，可以适当减小设定值；The smaller the value, the smaller the cutoff frequency and the faster the response. If a higher torque response is required, the set value can be appropriately reduced;	

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**
8	速度检测滤波器 Speed detection filter	**a**，去噪音设定速度检测滤波器特性；De-noise setting speed detection filter characteristics; **b**， 数值越大，截止频率越大，电机产生的噪音越小。如果负载惯量很大，可以适当增加设定值。数值太大，造成响应变，可能会引起振荡。 数值越小，截止频率越高，速度反馈响应越快。如果需要较高的速度响应，可以适当减小设定值；The larger the value, the larger the cut-off frequency and the smaller the noise generated by the motor. If the load inertia is large, the setting value can be increased appropriately. If the value is too large, the response will change, which may cause oscillation. The smaller the value, the higher the cutoff frequency and the faster the speed feedback response. If a higher speed response is required, the set value can be appropriately reduced;	**20~3000 [40]**

9	位置比例增益 Position proportional gain	**a**，设定位置环调节器的比例增益；Set the proportional gain of the position loop regulator; **b**，设置值越大，增益越高，刚度越大，相同频率指令脉冲条件下，位置滞后量越小。但数值太大可能会引起振荡或超调；The larger the setting value, the higher the gain, the greater the stiffness, and the smaller the position lag under the same frequency command pulse condition. But setting the value too large may cause oscillation or overshoot; **c**，参数数值根据具体的伺服驱动系统型号和负载情况确定；The parameter values are determined according to the specific servo drive system model and load conditions;	**1~500** **[80]**
10	位置前馈增益 Position feedforward gain	**a**，设定位置环的前馈增益；Set the feedforward gain of the position loop; **b**，设定为 100%时，表示在任何频率的指令脉冲下，位置滞后量总是为 0；When it is set to 100%, it means that the position lag is always 0 under the command pulse of any frequency; **c**，位置环的前馈增益增大，控制系统的高速响应特性提高，但会使系统的位置环不稳定，易振荡；If the feedforward gain of the position loop is increased, the high-speed response characteristics of the control system will improve, but the position loop of the system will be unstable and easy to oscillate; **d**，除非需要很高的响应特性，位置环的前馈增益通常为 0；Unless very high response characteristics	**0~100** **[0]**

		are required, the feedforward gain of the position loop is usually 0;	
11	Position feedforward filter cut-off frequency	**a**， Set the cut-off frequency of the low-pass filter of the position loop feedforward amount; **b**， ； The function of this filter is to increase the stability of compound position control;	**1~1200** **[300]**

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**

12	位置指令脉冲分频分子 Position command pulse division numerator	**a，**若系统编程走 5 毫米(5000 个脉冲)需电机转一圈： If the system is programmed to travel 5 mm (5000 pulses), the motor needs to make one revolution: PA 12 / PA 13 = 脉冲分子 Pulse molecule / 脉冲分母 Pulse denominator = 实际反馈 Actual feedback / 指令脉冲 Command pulse = 电机编码器线数(2500 线) X 倍频数(4) Motor encoder line number (2500 lines) X Multiplier (4) / 指令脉冲数 Command pulse number (5000) = 10000/5000 = 2/1 = 2	**1~32767** **[1]**
13	位置指令脉冲分频分母 Position command pulse division denominator	**b，** 若电机与丝杆直联，丝杆螺距为 6 毫米： If the motor is directly connected to the screw, the screw pitch is 6 mm: PA12 / PA13 = 10 / 丝杆螺距(6) Screw pitch (6) = 5/3 **注：**数控机床可参照 b 来设置更为直观。 Note: CNC machine tools can be set by referring to b to be more intuitive. 齿轮比范围 ： 1/100 ≤ G ≤100 Gear ratio range: 1/100 ≤ G ≤100	**1~32767** **[1]**
16	定位完成范围 Positioni	**a，** 位置控制时，位置偏差计数器内数值小于或等于设定值时，定位完成 COIN ON 否则OFF； In position control, when the value in the position	**0~3000** **[20]**

	ng completion range	deviation counter is less than or equal to the set value, the positioning is completed COIN ON otherwise OFF; **b，** 其它控制模式下，为速度到达信号；In other control modes, it is the speed arrival signal;	
17	位置超差检测范围 Position tolerance detection range	在位置控制方式下，当位置偏差计数器的计数值大于本参数设定值时，伺服驱动器报警； In the position control mode, when the count value of the position deviation counter is greater than the set value of this parameter, the servo drive alarms;	**0~3000** **[400]**
18	位置超差是否检测 Position tolerance Whether to detect	0：检测有效；The test is valid; 1：屏蔽 4 号报警，PA17 无效；Shield No. 4 alarm, PA17 is invalid; 2：屏蔽 4 号、6 号报警，PA17 无效； Shield No. 4 and No. 6 alarm, PA17 is invalid;	**0~2** **[0]**

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**

19	位置指令平滑滤波 Position command smoothing filter	主要针对上位机没有加减速，不具有指数形式的加减速时，此参数可对指令脉冲进行平滑过滤，并对加减速进行优化； This parameter can smoothly filter the command pulse and optimize the acceleration and deceleration when the host computer has no acceleration or deceleration, and does not have exponential acceleration and deceleration; 此滤波不会丢失脉冲，执行速度可能出现延时； This filter will not lose pulses, and the execution speed may be delayed;	**0~3000** **[0]**
20	驱动禁止输入无效 Invalid drive prohibition input	0： CCW、CW 输入禁止有效；Input prohibition is valid; 1： CCW、CW 输入禁止无效；Input prohibition is invalid; 2：CCW、CW 输入禁止有效，无报警提示；Input prohibition is valid, and there is no alarm prompt;	**0~2** **[1]**
21	JOG运行速度 JOG running speed	设置 JOG 模式时正反向的速度设定 Set the forward and reverse speed setting in JOG mode	**-3000~3000** **[120]**
23	最高速度限制 Maximum speed limit	设置伺服电机的最高限速与伺服电机有关 Setting the maximum speed limit of the servo motor is related to the servo motor 按照参数电机型号来设置电机的最高转速 Set the maximum speed of the motor according to the parameter motor model	**0~5000** **[3600]**

24	内部速度 1 Internal speed 1	PA4=1，PA22=0 时： CNISC1 脚 OFF，SC2 脚 OFF 时 为内部速度 1；	**-3000~3000** **[0]**
25	内部速度 2 / 调零电流 Internal speed 2 / zero current	**a，** PA4=1，PA22=0 时： CNISC1 脚 ON，SC2 脚 OFF 时 为内部速度 2； When PA4=1, PA22=0: When CNISC1 pin is ON and SC2 pin is OFF, it is internal speed 2; **b，** PA4=4 时，设定电机调零电流百分比； When PA4=4, set the motor zero current percentage;	**-3000~3000** **[100]**
26	内部速度 3 Internal speed 3	PA4=1，PA22=0 时： CNISC1 脚 OFF，SC2 脚 ON 时 为内部速度 3 When PA4=1, PA22=0: When CNISC1 pin is OFF and SC2 pin is ON, it is internal speed 3	**-3000~3000** **[300]**
27	内部速度 4 Internal speed 4	PA4=1，PA22=0 时： CNISC1 脚 ON，SC2 脚 ON 时 为内部速度 4 When PA4=1, PA22=0: When CNISC1 pin is ON and SC2 pin is ON, it is internal speed 4	**-3000~3000** **[−100]**

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**

28	到达速度 Arrival speed	非位置模式下：In non-position mode: 当电机速度大于此设定值时，COIN： ON，否则 OFF； When the motor speed is greater than this set value, COIN: ON, otherwise OFF; 此参数只对电机速度的判断，无方向性； This parameter only judges the motor speed and has no directionality;	**0~3000** **[500]**
30	用户转矩过载报警值 User torque overload alarm value	**a，** 设置用户转矩过载值，该值为额定转矩的百分比，转矩限制值不分方向，正向反向都保护；Set the user torque overload value, the value is the percentage of the rated torque, the torque limit value regardless of direction, both forward and reverse are protected; **b，** 在 PA31>0 情况下，当电机转矩>PA30，持续时间>PA31 情况下，驱动器报警，报警号为 Err-29，电机停转。报警后驱动器必须重新上电清除报警；In the case of PA31>0, when the motor torque>PA30 and the duration>PA31, the drive alarms, the alarm number is Err-29, and the motor stops. After the alarm, the drive must be powered on again to clear the alarm;	**0~300** **[200]**
31	转矩过载检测时间 Torque overload	转矩过载检测时间，单位毫秒；Torque overload detection time, in milliseconds; 为 0 时，用户转矩过载报警功能无效；When it is 0, the user torque overload alarm function is invalid;	**0~30000** **[0]**

	detection time		
34	内部 CCW 转矩限制 Internal CCW torque limit	设置电机 CCW 方向的内部转矩限制百分比值 例：设定为额定转矩的 2 倍，则设置值为 200 Set the internal torque limit percentage value of the motor CCW direction Example: Set to 2 times of the rated torque, the set value is 200 此设定值一直限制有效； This set value is always limited and effective;	**0~300** **[250]**
35	内部 CW 转矩限制 Internal CW torque limit	设置电机 CW 方向的内部转矩限制百分比值 例：设定为额定转矩的 2 倍，则设置值为 -200 Set the internal torque limit percentage value of the motor CW direction Example: Set to 2 times of the rated torque, the set value is 200 此设定值一直限制有效； This set value is always limited and effective;	**0~-300** **[-250]**
36	转矩限制到达范围 Torque limit reach range	转矩限制时转矩到达检测范围 Torque reaches the detection range during torque limit	**1~300** **[5]**

Parameter No.	Parameter Name	Detailed function	Parameter range [Defaults]
37	转矩限制检测时间 Torque limit detection time	转矩限制时转矩到达检测时间 Torque arrival detection time during torque limit	**1~6000 [5]**
38	外部转矩限制 External torque limit	PA4=6，CN1 的 14 或 15 脚与 0V 通时：CCW，CW 转矩百分比限制，正反同时生效； When PA4=6, and CN1 pin 14 or 15 is connected to 0V: CCW, CW torque percentage limit is valid in both positive and negative; PA38 小于 PA34，PA35 设定值；PA38 is less than PA34, PA35 set value;	**0~300 [100]**
40	加速时间常数 Acceleration time constant	设置值是表示电机从 0~1000r/min 的加速时间。 The setting value means the acceleration time of the motor from 0~1000r/min. 线性加减速特性仅用于速度控制方式； Linear acceleration and deceleration characteristics are only used in speed control mode; 若上位机具有加减速特性，此参数应设置为 0； If the host computer has acceleration and deceleration characteristics, this parameter should be set to 0;	**1~10000 [100]**
41	减速时间常数	设置值是表示电机从 1000~0r/min 的减速时间。 The setting value means the deceleration time of the	**1~10000 [100]**

	Deceleration time constant	motor from 1000~0r/min. 线性加减速特性，仅用于速度控制方式； Linear acceleration and deceleration characteristics are only used in speed control mode; 若上位机具有加减速特性，此参数应设置为 0； If the host computer has acceleration and deceleration characteristics, this parameter should be set to 0;	
42	多功能端子切换 Multi-function terminal switch	0：15 号报警生效/1：屏蔽 15 号报警； [0001] 0: Alarm 15 becomes effective/1: Alarm 15 is shielded; [0001] 0：驱动器上传为宝元系统使用的参数/ 1：驱动器上传为新代系统使用的参数；[0010] 0: Drive upload is the parameter used by Baoyuan system / 1: Drive upload is the parameter used by SYNTEC system; [0010] 0：转矩控制时速度限制的来源为数控系统， 0: The source of the speed limit in torque control is the CNC system, 1：时转矩控制时速度限制的来源为 PA50；[0100] 1: The source of speed limit in torque control is PA50; [0100]	**0000~1111** **[0001]**
47	电机使能时抱闸延时导通设定 Setting of brake close delay when the	最大值 500 为延时 5 秒，默认 0.8 秒； The maximum value of 500 is a delay of 5 seconds, and the default is 0.8 seconds; 是指驱动正常上电，电机先使能后到 BRK+、BRK-延时导通抱闸工作这段时间，报警时不导通； It refers to the time from that the drive is normally powered on, the motor is enabled first, and then the BRK+ and BRK- delay turn on the brake to work. It	**0~500** **[80]**

	motor is enabled	will not conduct when alarming;	
48	电机抱闸关时使能延时断设定 Setting of enable delay when motor brake is off	最大值 500 为延时 5 秒，默认 0.8 秒； The maximum value of 500 is a delay of 5 seconds, and the default is 0.8 seconds; 是指正常驱动上电， BRK+，BRK-先断开抱闸不工作到使能延时断开这段时间，报警时不延时 It refers to the time from that the drive is normally powered on, BRK+，BRK- first open the brake and do not work, and then the enable off delay. There will be no delay when alarming.	**0~500** **[0]**

Parameter No.	Parameter Name	Detailed function	Parameter range [Defaults]
53	低 4 位输入端子强制 ON 输入 Low 4-bits input terminal forced ON input	不借用外部线路，用参数0，1 的变化，来进行下列功能的 ON，OFF。PA53，PA54 一样操作。 Without borrowing external circuits, use the changes of parameters 0 and 1 to turn on and off the following functions. PA53 and PA54 operate in the same way. SON：伺服使能； **[0001]** SON: Servo enable; [0001] A-CLR：报警清除； **[0010]** A-CLR: Alarm clear; [0010] FSTP：CCW 驱动禁止； **[0100]**	**0000~1111** **[0000]**

		FSTP: CCW drive prohibited; [0100] RSTP：CW 驱动禁止； **[1000]** RSTP: CW drive prohibited; [1000]	
54	高4 位输入端子强制 ON 输入 HIGH 4-bits input terminal forced ON input	CLE/SC1/ZEROSPD： 偏差计数器清零/速度选择 1/零速箝位； **[0001]** Deviation counter clear / speed selection 1 / zero speed clamp; [0001] INH/SC2：指令脉冲禁止/速度选择 2； **[0010]** INH/SC2: Command pulse prohibition/speed selection 2; [0010] FIL：CCW 转矩限制； **[0100]** FIL: CCW torque limit; [0100] RIL：CW 转矩限制； **[1000]** RIL: CW torque limit; [1000]	**0000~1111** **[0000]**
55	低 4 位输入端子逻辑取反 Low 4-bits input terminal Logic negation	用参数 0/1 的变化来实现功能的取反 （即原来外部开关电路输入取反，常开变常闭，常闭变常开。） Use the change of parameter 0/1 to realize the function inversion (that is, the original external switch circuit input is inverted, normally open becomes normally closed, and normally closed becomes normally open.) SON：伺服使能； **[0001]** SON: Servo enable; [0001] B-CLR：报警清除； **[0010]** A-CLR: Alarm clear; [0010] FSTP：CCW 驱动禁止； **[0100]**	**0000~1111** **[0000]**

		FSTP: CCW drive prohibited; [0100] RSTP：CW 驱动禁止； **[1000]** RSTP: CW drive prohibited; [1000]	
56	高 4 位输入端子逻辑取反 HIGH 4-bits input terminal Logic negation	用参数 0/1 的变化来实现功能的取反 （即原来外部开关输入电路取反，常开变常闭，常闭变常开。） Use the change of parameter 0/1 to realize the function inversion (that is, the original external switch circuit input is inverted, normally open becomes normally closed, and normally closed becomes normally open.) CLE/SC1/ZEROSPD： 偏差计数器清零/速度选择 1/零速箝位； **[0001]** Deviation counter clear / speed selection 1 / zero speed clamp; [0001] INH/SC2：指令脉冲禁止/速度选择 2； **[0010]** INH/SC2: Command pulse prohibition/speed selection 2; [0010] FIL：CCW 转矩限制； **[0100]** FIL: CCW torque limit; [0100] RIL：CW 转矩限制； **[1000]** RIL: CW torque limit; [1000]	**0000~1111** **[0000]**

Parameter No.	Param eter Name	Detailed function	Parameter range [Defaults]
57	输出端子逻辑取反 Output terminal Logic negation	用参数 0，1 的变化，来实现功能的取反 （即原来外部开关输出电路取反，常开变常闭，常闭变常开） Use the change of parameters 0 and 1 to realize the function inversion (that is, the original external switch output circuit is inverted, normally open becomes normally closed, and normally closed becomes normally open) SRDY：伺服准备好； **[0001]** SRDY: Servo is ready; [0001] ALM：伺服报警； **[0010]** ALM: Servo alarm; COIN：定位完成/速度到达； **[0100]** COIN: Positioning completed/speed reached; BRK： 电机抱闸； **[1000]** BRK: Motor brake;	**0000~1111** **[0010]**
58	演示模式 2 的时间设置 Time setting of demo mode 2	演示模式 2 时：In demo mode 2: 伺服电机高速老化的时间设置，单位为 0.1 分钟。 The high-speed aging time setting of the servo motor, the unit is 0.1 minutes.	**1~30000** **[600]**
59	演示模式选择 Demo mode	PA0=510 PA4=0 时生效； Valid when PA0=510 PA4=0; 0：关闭演示模式；1：慢速演示；2：快速演示； 0: Turn off the demo mode; 1: Slow demo; 2: Fast	**0~2** **[0]**

	selection	demo;	
60	电流环比例增益 Current loop proportional gain	驱动器根据读取电机的规格自动调整此参数。 The drive automatically adjusts this parameter according to the specifications ofthe read motor.	**0~32767** **[600]**
61	电流环积分时间常数 Current loop integral time constant	驱动器根据读取电机的规格自动调整此参数。 The drive automatically adjusts this parameter according to the specifications ofthe read motor.	**0~32767** **[50]**
66	编码器类型选择 Encoder type selection	0：普通增量式光电编码器； 0: Generic incremental photoelectric encoder; 1：普通增量省线式光电编码器； 1: Generic incremental line-saving photoelectric encoder; 2：多摩川总线多圈绝对值编码器（131072 线）； 2: Tamagawa bus multi-turn absolute encoder (line 131072);	**0~2** **[2]**
68	速度比例增益系数 Speed proportional gain factor	驱动器根据读取电机的规格自动调整此参数； The drive automatically adjusts this parameter according to the specifications ofthe read motor; 此参数为 PA5 参数的系数； This parameter is the coefficient of PA5 parameter;	**0~500** **[100]**

		伺服电机的增益=PA5 * PA68; The gain of the servo motor = PA5 * PA68;	
70	M_II 功能选择应用开关 2 M_II function selection switch 2	低扭模式设置为 1 Low torque mode is set to 1	**-32768~32767** **[0]**

Parameter No.	**Param eter Name**	**Detailed function**	**Parameter range [Defaults]**
71	M_II 命令数据分配 M_II command data distribution	低扭模式设置为 16 It is se to 16 in Low torque mode	**-32768~32767** **[0]**
72	功能选择开关 Function selection switch	0010 为与新代控制器通讯时上传安川驱动器型号;上传型号为 SGDV-200A11B002000; 0010 is the Yaskawa driver model uploaded when communicating with the new generation controller; the uploaded model is SGDV-200A 11B002000;s 0001 为与新代控制器通讯时上传新代要求的驱	**0000~1111** **[0010]**

		动器型号代码;上传型号为 S3P_DO_13I_M_II; 0001 is the drive model code required by SYNTEC when communicating with the SYNTEC controller; the upload model is S3P_DO_13I_M_II;	
79	增量式编码器不使能 Incremental encoder is not enabled	0：增量编码器使能； 0: Incremental encoder is enabled; 1：增量编码器不使能； 1: Incremental encoder is not enabled;	**0～1** **[1]**
80	总线通讯轴地址 Bus communication axis address	总线通讯协议时代表地址：1、2、3…… Represent address in bus communication protocol: 1, 2, 3……..	**1~15** **[1]**
85	允许 3 号报警 Allow No. 3 alarm	0：默认屏蔽欠压报警；1：允许欠压3 号报警； 0: Shield undervoltage alarm by default; 1: Allow undervoltage No. 3 alarm;	**0~1** **[0]**
88	位置比例增益系数 Position proportional gain factor	位置比例增益为 PA9*PA88： The position proportional gain is PA9*PA88:	**20~300** **[100]**
90	编码器单圈值 低 16 位	a，十进制：显示为 0，1...32767，-32768...-1，0； 通讯无符号数据读取时为 0，1...65535，65536； Decimal: Displayed as 0, 1...32767, -32768...-1, 0;	**0~65536** **[0]**

	Encoder single turn value Low 16-bits	Communication unsigned data is read as 0, 1...65535, 65536 ;	
91	编码器单圈值 高 16 位 Encoder single turn value High 16-bits	a，十进制，单圈值=PA90+PA91*65536；Decimal, single-turn value=PA90+PA91*65536 b，显示为 0，1；Displayed as 0, 1;	**0~1 [0]**

Parameter No.	**Param eter Name**	**Detailed function**	**Parameter range [Defaults]**
92	编码器多圈值 低 16位值 Encoder multi-turn value Low 16-bits value	a,十进制：显示为 0，1...32767，-32768...-1，0；Decimal: Displayed as 0, 1...32767, -32768...-1, 0; b,485 通讯无符号数据读取时为 0，1...65535，65536； 485 communication unsigned data is read as 0, 1...65535, 65536; c,若此参数因电池失电丢失后会 40#报警，并只有通过 PA99 号参数清除，断电及 CLR 端子无法清除；	**0~65536 [0]**

		If this parameter is lost due to battery power failure, it will alarm 40#, and it can only be cleared through PA99 parameter. Power failure and CLR terminal cannot clear; d,多圈值=PA92*131072； Multi-turn value=PA92*131072;	
93	速度比例增益系数缩放倍数 Speed proportional gain factor zoom factor	速度比例增益 PA5*PA93： Speed proportional gain PA5*PA93:	**20~300** **[100]**
94	电流环比例增益缩放倍数 Current loop proportional gain zoom factor	电流环比例增益 PA60*PA94： Current loop proportional gain PA60*PA94:	**20~300** **[100]**
95	ERR85 检测阈值 ERR85 detection threshold	百分比 percentages	**0~100** **[20]**
96	功能开关 Function switch	0：为屏蔽 ERR44 报警; 0 means ERR44 alarm is blocked; 1：为不屏蔽 ERR44 报警;断电重启有效.	**0~15** **[0]**

		1: ERR44 alarm is not blocked; power-off restart is effective. 12：适配凯恩帝系统。 12: Adapt to the KND system.	

Parameter No.	Param eter Name	Detailed function	Parameter range [Defaults]
97	DIN 输入功能是否有效 Whether DIN input function is valid	0：DIN 输入功能有效 0: DIN input function is valid 1：DIN 输入功能无效 1: DIN input function is invalid	0~1 [1]
98	电流环积分时间常数缩放倍数	电流环积分时间常数PA61*PA98： Current loop integral time constant PA61*PA98:	20~300 [100]

	Current loop integral time constant zoom factor		
99	复位电池失电 40 号报警 Reset battery power failure No. 40 alarm	a，此参数无法保存，断电重启生效，仅用于电池报警复位；This parameter cannot be saved, it will take effect after power off and restart, and is only used for battery alarm reset; b，此参数只有 PA84=0 时生效；This parameter only takes effect when PA84=0 c，PA84=0 时：在电池与电机编码器连线断开时出现报警，连接好后，只有把此参数置 1 可清除报警；When PA84=0, an alarm occurs when the connection between the battery and the motor encoder is disconnected. After the connection is made, only setting this parameter to 1 can clear the alarm; d， PA84=0 时：若电池低电压、无电池时无法清除报警，为确保多圈信号准确； When PA84=0, if the battery voltage is low or there is no battery, the alarm cannot be cleared, make sure the accuracy of the multi-turn signal; e，电池电压正常稳定在3.6V The battery voltage is normally stable at 3.6V	**0~1** **[0]**

6.5 [Detailed explanation of PE function parameters]

Parameter No.	Param eter Name	Detailed function	Parameter range [Defaults]
10	陷波器功能开关 Notch filter function switch	0000：第 1 段、第 2 段陷波滤波器均无效 The first and second notch filters are invalid 0001：第 1 段陷波滤波器有效 The first stage notch filter is effective 0100：第 2 段陷波滤波器有效 The second stage notch filter is effective 0101：第 1 段、第 2 段陷波滤波器均有效 The first and second notch filters are both effective	**0000～0101** **[0000]**
11	陷波器自动调整开关 Automatic adjustment	0000：第 1 段、第 2 段陷波滤波器均不自动调整 ； The first and second notch filters are not automatically adjusted;	**0000～0101** **[0000]**

	switch of notch filter	0001：第 1 段陷波滤波器自动调整 The first band notch filter is automatically adjusted 0100：第 2 段陷波滤波器自动调整 The second band notch filter is automatically adjusted 0101：第 1 段、第 2 段陷波滤波器均自动调整。 The first and second notch filters are automatically adjusted.	
12	第 1 段陷波滤波器频率 1st band notch filter frequency		**50～4000** **[0]**
13	第 1 段陷波滤波器品质因数 Quality factor of the 1st notch filter		**50～500** **[80]**
14	第 1 段陷波滤波器深度 Depth of the 1st notch filter		**0～1000** **[0]**
15	第 2 段陷波滤波器频率 2nd band notch filter frequency		**50～4000** **[0]**
16	第 2 段陷波滤波器品质因数		**50～500** **[80]**

	Quality factor of the 2nd stage notch filter		
17	第 2 段陷波滤波器深度 2nd stage notch filter depth		**0～1000** **[0]**

Parameter No.	**Param eter Name**	**Detailed function**	**Parameter range [Defaults]**
18	自动陷波器速度偏差阀值 Automatic notch filter speed deviation threshold		**0～2000** **[50]**
35	第 1 段抑振滤波器抑振频率 Vibration suppression frequency of 1st stage		**1～1000** **[150]**

	vibration suppression filter		
36	第 1 段抑振滤波器抑振增益 Vibration suppression gain of the 1st stage vibration suppression filter		**1～1000 [100]**
37	第 1 段抑振滤波器抑振系数 Vibration suppression coefficient of the 1st stage vibration suppression filter		**0～300 [0]**
38	第 1 段抑振滤波器补偿值 1 1st stage vibration suppression filter compensation value 1		**0～1000 [0]**

39	第 1 段抑振滤波器补偿值2 1st stage vibration suppression filter compensation value 2		**0～1000** **[0]**
40	双环测馈和摩擦补偿功能开关 Double loop measuring/feeding and friction compensation function switch	0000：双环测馈和摩擦补偿关闭 Double loop measuring/feeding and friction compensation closed 0001：双环测馈有效 Double loop measuring/feeding is effective 0100：摩擦补偿有效 friction compensation is effective 0101：双环测馈和摩擦补偿均有效 Double loop measuring/feeding and friction compensation are all effective 1000：第 1 段抑振功能有效 The first stage vibration suppression function is effective	**0000～0101** **[1000]**
41	摩擦补偿增益 Friction compensation gain	速度环比例增益（带宽）的百分比 Speed loop proportional gain (bandwidth) percentage	**10～1000** **[100]**
43	摩擦补偿系数 Friction compensation coefficient	摩擦补偿转矩的百分比 Percentage of friction compensation torque	**0～100** **[0]**

44	摩擦补偿频率补偿值 Friction compensation frequency compensation value		**-10000～10000** **[0]**

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**
45	摩擦补偿增益补偿值 Friction compensation gain compensation value	摩擦补偿增益/摩擦补偿增益补偿 Friction compensation gain/Friction compensation gain compensation	**1～1000** **[100]**
46	双环测馈增益 Double loop measuring/feeding gain		**1～500** **[40]**
47	双环测馈增益补偿值 Double loop		**0～1500** **[150]**

	measuring/feeding gain compensation value		
50	惯量辨识时电机运行圈数 Motor running circle number during inertia identification		**1～300** **[30]**
51	惯量辨识时电机运行速度 Motor running speed during inertia identification		**1～3000** **[1000]**
52	惯量辨识时电机运行加速度 Motor running acceleration during inertia identification		**0～300** **[10]**
53	惯量辨识运行停顿时间 Inertia identification running pause time		**0～1000** **[0]**

54	惯量辨识时初始转动惯量比 Initial moment of inertia ratio during inertia identification		**0～1000** **[200]**
55	惯量辨识时速度环比例增益 Speed loop proportional gain during inertia identification		**10～3000** **[150]**

Parameter No.	**Parameter Name**	**Detailed function**	**Parameter range [Defaults]**
56	惯量辨识时速度环积分时间常数 Speed loop		**2～3000** **[200]**

	integral time constant during inertia identification		
57	惯量辨识时位置前馈增益 Position feedforward gain during inertia identification		**0～100** **[100]**
58	惯量辨识时速度偏差阀值 Speed deviation threshold during inertia identification		**0～3000** **[500]**
59	惯量辨识时位置环比例增益 Position loop proportional gain during inertia identification		**1～1000** **[40]**

6.6 [PF]

Parameter No.	Param eter Name	Detailed function	Parameter range [Defaults]
0	电机电压等级 Motor voltage level	0-220V 1-380V	**0～32767** **[0]**
1	电机额定功率 Motor rated power	0.01Kw	**0～32767** **[0]**
2	电机额定电流 Motor rated current	0.01A	**0～32767** **[0]**
3	电机额定转矩 Motor rated	0.01Nm	**0～32767** **[0]**

	torque		
4	电机最大转矩 Motor torque	0.01Nm	**0～32767** **[0]**
5	电机额定转速 Motor rated speed	1rpm	**0～32767** **[0]**
6	电机最高转速 Maximum motor speed	1rpm	**0～32767** **[0]**
7	电机转动惯量 Motor moment of inertia	10-6Kgm2	**0～32767** **[0]**
8	电机磁极对数 Number of motor pole pairs	0.001 Ω	**0～32767** **[0]**
9	电机相电阻 Motor phase resistance	0.01mH	**0～32767** **[0]**
10	电机 d 轴电感 Motor d-axis inductance	0.01mH	**0～32767** **[0]**
11	电机 q 轴电感 Motor q axis inductance	0.01mH	**0～32767** **[0]**

Parameter No.	Param eter Name	Detailed function	Parameter range [Defaults]
12	电机反电动势常数 Motor opposing electromotive force constant	0.01V/Krpm	0～32767 [0]
13	电机转矩常数 Motor torque constant	0.001Nm/A	0～32767 [0]
14	电机电气时间常数 Motor electrical time constant	0.01ms	0～32767 [0]
15	电机机械时间常数 Motor mechanical time constant	0.01ms	0～32767 [0]
16	电机零位偏移量低 16 位	17BIT 编码器 Encoder：16384 23BIT 编码器 Encoder：16384	0～32767 [0]
17	电机零位偏移量高 16 位	17BIT 编码器 Encoder：0 23BIT 编码器 Encoder：0	0～32767 [0]

18	电机编码器类型 Motor encoder type	17BIT 编码器 Encoder：16 23BIT 编码器 Encoder：17	**0～32767** **[0]**
19	电机编码器线数低 16 位	17BIT 编码器 Encoder：0 23BIT 编码器 Encoder：0	**0～32767** **[0]**
20	电机编码器线数低高位	17BIT 编码器 Encoder：2 23BIT 编码器 Encoder：128	**0～32767** **[0]**
21	电机编码器数据写入控制字 Motor encoder data write control word	手动设置或者通过串口调试软件将电机的相关参数写入 PF-0-PF-20； Manually set or write the relevant parameters of the motor into PF-0-PF-20 through serial debugging software; 随后将 PF21 设置为 1，驱动器开始将电机参数写入编码器； Then set PF21 to 1, and the drive starts to write motor parameters into the encoder; 参数写入过程中，PF21指示写入的状态； During parameter writing, PF21 indicates the state of writing; PF21变为2，表示参数正在写入； PF21 becomes 2, indicating that the parameter is being written; PF21变为3 表示参数写入完成； PF21 becomes 3 to indicate the completion of parameter writing; PF21变为 15 表示参数写入错误； PF21 changes to 15 means parameter writing error;	**0～3** **[0]**

Chapter 7 Faults and Diagnosis

7.1 Alarm list

(Table 7.1)

Alarm No.	Alarm name	Failure analysis
1	超速 Overspeed	伺服电机转速超过设定值 Servo motor speed exceeds the set value
2	主电路过压 Main circuit overvoltage	三相或两相电源电压过高或制动不工作 The three-phase or two-phase power supply voltage is too high or the brake does not work
3	主电路欠压 Main circuit undervoltage	三相或两相电源电压过低 Three-phase or two-phase power supply voltage is too low
4	位置超差 Location is out of tolerance	位置偏差计数器的数值超过设定值，电压过低 The value of the position deviation counter exceeds the set value, and the voltage is too low
5	电机过热 Motor overheated	电机温度过高 Motor temperature is too high
6	电机堵转 Motor blocked	电机卡住传动不流畅，或负载过大 The motor is stuck and the transmission is not smooth, or the load is too large
7	驱动禁止异常	CCW、CW 无输入或参数 PA20 不为 1

	Drive prohibition abnormal	CCW, CW have no input or the parameter PA20 is not 1
8	位置偏差计数器溢出 Position deviation counter overflow	位置偏差计数器的数值的绝对值超过 230 The absolute value of the position deviation counter exceeds 230
11	IPM 模块故障 IPM module failure	IPM 智能模块故障 IPM smart module failure
12	过电流 Overcurrent	电机电流过大 Motor current is too large
13	过负载 Overload	驱动器及电机过负载(瞬时过流)，传动不流畅 Drive and motor are overloaded (instantaneous overcurrent), and the transmission is not smooth
14	制动故障 Brake failure	制动电阻坏或制动电路故障 The braking resistor is broken or the braking circuit is faulty
16	电机热过载 Motor thermal overload	电机电热值超过设定值 Motor heating value exceeds the set value
17	速度响应故障 Speed response failure	速度误差长期过大 Long-term excessive speed error
20	EEPROM 错误 EEPROM error	EEPROM 错误，参数保存失败 EEPROM error, parameter saving failed
22	D/A 转换芯片错误 D/A conversion chip error	控制板故障 D/A 转换芯片坏 Control board failure D/A conversion chip is broken
29	用户转矩过载报警 User torque overload alarm	电机负载超过用户设定的数值和持续时间 Motor load exceeds the value and duration set by the user
34	软件版本不匹配 Software version does not	软件烧写错误或未恢复出厂值 Software programming error or no factory reset

	match	
36	总线编码器接收错误 Bus encoder receiving error	检查编码器线，屏蔽线注意双端接地 Check the encoder wire, and the shield wire should be grounded at both ends

Alarm No.	**Alarm name**	**Failure analysis**
37	总线编码器数据较验错 Bus encoder data check error	检查编码器线，屏蔽线注意双端接地 Check the encoder wire, and the shield wire should be grounded at both ends
39	总线编码器反馈断线 Bus encoder feedback disconnection	编码器线连线松动或断开 Encoder cable connection is loose or disconnected
40	总线编码器电池失电 Bus encoder battery loses power	电池断线或电压低 Battery disconnection or low voltage
42	电机参数读取错误 Motor parameter reading error	读取电机编码器内电机参数时未完成 Reading Incomplete of the motor parameters from the motor encoder
43	电机功率不匹配 Motor power does not match	伺服电机额定电流超过驱动器额定电流 The rated current of the servo motor exceeds the rated current of the drive
44	PA63 设置异常 PA63 setting is abnormal	PA63 未和电机编码器匹配 PA63 does not match the motor encoder
78	总线通讯时断时通	等待上位机通讯；干扰或者虚焊

	Bus communication is off and on	Waiting for host computer communication; interference or false welding
81	总线通讯看门狗故障 Bus communication watchdog failure	总线通讯数据异常 Bus communication data is abnormal
82	总线通讯周期异常 Bus communication cycle is abnormal	通讯周期设定异常 Communication cycle setting abnormal
83	驱动轴地址与上位机不匹配 The drive shaft address does not match the host computer	驱动器轴地址与上位机设定轴地址不一致 The drive axis address is inconsistent with the axis address set by the host computer
84	驱动器接收到不支持指令 The drive received an unsupported command	驱动未响应此功能指令 The driver did not respond to this function command
85	非法状态执行命令 Illegal state execution command	上位机与驱动的工作时序不一致 The working sequence of the host computer and the driver is inconsistent
86	驱动参数设定异常 Drive parameter setting abnormal	PA4 PA59 PA53 PA5 设定异常不为出厂设置 PA4 PA59 PA53 PA5 setting is abnormal, not the factory setting
88	未同步到数控系统 Not synchronized to the CNC system	驱动器没有同步到数控系统 The drive is not synchronized to the CNC system
89	传输周期通知帧接收异常 Transmission cycle notification frame reception abnormal	传输周期通知帧接收异常 Transmission cycle notification frame reception abnormal
90	接收指令异常 Command receiving abnormal	当前命令还未执行完又接收到新的命令 The current command has not been executed

		yet and a new command is received
91	脉冲丢失 Pulse loss	脉冲丢失 Pulse loss
92	原点设置失败 Origin setting failed	坐标原点设置失败 Coordinate origin setting failed
93	原点设置成功 Origin set successfully	坐标原点设置成功 The coordinate origin is set successfully
94	参数设定成功提示重启 Prompt to restart after parameter setting	通过控制器设置了驱动器要断电重启才有效的参数 Set the parameters of the drive to be effective after power-off and restart through the controller
942	命令格式设置不正确 Incorrect command format setting	命令格式设置不正确 Incorrect command format setting
951	系统指令异常 System command abnormal	在指令条件不充分的情况下进行了指令 The instruction was executed without sufficient instruction conditions
971	系统指令异常 System command abnormal	不在相应层执行相应的命令 Do not execute the corresponding command at the corresponding layer
100	系统指令异常 System command abnormal	在执行 CONNECT 命令的时候有通讯错误 There is a communication error when executing the CONNECT command

7.2 Troubleshooting

(Table 7.2)

Alarm No.	Alarm name	Failure analysis	Alarm No.	Alarm name
1	超速 Overspeed	通电时 Powered on	■驱动或电机故障 Drive or motor failure	■更换驱动器 Replace the drive
			■检查参数 Check the parameters	■看是否内部使能 See if internally enabled
		使能时 Enabled	■电机 UVW 之间短路 Short circuit between motor UVW	■检查电机连线 Check motor wiring
			■编码器 0 位偏差 Encoder 0 bit deviation	■电机编码器调零 Motor encoder zero adjustment
			■伺服参数不对 Incorrect servo parameters	■恢复伺服参数 Restore servo parameters
		电机运行过程中 Motor running	■电机接头短路 Motor connector short circuit	■电机接头有无进水 Whether there is water in the motor connector
			■指令速度过快 Command speed is too fast	■降低指令速度 Lower command speed
			■加减速不平稳 Unsteady acceleration and deceleration	■调整加减速常数 Adjust acceleration and deceleration constant
			■负载过大 Overloaded	■减轻负载 Lighten the load

2	主电路过压 Main circuit overvoltage	通电时 Powered on	■电源电压过高 Power supply voltage is too high	■降低电源电压 Lower power supply voltage
			■电源波形不正常 Power waveform is abnormal	■更换供电电源 Replace power supply
			■伺服器故障 Server failure	■更换伺服器 Replace server
		运转时 Running	■电路板故障 Circuit board failure	■更换伺服器 Replace server
			■制动回路故障 Brake circuit failure	■检查制动电阻 Check the braking resistor
3	主电路欠压 Main circuit undervoltage	通电时 Powered on	■主电源电压过低 Main power supply voltage is too low	■更改供电电源 Change the power supply
			■电路板故障 Circuit board failure	■更换伺服器 Replace server
			■软启动电路坏 The soft start circuit is broken	■更换伺服器 Replace server
		运转时 Running	■变压器容量不够 Insufficient transformer capacity	■加大变压器 Increase transformer
			■电源接线松动 Loose power wiring	■紧固接线端子 Fasten the terminal
			■电路板故障 Circuit board failure	■更换伺服器 Replace server
4	位置超差	运转时	■指令速度太快	■降低指令速度

	Location is out of tolerance	Running	Command speed is too fast	Lower command speed
			■输入电压过低 Input voltage is too low	■检查 R/S/T 电源 Check R/S/T power supply
			■PA17 号参数太小 PA17 parameter is too small	■参数适当增大 Increase the parameter appropriately
			■连线松动或过载 Loose or overloaded connection	■检查紧固连线 Check and tighten the connection

Alarm No.	Alarm name	Status	Cause	Solution
5	电机过热 Motor overheated	通电时 Powered on	■电机损坏 Motor damaged	■更换电机 Replace the motor
			■传感器连线断开 Sensor cable disconnected	■查线，换传感觉器 Check the cable, change the sensor
		运转时 Running	■电机功率太小 Motor power is too small	■更换大功率电机 Replace the high-power motor
			■电机接口短路 Motor interface short circuit	■做好防水防尘 Be waterproof and dustproof
			■伺服参数不对 Incorrect servo	■适配好电机型号 Suitable motor model

			parameters	
6	电机堵转 Motor blocked	运转时 Running	■传动部分卡死 The transmission part is stuck	■脱开机械部分 Disengage the mechanical part
			■负载过大 Overloaded	■减轻负载 Lighten the load
			■电机故障 Motor failure	■更换电机 Replace the motor
7	禁止异常 Prohibition abnormal	通电时 Powered on	■检查参数及接线 Check parameters and wiring	■PA20，CW 及 CWW 接线 PA20, CW and CWW wiring
8	位置偏差计数器溢出 Position deviation counter overflow	运转时 Running	■电机堵转 Motor blocked	■检查负载 Check load
			■指令频率异常 Command frequency is abnormal	■上位机速度减少 Lower host computer speed
			■接线错误 Wrong wiring	■查线接好屏蔽层 Check the wire and connect the shielding layer
			■编码器损坏 Encoder is damaged	■为易碎品需更换 It is fragile and needs to be replaced
			■编码器 5V 电压低 Encoder 5V low voltage	■缩短连线或换驱动 Shorten the connection or change the drive
		运转时 Running	■CN2 插头接触不良 Bad contact of CN2 plug	■紧固CN2 插头 Fasten CN2 plug

			■线缆虚焊隐患 Cable Pseudo Soldering hidden danger	■更换线缆 Replace the cable
			■电路板芯片故障 Circuit board chip failure	■查干扰更换伺服器 Check interference and replace the server
11	IPM 模块故障 IPM module failure	通电时 Powered on	■电路板故障 Circuit board failure	■更换伺服器 Replace the server
			■电机 UVW 之间短路 Short circuit between motor UVW	■查线更换电机 Check the wire and replace the motor
		运转时 Running	■电机故障 Motor failure	■查线更换电机 Check the wire and replace the motor
			■接电不良 Poor connection	■查线，防干扰 Check the wire, prevent interference
12	过流 Overcurrent	通电或运转时 Powered on or Running	■电机坏 Motor is broken	■更换电机 Replace the motor
			■UVW 之间短路 Short circuit between UVW	■查线并更换伺服器 Check the wire and replace the server
			■过载 Overload	■换大功率驱动电机 Change to high-power drive motor

Alarm No.	Alarm name	Status	Cause	Solution
13	过负载 Overload	通电时 Powered on	■电机损坏进水 Motor damaged and watered	■更换电机 Replace the motor
			■电路板坏 Bad circuit board	■更换伺服器 Replace server
		运转时 Running	■机械负载过大 Excessive mechanical load	■减少负载 Reduce load
			■机械传动不流畅 Unsmooth mechanical transmission	■检查机械传动部件 Check mechanical transmission parts
			■UVW 之间短路 Short circuit between UVW	■检查线缆 Check the cables
			■抱闸没松开 The brake is not released	■确保抱闸电源稳定 Ensure that the brake power supply is stable
14	制动故障 Brake failure	通电时 Powered on	■电路板故障 Circuit board failure	■更换伺服 Replace server
		运转时 Running	■制动电阻坏 Broken braking resistor	■检查制动电阻连线 Check the brake resistor connection
			■制动容量不足 Insufficient braking capacity	■延长加减速时间 Extend acceleration and deceleration time
			■机械惯量过大 Mechanical inertia is	■减少机械惯量 Reduce mechanical

			too large	inertia
			■编码器UVW连线不对 Encoder UVW connection is wrong	■检查连线并更换 Check the connection and replace
			■编码器电源不稳 Encoder power supply is unstable	■要求 5V 电压要稳 Requires 5V voltage to be stable
			■编码器线数不对 The number of encoder lines is incorrect	■调整参数对应线数 Adjust the number of corresponding lines
16	电机热过载 Motor thermal overload	通电时 Powered on	■伺服参数错误 Servo parameter error	■重新恢复出厂值 Restore factory value
		运转时 Running	■机械传动不畅 Poor mechanical transmission	■增加润滑，减负载 Increase lubrication, reduce load
			■过载时间长 Long overload time	■减负载，启停平滑 Load reduction, smooth start and stop
17	速度响应故障 Speed response failure	运转时 Running	■长时间误差过大 Long term large deviation	■调整参数位置前馈 Adjust parameter position feed forward
			■启停时间太短 Start-stop time is too short	■调整加减速时间 Adjust acceleration and deceleration time
20	ROM 报警 ROM alarm	运转时 Running	■参数存储报警 Parameter storage alarm	■恢复参数更换伺服 Restore the parameters and replace the servo
22	D/A 芯片坏 D/A chip is	通电时 Powered on	■更换控制板 Replace the control	■恢复参数更换伺服 Restore the parameters

	broken		board	and replace the servo
29	转矩不足 Insufficient torque	运转时 Running	■超过设定转矩 Set torque exceeded	■查参数 PA30，PA31 Check the parameters PA30, PA31
			■检查电机选型 Check motor selection	■重新适配电机 Refit the motor
			■机械过载 Mechanical overload	■脱开负载再试 Disconnect the load and try again
34	软件版本不匹配 Software version does not match	通电时 Powered on	■软件烧写错误 Software programming error	■更换驱动器 Replace the drive
			■未恢复出厂值 Factory value not restored	■DEF 恢复参数 DEF recovery parameters

Alarm No.	Alarm name	Status	Cause	Solution
35	通讯错误 Communication error	通电时 Powered on	■CRC 校验错误 CRC check error	■检查 CN3 和上位机的通讯参数和连接线 Check the communication parameters and connection lines between CN3 and the host computer
36	总线编码	通电时	■编码器线断开	■紧固编码器线

	器接收错误 Bus encoder receiving error	Powered on	Encoder wire disconnected	Fasten the encoder cable
			■编码器坏 Encoder broken	■更换编码器 Replace the encoder
			■编码器线错误 Encoder wire error	■更换正确编码器线 Replace the correct encoder cable
37	总线编码器数据较验错 Bus encoder data checking error	通电时 Powered on	■编码器线断开 Encoder wire disconnected	■紧固编码器线 Fasten the encoder cable
			■编码器坏 Encoder broken	■更换编码器 Replace the encoder
			■编码器线错误 Encoder wire error	■更换正确编码器线 Replace the correct encoder cable
39	总线编码器反馈断线 Bus encoder feedback disconnection	通电时 Powered on	■编码器线断开 Encoder wire disconnected	■紧固编码器线 Fasten the encoder cable
			■编码器坏 Encoder broken	■更换编码器 Replace the encoder
			■编码器线错误 Encoder wire error	■更换正确编码器线 Replace the correct encoder cable
40	总线编码器电池失电 Bus encoder battery	通电时 Powered on	■电池线松动 Loose battery cable	■检查电池接线 Check battery wiring
			■电池寿命到期 Battery life expired	■更换电池 Replace battery
			■编码器坏 Encoder broken	■更换编码器 Replace the encoder

	loses power			
42	电机参数读取错误 Motor parameter reading error	通电时 Powered on	■编码器参数不对 Incorrect Encoder parameters	■更换电机 Replace the motor
			■编码器线松动 Loose encoder cable	■更换编码器线 Replace the encoder cable
43	电机功率不匹配 Motor power does not match	通电时 Powered on	■电机选型过大 Motor selection is too large	■更换小功率电机 Replace it with low-power motor
			■驱动电流小 Small drive current	■更换大功率驱动器 Replace it with high-power drive
44	PA63 异常 PA63 abnormal	通电时 Powered on		■正确匹配编码器 Correctly match the encoder
78	总线通讯时断时通 Bus communication is off and on	通电时 Powered on	■等待上位机通讯 Waiting for host computer communication	■通讯后报警清楚 The alarm is clear after communication
		运转时 Running	■干扰或者虚焊 Interference or Pseudo Soldering	■检查通讯线缆 Check the communication cable
81	总线通讯看门狗故障 Bus communica	通电时 Powered on	■总线通讯数据异常 Bus communication data is abnormal	■重新建立与控制器的通讯 Re-establish communication with the controller

	tion watchdog failure	运转时 Running	■通讯异常 Communication abnormal	■联系客服工程师 Contact customer service engineer

Alarm No.	Alarm name	Status	Cause	Solution
82	总线通讯周期异常 Bus communication cycle is abnormal	通电时 Powered on	■通讯周期设定异常 Communication cycle setting abnormal	■检查设置是否符合协议要求 Check whether the settings meet the protocol requirements
83	驱动轴地址与上位机不匹配 The drive shaft address does not match the host computer	通电时 Powered on	■驱动器轴地址与上位机设定轴地址不一致 The drive shaft address is inconsistent with the axis address set by the host computer	■检查上位机和驱动的轴地址设定并重启. Check the shaft address settings of the host computer and drive and restart
84	驱动器接收到不支持指令 The drive received an	通电时 Powered on	■驱动未响应此功能指令 The driver did not respond to this function command	■检查驱动器是否支持指令 Check if the drive supports instructions ■联系客服工程师

	unsupported command			Contact customer service engineer
85	非法状态执行命令 Illegal state execution command	通电时 Powered on	■上位机与驱动的工作时序不一致 The working sequence of the host computer and the driver is inconsistent	■当驱动和上位机建立连接后消除 Eliminate when the driver and the host computer are connected
		运行中 Running	■上位机发送非法指令或通讯异常 The host computer sends illegal commands or communication is abnormal	■检查上位机命令 Check the host computer command
86	驱动参数设定异常 Drive parameter setting abnormal	通电时 Powered on	■参数设定错误 Parameter setting error	■设 PA4 PA59 PA53 PA55 为出厂设置 Set PA4 PA59 PA53 PA 55 AS FACTORY SETTINGS
87	转矩限制中长期接收脉冲导致跟踪误差异常大; Long-term reception of pulses during	运转时 Running	■位置控制时, 在转矩限制中的情况下, 长期接收脉冲导致跟踪误差异常大; In position control, in the case of torque limitation, long-term reception of pulses causes abnormally large	■检查机械是否卡死; Check whether the machine is stuck; ■在发命令的过程中, 负载是否超过设定的转矩限制值持续的时间太长; In the process of sending a command,

	torque limit causes abnormally large tracking errors;		tracking errors;	whether the load exceeds the set torque limit for too long;
88	未同步到数控系统 Not synchronized to the CNC system	运转时 Running	■驱动器没有同步到数控系统 The drive is not synchronized to the CNC system	■检查上位机命令 Check the host computer command
89	传输周期通知帧接收异常 Transmission cycle notification frame reception abnormal	运转时 Running	■传输周期通知帧接收异常 Transmission cycle notification frame reception abnormal	■检查上位机命令 Check the host computer command
90	接收指令异常 Command reception abnormal	运转时 Running	■当前命令还未执行完又接收到新的命令 The current command has not been executed yet and a new command is received	■检查上位机命令 Check the host computer command

Alarm No.	Alarm name	Status	Cause	Solution
91	脉冲丢失 Pulse loss	运转时 Running	■脉冲丢失 Pulse loss	■检查上位机命令 Check the host computer command ■更换驱动器 Replace the drive
92	原点设置失败 Origin setting failed	通电时 Powered on	■坐标原点设置失败 Coordinate origin setting failed	■如在配绝对值编码器电机时，在驱动器有报警的情况下执行PA78 = 1 If it is equipped with an absolute encoder motor, PA78 = 1 should be executed when the driver has an alarm.
93	原点设置成功 Origin set successfully	通电时 Powered on	■坐标原点设置成功 Coordinate origin is set successfully	■断电重启 Power off and restart
94	参数设定成功提示重启 Prompt to restart after parameter	运转时 Running	■通过控制器设置了驱动器要断电重启才有效的参数 Set the parameters of the drive to be effective after power-off and	■断电重启 Power off and restart

	setting		restart through the controller	
942	命令格式设置不正确 Incorrect command format setting	运转时 Running	■命令格式设置不正确 Incorrect command format setting	■检查上位机命令 Check the host computer command
951	系统指令异常 System command abnormal	运转时 Running	■在指令条件不充分的情况下进行了指令 The instruction was executed without sufficient instruction conditions	■检查上位机命令 Check the host computer command
971	系统指令异常 System command abnormal	运转时 Running	■不在相应层执行相应的命令 Do not execute the corresponding command at the corresponding layer	■检查上位机命令 Check the host computer command
100	系统指令异常 System command abnormal	运转时 Running	■在执行CONNECT命令的时候有通讯错误 There is a communication error when executing the CONNECT command	■检查上位机命令 Check the host computer command

Chapter 8 Debugging and Application

8.1 Notes for quick debugging

一、 Make sure the connection is correct

■ R, S, T and U, V, W can not be reversed, and there should be no looseness.

■Whether the input voltage of L series is three-phase 220V. Whether the H series input voltage is three-phase 380V.

■ Check that the 18 pins and +24V in the interface CN1 are connected correctly, and the 36 and 9 pins are connected to 0V correctly, and the polarity cannot be reversed.

■ Check whether the +5V in the interface CN2 is correctly wired, and the polarity cannot be reversed.

■ Whether the motor connection cable is short-circuited or grounded.

■The motor wiring must be connected to the corresponding driver

二、 Determine the power-on sequence

■The strong power and control power of the C7-13ia series servo are energized at the same time.

■If the selected motor brake does not require servo control, it must be satisfied that the brake is energized more than 1 second after the servo is enabled, so as to ensure the accuracy and safety of the equipment position.

■The integrated design of strong current and control of C7-13ia series servo adopts the power-off delay discharge design of control and display circuit. After the power is cut off, the internal strong current is immediately cut off, and the display and control circuit will automatically cut off after a few seconds of delayed discharge.

In order to use the driver correctly, please read the following sequence diagram carefully:

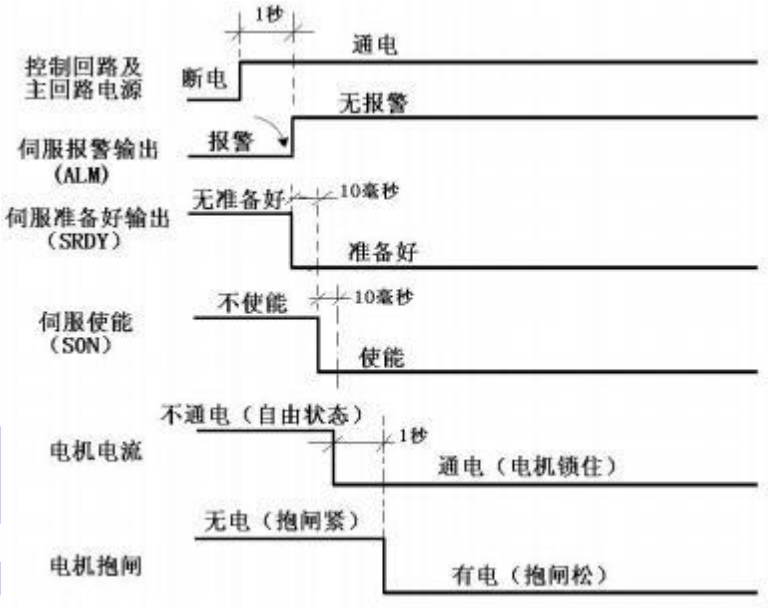


Figure 8.1 Sequence diagram ofpower-on and alarm

8.2 Position control (parameters quickly adjusted after power-on)

Example: drive with 110ST-M05430LMB motor (position control)

1 、 After energizing, measure the three-phase 220V voltage between R, S and T to confirm that there is no problem.

2、 Do not turn on the servo enable signal temporarily, and check whether there is an alarm, observe the red light (ALM), if there is no red light on, it works normally, and you can proceed to the next step.

3、When power on, the drive will automatically adapt the parameters through the bus encoder.

a，Enter the parameter management mode "EE--", adjust to "EE-def" and press and hold the Enter key for 3 seconds. After "Finish" appears, it means that all the parameters of the drive except the motor parameters have been restored to the factory default values.

b，After restarting and powering on, you can check several key parameters of position control (see Table 8.2 below) to confirm that they are correct. The upper computer can give an enable signal (or internal enable), and after the (Run) green light is on, pulses will be given. And observe the dynamic effect of the motor, you can modify the gain to adjust the motor characteristics.

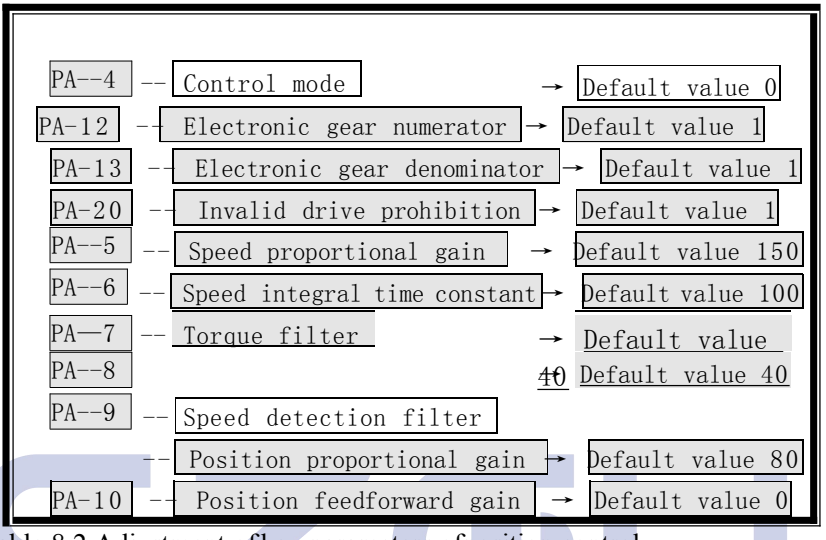


Table 8.2 Adjustment of key parameters of position control

8.3 Debug typical problems

一、(Run) Green light off when enabled

a, Check whether the three-phase R, S, T voltage is normal.

b, Whether the CN3/CN4 interface/CN6/CN7 interface is connected correctly.

c, Check whether the host computer system starts normally or if there is an alarm that has not been cleared.

d, If the above lights still don't light up, use the internal enable PA53=0001 to try again.

二、"Err—39, Err—40, Err—42, Err—43" alarm appears

The photoelectric encoder is a very typical fragile and sensitive component, which needs to be protected in every aspect

a, Check whether the motor power model matches.

b, Whether the shielding layer is well grounded at both ends and the plug has impurity conductors.

c, Does the too long wire attenuate the encoder power supply 5V?

d, Interferenceproblem, whether there is a strong magnetic line nearby, if there is, isolate it as much as possible.

f, Check whether the battery in the battery box is in good condition.

三、 Servo motor jitter

a， Determine whether the load and inertia carried by the servo motor are within the allowable range of the motor.

b， Adjust the parameters PA-5, PA-6, PA-9.

c， Observe the different degrees of motor jitter at high and low speeds to add and subtract parameters.

四、 Servo motor is noisy

a， Make sure that the load and inertia of the servo motor are within the allowable range of the motor.

b， PA-5，PA-7，PA-8，PA-9。Adjust the parameters PA-5, PA-7, PA-8, PA-9.

c， Observe the difference in noise when the motor is at high speed, low speed, and stop to adjust the parameters.

五、 Setting of electronic gear ratio

Take CNC machine tools as an example:

a，Servo motor and screw rod are directly connected (motor rotates 1 circle, screw rod

rotates 1 circle)

■ If the CNC system is programmed to send 10,000 pulses corresponding to 10MM

■ The photoelectric encoder is 2500 lines

■ Screw pitch is 6MM PA12 / PA1:

= (Command value mm)*(encoder line number)*(4 times frequency)/(pitch)*(pulse number)

= 10*2500*4/6*10000 = 5/3

b, There is a gearbox between the servo motor and the screw rod (motor rotates 5 times, screw rod rotates 2 times)

■ If the CNC system is programmed to send 10,000 pulses corresponding to 10MM

■ The photoelectric encoder is 2500 lines

■ Screw pitch is 6MM PA12 / PA13:

= (Command value mm)*(encoder line number)*(4 times frequency)*(motor turns)/ (Pitch)*(Number of pulses)*(Number of screw turns)

= 10*2500*4*5/6*10000*2 = 25/6

即 which is： PA12=25， PA13=6 ；

六、 Drive 40# alarm clear

When the drive and the motor are connected and energized for the first time, an alarm Err40 will appear. At this time, you can modify the drive parameter PA99 to 1 and then press the confirm key. After confirmation, the decimal point disappears to indicate that the confirmation is valid, and it needs to be powered off and restarted.

Appendix 1

Precautions for the use of MechatrolinkII/Ⅲ bus driver

When equipped with absolute encoder motor, the electronic gear ratio can only be set to 1:1; even if it is set to other values, the drive is still used at 1:1; please set the gear ratio on the host computer.

2. When using the bus communication function, in order to prevent the command issued by the bus from conflicting with the input pin function of the 36-pin high-density plug, it is recommended that the input pin function of the 36-pin high-density plug is not used at this time; otherwise the drive may work abnormally;

3. The reserved function parameters of the drive are internal use parameters of the drive, DO NOT change at will,, it is recommended to keep the factory value; otherwise the drive may work abnormally;

4. Except for the enable pin, the DINPUT-related input functions of the driver are all shielded by default; therefore, the functions of PA53, PA54, PA55, PA56 are only valid for the enable pin;

5. After the drive is powered on, if there is no alarm or after the alarm disappears, the drive will display the axis address of the corresponding axis; such as SLV-1;

6. The setting value of the axis address parameter PA80 of each drive cannot be repeated, and it must be consistent with the axis card port number of the corresponding axis of the controller (Pr21-Pr40 parameter of SYNTEC controller). After setting the axis address of the drive, find EE-SET on the drive. After long pressing the SET button, FINISH will appear. Power off and restart to take effect;

7. Any parameter manually modified by the driver must be saved and then restarted to take effect;

8. The parameters PA5, PA6, PA7, PA9 on the drive end can be changed online through the bus controller. After changing these parameters on the CNC system side, these parameters are saved in the EEPROM of the drive. Pay attention to the units of these parameters on the drive end; after the first modification, be sure to check and confirm on the drive end.

PN100(Speed loop gain)	Corresponding to the drive end is PA5
PN101(速度回路积分时间常数 Speed loop integral time constant)	Corresponding to the drive end is PA6
PN401(First torque command filter)	Corresponding to the drive end is PA7
PN102(Position loop gain)	Corresponding to the drive end is PA9

Note

A：After these parameters are changed on the controller side, they are saved to the driver side in real time; and take effect in real time;

B：Pay attention to the units of PA5, PA6, PA7, PA9, see the parameter description on the driver side for details;

13. When using the bus communication function, PA4, PA59, PA53, PA55 must be the factory default values, otherwise the driver will report ERR86 during bus communication;

Appendix 2

Precautions when matching with SYNTEC bus controller

Such as X-axis related configuration (controller must set parameters as required)

Pr21 Axial corresponding axis card port number	Set to be consistent with the drive axis address corresponding to the corresponding axis (PA80 value) (required)
Pr61 Axial position sensor resolution	Set to 32768 for absolute encoder motor
Pr81 Axial feedback frequency multiplication	4
Pr161 Axial screw width (Pitch)	Pitch: unit um
Pr201Axial sensor type	Set to 3 for absolute encoder motor (required)
Pr401 Cutting acceleration and deceleration time	The larger the value, the smaller the motor start-stop vibration but the
	slower the response
The time required to accelerate to	The larger the value, the smaller the
1G	motor start-stop vibration but the slower the response

There are other related parameters, please refer to the SYNTEC parameter setting manual for details;

When the M-II servo drive establishes communication with the bus controller, how to judge the communication is established?

Situation 1: The SYNTEC bus controller alarm display prompt box is not displayed, the drive communication indicator is flashing, and the drive has no alarm; it means that the device can be used normally when the communication has been established;

Situation 2: The SYNTEC bus controller alarm display box shows an alarm (the display content corresponds to the alarm number uploaded by the driver), but no "drive communication abnormality" is displayed, and the driver communication indicator is flashing, indicating that the driver and the controller have established communication. ; What you need to do at this time is to troubleshoot; after troubleshooting, determine

whether the connection needs to be re-established according to whether the alarm can be cleared online;

Situation 3: The drive communication indicator is not flashing, check whether the M-II/ Ⅲ communication line is plugged in tightly; whether the axis address is set repeatedly; whether the drive is abnormal;

Situation 4: The drive communication indicator is always flashing, but the SYNTEC bus controller alarm only displays "drive communication abnormal". Even if the drive has an alarm such as "ERR-39", the controller alarm does not display the corresponding alarm information. At this time, it is necessary to check whether the axis address setting of the drive is consistent with the axis address setting of the corresponding axis of the controller; whether the axis address setting is repeated. After troubleshooting, power off and restart; re-establish the connection;

Note: As long as the SYNTEC bus controller alarm display box does not display "drive communication abnormal", it means that the drive and the controller have established a connection;

Appendix 3

Description of MechatrolinkII/Ⅲ bus communication cable

一：

Mechatrolink II/Ⅲ bus connection method

MechatrolinkII/Ⅲ connection method

Note: 1. ■ connected to the C1 master station and terminal slave station indicates the terminal resistance.

2. When the total distance between the slave stations is 16 stations and the network exceeds 30m or the number of slave stations is greater than

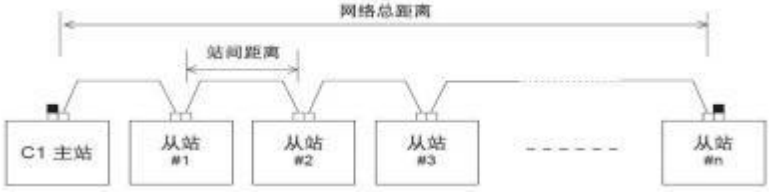
17 stations, use a repeater

Note: In order to reduce the signal reflection of the terminal part, both ends of the network are connected to the terminal connector. However, when the C1 master station has a built-in terminal (terminal resistance), the terminal connector can only be connected to another terminal of the network. The recommended resistance in the terminal connector is 130 ohm 1/4W.

二

MechatrolinkII/Ⅲ wiring specifications should be based on the total network distance and the distance between stations. Perform network wiring according to the following specifications

When not using a repeater:



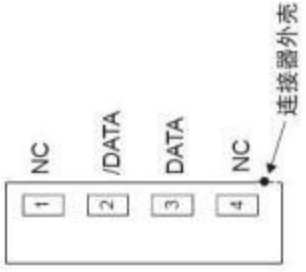
MechatrolinkII connection method (when no repeater is used)

从站数（n）	网络总距离
15 站（含）以下	50m 以下
16 站	30m 以下
17 站（含）以上	需要中继器

Note: 1. The total distance of the network. The total distance of the network refers to the length of the maximum cable connecting the bus to the network.

2. The distance between stations. The distance between stations refers to the length of cables between adjacent stations. When wiring, please ensure that the distance between stations is greater than 0.5m.

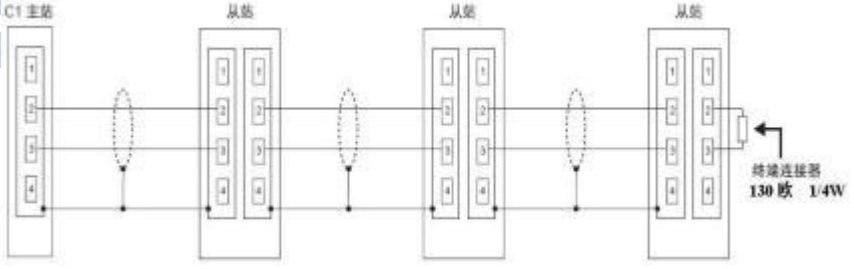
三： MechatrolinkII connector socket pin definition



面对插座的插入侧观察时的引脚分布图

Pin layout when viewed from the insertion side of the socket

四． MechatrolinkII 电缆连接示意图 MechatrolinkII cable connection diagram



Appendix 4

MechatrolinkII/Ⅲ

一：The setting of MechatrolinkII/Ⅲ servo drive axis address

When using MechatrolinkII/Ⅲ protocol serial communication, each servo drive must first set its servo drive station number on the parameter PA80. The upper controller communicates with the corresponding servo drive according to the station number.

PA80 setting value	**Corresponding axis address**	**Remarks**
1	0X21	即十进制的 33 Which is 33 in decimal
2	0X22	即十进制的 34 **Which is 34 in decimal**
3	0X23	即十进制的 35 **Which is 35 in decimal**
4	0X24	即十进制的 36 **Which is 36 in decimal**
5	0X25	即十进制的 37 **Which is 37 in decimal**
6	0X26	即十进制的 38 **Which is 38 in decimal**
7	0X27	即十进制的 39 **Which is 39 in decimal**
8	0X28	即十进制的 40 **Which is 40 in decimal**
9	0X29	即十进制的 41 **Which is 41 in decimal**
10	0X2A	
11	0X2B	

12	0X2C	
13	0X2D	
14	0X2E	
15	0X2F	
a	0x20 +(a 的 16 进制) (Hexadecimal of a)	
…	….	
62	0X20 + 0X3E = 0X5E	

Note: 1. After PA80 is changed and saved, it will take effect after power off and restart;

2. The drive only supports MECHATROLINK II protocol format of The drive only supports MECHATROLINK Ⅲ protocol format of 48BYTE, 100MHZ;;

3.The drive only supports MECHATROLINK Ⅲ protocol format of 48BYTE, 100MHZ;

二：The currently open commands for the drive are as follows

Main command	**Sub command**
NOP	NOP
CONNECT	SVPRM_RD
DISCONNECT	SVPRM_WR

SENS_ON	ALM_RD
ID_RD	SMON
ALM_CLR	ALM_CLR
SYNC_SET	MEM_WR
SMON	
SV_ON	
SV_OFF	
INTERPOLATE	
MEM_WR	
SVPRM_RD	
SVPRM_WR	
ZRET	
TRQCTRL	

三：Supported transmission cycle and the number of drives that can be connected in each transmission cycle:

传送字节数 Transmitted bytes	传输周期 Transmission cycle						
	1.0ms	1.5ms	2.0ms	2.5ms	3.0ms	3.5ms	4.0ms
30 字节 30 bytes	8	14	20	25	30	30	30