CF80 Medium Voltage Inverters

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NIETZ ELECTRIC CO.,LTD

Introduction

CF80 series high-voltage inverter is a strategic industrial intelligent high-voltage inverter control system launched by Shanghai Nietz Electric Co., Ltd. This instruction manual is the instruction manual for the CF80 series high-voltage inverter. Its purpose is to help users and the company's relevant technical personnel and engineering implementation personnel understand and master the basic principles, debugging procedures, operation methods, use and maintenance of the CF80 series high-voltage inverter. Various precautions during the process.
Users must read this manual carefully before use and operate and use it in accordance with the requirements in the manual to avoid unnecessary safety hazards and equipment failures.

Range Of Application

This instruction manual applies to the use of CF80 series high-voltage inverters.
The pictures and content of this manual are explained using the debugging system as an example. If you find that the interface is different from the interface in this manual during use, please refer to the actual system used.

Catalogue

Precautions

The CF80 series high-voltage inverter has been designed with personal safety in mind. However, as with any other high-voltage equipment, there are numerous internal connections that contain lethal voltages. In addition, some internal components are very hot and cannot be touched at will. For safety reasons, please follow the following rules when working on or near the CF80 series high-voltage inverter:

- Correct operating procedures must be strictly followed before performing any maintenance or overhaul work.
- Never touch any part of the inverter cabinet before confirming that the inverter is no longer hot and powered.
- When installing external wiring, follow standard and local safety regulations. There must be a protective isolation section between low voltage (ELV) cables and any other cables specified by CE safety standards.
- Never think that after turning off the input circuit breaker, there will no longer be any dangerous voltage in the cabinet. On the contrary, the voltage still exists on the input terminal of the circuit breaker, or there is voltage from other places, such as when the unit capacitor has not been discharged.
- Please always operate with one hand, wear safety shoes and protective glasses, and have other people present at the same time.
- Only use instruments (such as multimeters, oscilloscopes, etc.) that meet the requirements for high-voltage measurement (insulation provided internally within the instrument, not by grounding the case).
- Never remove the protective cover (marked with a high voltage symbol) or attempt to measure the circuit under the protective cover.
- Be very careful when touching or measuring components in the cabinet, and be extremely careful to prevent the meter rods from touching each other or coming into contact with other terminals.
- Hazardous voltages may still be present in the inverter cabinet when the circuit breaker is opened (shutdown) and the power supply is switched off.
- Do not operate the inverter with the cabinet door open.
- Only professionals can install, operate, inspect and maintain inverters. Professionals refer to "people who are familiar with the structure and operation of the equipment and have strong safety awareness."
- Never disconnect the control power supply during high-voltage power supply, otherwise it will cause serious system overheating or unit damage.
- Do not place flammable materials in, on, or near cabinets, including equipment drawings and instructions.

- Make sure to use a flat flat bed to transport the series high-voltage inverter. Before unloading the truck, make sure the concrete base used to store and secure the drive is level.
- When lifting the inverter system, be sure to confirm that the crane, steel ropes and hooks have sufficient tonnage to prevent the cabinet from falling to the ground or falling too fast and damaging the inverter.
- Do not use a forklift to lift electrical cabinets without forklift lifting holes. Make sure the forklift tines fit into the forklift lifting holes and are of sufficient length.
- When damaged components (such as capacitors and other electronic components) need to be disposed of, local regulations and requirements must be followed.
- During the operation of the inverter, the nominal weighted sound level 1 meter away from the inverter can exceed 50dB.
- Be sure to eliminate static electricity (ESD) when approaching or touching components in the inverter cabinet. There are many components on printed circuit boards that are sensitive to static electricity. Contact or maintenance of these components can only be done by professionals, and only after reading and understanding the correct electrostatic techniques.
- The following guidance on electrostatic discharge must be followed, which can greatly reduce the harm of static electricity to components on printed circuit boards.
- Make sure that people who come into contact with the printed circuit board of the inverter correctly wear a grounded anti-static wrist strap. The wrist strap must be grounded through a 1M resistor. Grounding equipment can be purchased at most electrical stores.
- Static electricity can be eliminated by touching a grounded conductor such as a metal sheet.
- Static-sensitive devices must be stored in anti-static bags during transportation.
- When holding a printed circuit board, always hold it by the edges.
- Do not allow the printed circuit board to slide on any surface (desktop or work surface). If possible, perform PCB maintenance work on a workbench with a conductive surface (grounded through a 1M resistor). If a suitable conductive workbench is not available, a clean steel plate or aluminum plate can be used instead.
- Avoid using non-conductive materials such as plastic and styrene. They both generate large amounts of static electricity and are not easily released.
- Use a soldering iron with a grounded terminal. At the same time, use a metal vacuum type desoldering device or copper braided wire when removing tin.

- When sending components to the company for repair, anti-static safety packaging must be used to prevent further damage to the components due to static electricity.

Chapter 1 Introduction to high voltage Inverter

1. The significance of high voltage inverter application

1.1 Energy saving

（1） Frequency conversion speed regulation has completely changed the phenomenon of "big horse-drawn cart" caused by equipment design margin, and solved the energy loss problem caused by the unadjustable fixed speed rotation of the motor;

（2） Large throttling losses due to load dampers or valve adjustments no longer exist after frequency conversion;

（3） The load under certain working conditions needs to be adjusted frequently. The linearity of the baffle adjustment is too poor and cannot keep up with the changing speed of the working conditions, so the energy consumption is very high. The variable frequency adjustment response is extremely fast and is basically synchronized with the changes in the working conditions;

（4） The power factor has increased from about 0.85 before frequency conversion to more than 0.95, reducing line losses;

（5） The high-voltage inverter itself has very little loss, and the overall efficiency is over 98%.

1.2 Due to the superior soft start/stop function of the high-voltage inverter (can start at zero speed), the impact of the starting impulse current on the motor and the power grid is greatly reduced, effectively reducing motor faults, thereby extending the maintenance cycle and service life of the motor. At the same time, it also effectively avoids the adverse impact of impact loads on the power grid.

1.3 Since the input power factor of the high-voltage inverter is above 95%, it not only eliminates the need for power compensation, but also improves the power factor of the power grid and reduces reactive power losses.

1.4 After frequency conversion adjustment, manual adjustment is no longer required, which can extend the service life of the load and the entrance and exit doors and reduce maintenance costs.

1.5 Due to the unique smooth adjustment of the motor load speed of the high-voltage inverter, the mechanical wear of the load and motor is greatly reduced, and the temperature of the bearings and bearing bushes is reduced, effectively reducing maintenance costs and extending the service life of the equipment.

1.6 The use of frequency conversion adjustment can realize real-time constant operation of parameters and improve the safety and stability of system operation.
1.7 Since the frequency conversion speed regulation adopts automatic control, the automation level of equipment operation control and system operation management is further improved, thereby truly realizing automatic adjustment and greatly enhancing the safety and reliability of operation.

2. Introduction to CF80 series high voltage inverter

Series xx type high-voltage inverter is a new generation of high-voltage inverter developed by Shanghai Nitz Electric Co., Ltd. It adopts direct high-to-high conversion method, multi-level series voltage doubling technical solution, and optimized PWM control algorithm to achieve high-quality Variable frequency variable voltage (VVVF) sinusoidal voltage and sinusoidal current output. The product has the following characteristics.

1. Vector control method

CF80 series high-voltage inverter has two control modes: universal vector and without/with speed sensor. Vector control measures and controls the stator current vector of the asynchronous motor, and controls the excitation current and torque current of the asynchronous motor respectively according to the principle of magnetic field orientation. It not only controls the size of the current, but also controls the phase of the current, which greatly improves the dynamic performance. It has the characteristics of large starting torque, good dynamic response, high speed regulation accuracy, and wide speed regulation range;

2. Speed start function

The inverter has a flying start function, which can realize the forward, reverse and two-way flying starting of the inverter respectively. It has a fast "frequency conversion-power frequency-variable frequency switching" function to meet the continuous operation requirements of the load;

3. High-high mode

It adopts phase-shifting transformer input, and the units are connected in series to directly output high voltage;

4. Air cooling design

The unique air duct design enables the equipment to operate reliably at room temperature of 50°C. It adopts top heat dissipation method and is easy to maintain. The fans are made of internationally renowned brands and are durable;

5. Modular Design

The power unit adopts modular design, can be interchanged at will, and is easy to disassemble and assemble;

6. Friendly Human-Computer Interface

The human-machine interface adopts a full Chinese interface touch screen. All operations can be input through buttons or DCS interface to avoid misoperation of the touch screen to the greatest extent. Alarms can be recorded in real time, and alarms can be accurately positioned and historical records stored;

7. Reliable Design

（1）The unit and control part use optical fiber communication；

（2）Unit hot standby design；

（3）Peripheral control components adopt PLC；

（4）The important components of the main circuit are imported high-quality brands. The rated operating parameters of all main circuit components are >2 times the actual operation. The transformer is configured with a capacity of 1.2 to 1.5 times the rated power of the motor, and is equipped with a bottom cooling fan and a top cooling fan.

8. Flexible User Interface

The interface method can be either hard-wired or communication. In addition to system settings, the interface status information provides user-defined output interfaces (users only need to set the corresponding I/O output content on the human-machine interface);

9. High Efficiency, High Power Factor

The overall machine efficiency is ≥98% and the power factor is ≥95%;

10. Low Harmonics

When 6 units per phase are connected in series, 36-pulse rectification per phase is used, and the high-frequency carrier ratio makes the output harmonics <4% when no-load and <2% when loaded;

11. Wide Voltage Input Range

The input voltage operates at full load at 6kV/10kV±10%, long-term derated operation is allowed at -10%~35%, and the equipment can work normally when the frequency fluctuates within the range of 50Hz±10%;

12. Small dv/dt

Due to the unit series output mode, dv/dt is small, which extends the life of the IGBT and reduces the insulation requirements for the entire device;

13. Unit Redundancy Hot Standby Technology

Make sure the equipment can output rated voltage;

14. Unique Unit Bypass Technology

The contactor mechanical bypass actuator is used, controlled by an independent bypass control board and powered by an independent power supply, ensuring reliable bypass when the unit fails, effectively avoiding the situation where the bypass cannot operate normally due to power loss of the power unit;

15. Line Voltage Automatic Equalization Technology

When one or several units of a certain phase are faulty and are bypassed, in order to ensure the output voltage level and power requirements of the inverter, the series of high-voltage inverters adopt a unique line voltage control method to not arbitrarily cut off the unit at the same location as the faulty unit. Under normal circumstances, ensure the output line voltage balance of the entire inverter to meet the on-site operating conditions to the greatest extent;

16. Instantaneous Power Failure Without Interference

High voltage instantaneous power outage can output torque without pulsation within 10 cycles. When the high voltage and control power supply are powered off at the same time, the inverter system can operate stably to a safe shutdown;

17. Control Loop Design Dual Power Supply Switching

One circuit is supplied by the high-voltage pre-charging cabinet for control power, and the other circuit is supplied by the high-voltage input isolation transformer. The automatic switching of the two circuits ensures that the equipment will not be affected after the control power supply is powered off;

18. Unique Overvoltage Protection Technology

In the design, the impact of operating overvoltage and lightning overvoltage on the equipment is fully considered, and different treatment measures are adopted for different overvoltages in the main loop and control loop to improve the reliability of the equipment;

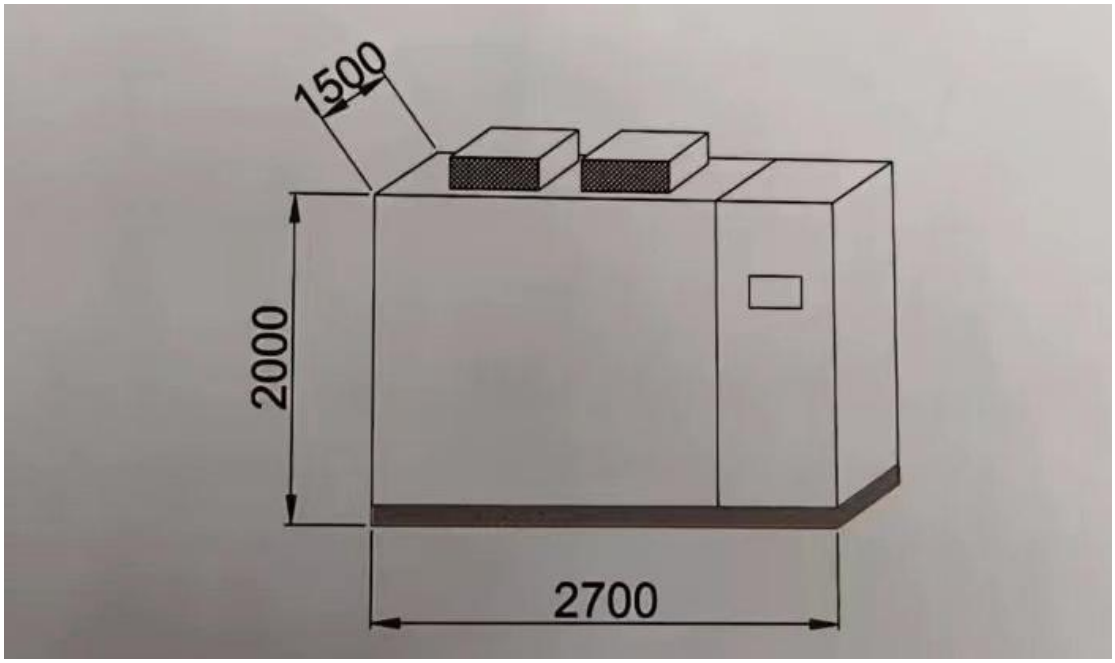
19. Incoming Line Cabinet Is Optional

The incoming cabinet can be configured according to the different requirements of users;

3.Structure introduction

CF80 series high-voltage inverter cabinet consists of three parts: transformer cabinet, power unit cabinet and control cabinet. (Note: ① 280kVA≤P≤1250kVA inverters adopt an integrated design; ② The number of fans installed in the inverter of the same voltage level varies depending on the power. The number of fans in the following dimensional diagram is not the standard number of fans).

1. The following figure shows the dimensions of the 280kVA≤P≤1250kVA inverter (unit: mm):



Illustrate:

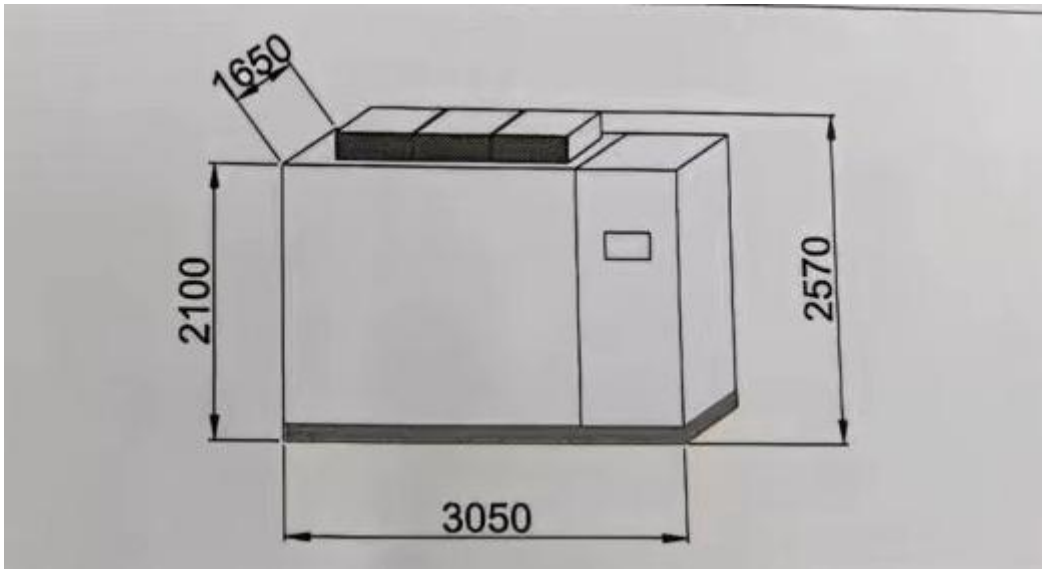
(1) 280kVA~560kVA: including fan height of 2386 and 2 fans;

(2) 630kVA~800kVA: including fan height of 2386 and 3 fans;

(3)900kVA~1250kVA: including fan height of 2470 and 2 fans;

(4) The total dimensions of the entire cabinet: width 2700 × depth 1500 × 2000.

2. The following figure shows the dimensions of the 1400kVA≤P≤2500kVA inverter (unit: mm):

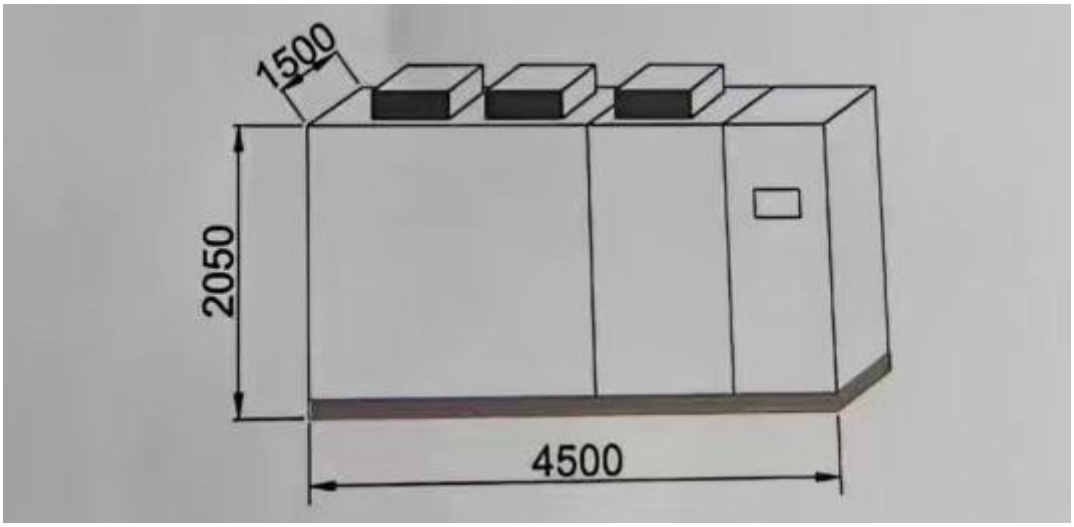


Illustrate:

(1)1400kVA~2500kVA: including fan height 2570;

(2) The total dimensions of the entire cabinet: width 3050 × depth 1650 × height 2100.

3. The following figure shows the dimensions of the 2800kVA≤P≤4500kVA inverter (unit: mm):



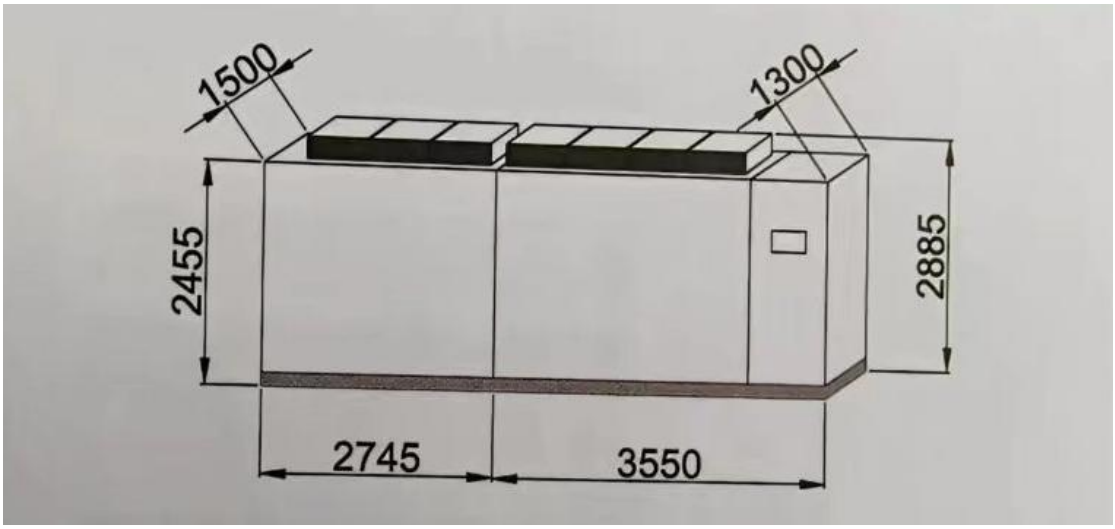
Illustrate:

(1) 2800kVA~3150kVA: including fan height 2525;

(2) 3500kVA~4500kVA: including fan height 2600;

(3) The total dimensions of the entire cabinet: width 4500 × depth 1500 × height 2050.

4.The following figure shows the dimensions of the 5000kVA≤P≤7000kVA inverter (unit: mm):



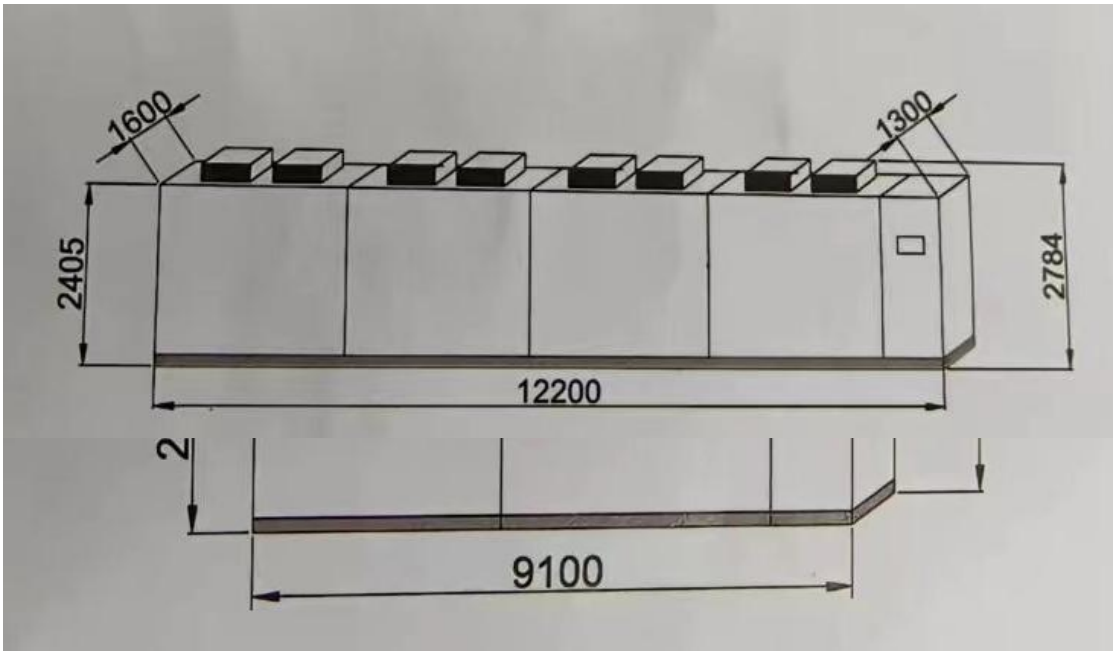
Illustrate:

(1) Including fan height 2885;

(2) Control cabinet depth 1300;

(3) The total dimensions of the entire cabinet: width 6925 × depth 1500 × height 2455.

5. The following figure shows the dimensions of the 8000kVA≤P≤9000kVA inverter (unit: mm):



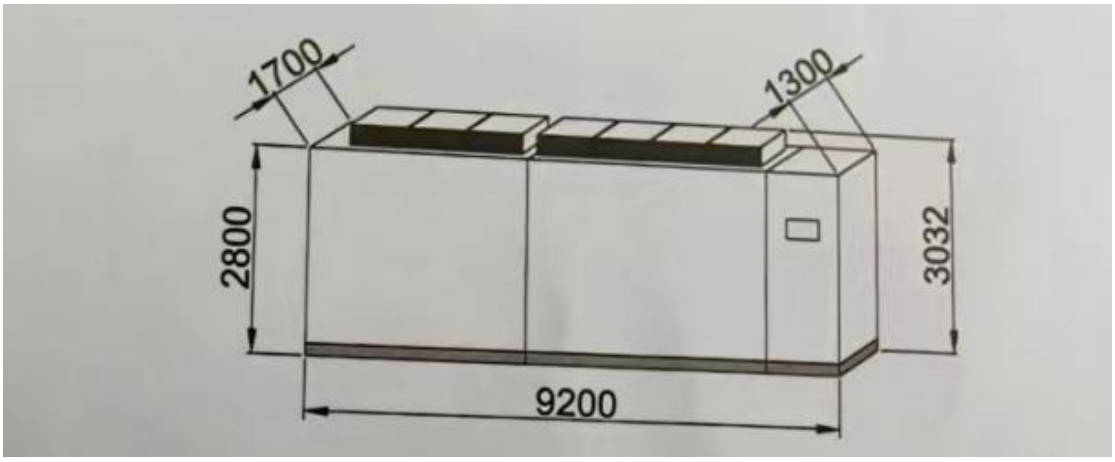
Illustrate:

(1) Including fan height 3032;

(2) Control cabinet depth 1300;

(3) The total dimensions of the entire cabinet: width 9100 × depth 1650 × height 2600.

6.The following figure shows the dimensions of the 10000kVA≤P≤11250kVA inverter (unit: mm):



Illustrate:

(1) Including fan height 3032;

(2) Control cabinet depth 1300;

(3) The total dimensions of the entire cabinet: width 9200 × depth 1700 × height 2800.

7. The following figure shows the dimensions of the 12500kVA≤P≤13750kVA inverter (unit: mm):

Illustrate:

(1) Including fan height 2784;

(2) Control cabinet depth 1300;

(3) The total dimensions of the entire cabinet: width 12200 × depth 1600 × height 2405.

For any of the above models of CF80 series high-voltage inverters, the transformer cabinet, power unit cabinet, and control cabinet can be disassembled, transported, and assembled during transportation. During installation, the fan cover must be extended to the outdoors to form indoor and outdoor circulation ventilation.

4. Technical Indicators

No.	Item	parameter	Note
1	standard	"Electricity Industry Standard of the People's Republic of China DL/T994-2006 High Voltage inverter for Fans and Water Pumps in Thermal Power Plants"	
2	Type and model		Depend on user needs
3	Installation Location	In door	
4	Technical solutions	direct high-high mode	
5	Requirements for electric motors	Ordinary three-phase asynchronous motor	
6	Is there a fuse on the input side of the inverter?	Yes	
7	Rated input voltage/allowable variation range	6kV/10kV ±10％	
8	System input voltage	6kV/10kV	
9	System output voltage	0～6kV，0～10kV	
10	System output current	Depends on power and on-site working conditions	
11	Maximum output voltage on inverter side	6.3kV/11kV	
12	Rated Capacity	Depend on user needs	
13	Rated input frequency/allowable variation range	50Hz±10％	
14	Sensitivity to grid voltage fluctuations	Not sensitive	
15	Inverter efficiency	≥98％	Different models have slightly different parameters.
16	harmonic	＜2％	
17	Reliability index (mean time between failures)	50000h	

18	Input side power factor	≥95%	Different models have slightly different parameters.
20	control method	Universal vector, without/with speed sensor control method (SVC/FVC)	
21	Control power	380±10%VAC three-phase four-wire	
22	Rectification form and component parameters	3-phase uncontrollable rectification	
23	Inverter unit form	H-bridge inverter	
24	transmission quadrant	Two quadrants	
25	Whether optical fiber cables are used for electrical isolation parts	Optical fiber communication Model: HFBR－EUS100 Manufacturer: Agilent USA	
26	Noise level	≤60dB	
27	cooling method	Forced air cooling	
28	Effect of cooling system failure on inverter	Within the allowed range, the alarm will not trip.	
29	Overload capacity	120% rated current, 1 minute	
30	Transformer losses		Different models have slightly different parameters.
31	total system loss		
32	Standard control connection	Hardwired	
33	Analog signal (input) specifications and quantity	4-20mA or 0-10V, 4 channels	Expand according to user needs
34	Analog signal (output) specifications and quantity	4-20mA or 0-10V，5 channels	
35	Switching signal (input) specifications and quantity	10 (relay dry node)	
36	Switching signal (output) specifications and quantity	16 (relay dry node)	
37	operating keyboard	touchscreen	
38	interface language	Chinese, English, Espanol	Depends on user requirements
39	Dimensions of frequency conversion device (taking 280kVA≤P≤1250kVA all-in-one machine as an example)	Width 2700mm × Depth 1500mm × Height 2000mm	
40	Weight of frequency conversion device (taking the all-in-one machine 280kVA as an example)	About 2620Kg	
41	Pre-opening maintenance or after-opening maintenance	Pre-market maintenance (reliable wall)	
42	Is an output filter required?	No	
43	Whether to provide an output filter	No	

44	After-sales service commitment	Respond within 24 hours	

Chapter 2 Hardware Part

1.Main circuit part

For different voltage levels (6kV/10kV) and power sizes of high-voltage inverters, the voltage and number of units will be different, but the basic principles are the same.

Note: The following takes a 3KV three-unit series high-voltage inverter as an example. The main circuit diagram is shown in Figure 2-1 below, which mainly includes the following parts:

1.1 Phase-Shifting Isolation Transformer

The secondary windings of the transformer that provide power to the power unit have a certain phase difference between them when wound, which not only greatly reduces the input harmonic current, but also allows the power factor to reach more than 95% at high or full load. Taking 3KV as an example, the phase-shifting isolation transformer in Figure 2-1 uses 18-pulse rectification, and the input current harmonics meet the regulations and requirements of corporate standards and IEEE519. In actual manufacturing, the number of pulse rectifiers can be larger, such as using a 30- or 36-pulse rectifier circuit structure. Of course, that will increase the difficulty of the transformer winding process.

1.2 Power Unit

The input voltage of the unit depends on the inverter model and the number of units; in Figure 2-1, there are 3 units for each phase, and there are 9 units in total for the 3 phases. Each unit is exactly the same and can be used interchangeably, which greatly improves system maintenance. performance and mass production.

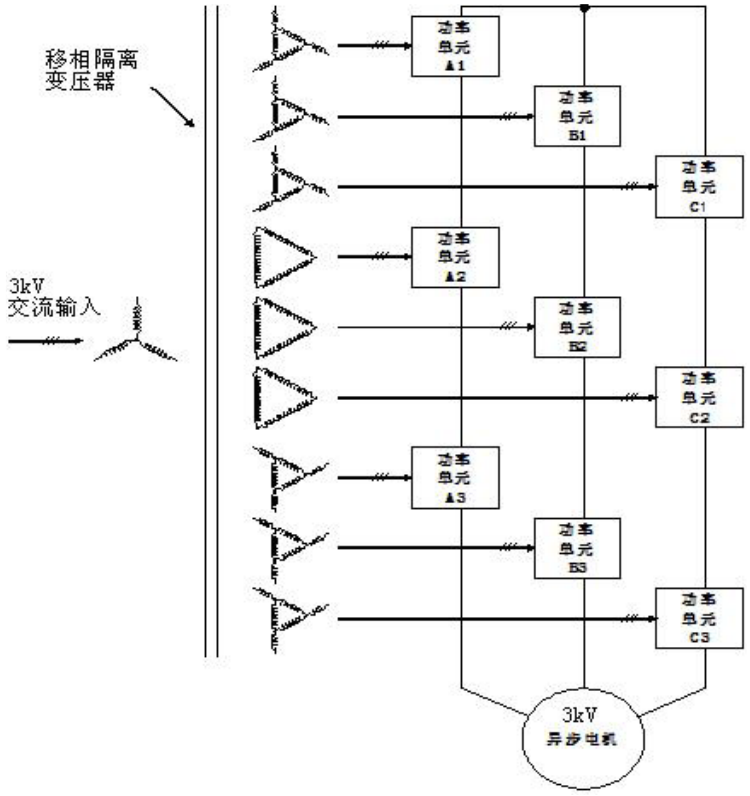


Figure 2-1 Main circuit diagram of series 3KV high-voltage inverter

Table 2-1 Power Unit Parameter Table

Line Voltage（KVAC）	Unit input voltage（VAC）	Number of power units	Power range（kVA）
	Xx Model	Xx Model	
6	690V	3*5	Max.7000
10		3*8	Max.12500

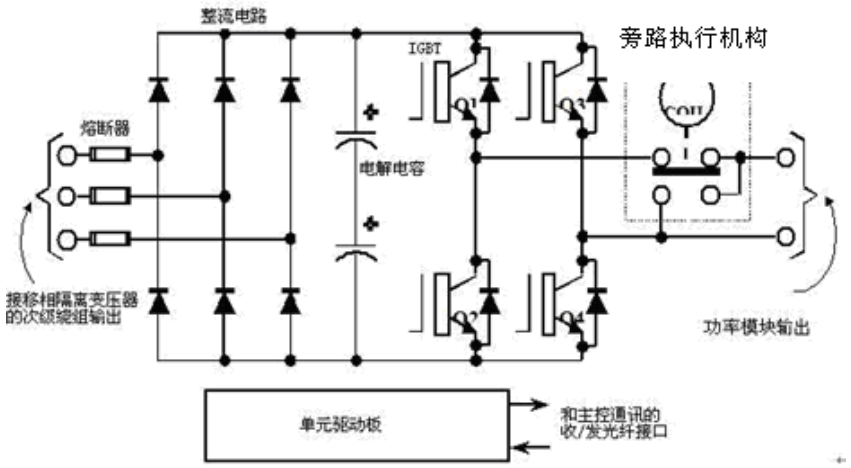


Figure 2-2 Schematic diagram of power unit

As can be seen from Figure 2-2, a complete power unit mainly consists of several parts such as fuses, rectifier bridges, film capacitors, IGBTs, unit driver boards, and bypass actuators. in:

(1) Fuse: mainly plays the role of over-current protection;

(2) Rectifier bridge: rectifies three-phase AC into DC.

(3) Thin film capacitor: plays the role of storing energy and filtering and smoothing waveforms;

(4) IGBT: Power switching device, which obtains the required PWM waveform (DC-AC inversion process) by controlling the switching of IGBT;

(5) Bypass actuator: When a unit fails, the faulty unit can be electrically bypassed through the bypass actuator, so that the entire high-voltage inverter can still continue to work;

(6) Unit driver board: Responsible for communicating with the main control, accepting the IGBT switch control signal sent by the main control and reporting fault information to the main control (such as over-voltage/under-voltage/IGBT damage/communication abnormality, etc.); control at the same time /Driving 4 IGBT switches.

2.Main control part

2.1 Hardware structure

The main control box is powered by an independent power supply. The core part of the control is the main control board. The main control board controls the work of each board in the system. There is a flash memory card on it, which can be removed from the microcomputer board when the main control board is replaced. The flash memory card contains all parameter information and the system program of the inverter, so the main control board can be replaced without reprogramming the main control board.

2.2 The main functions responsible for the main control part

(1) Two-way communication with PLC, receiving information such as target frequency/target voltage from PLC; at the same time, feedback fault information/current frequency/current voltage, etc. to PLC.

(2) Based on the target frequency, generate the switching waveform of each unit that conforms to the frequency/voltage/phase, and send it to the driver board of each unit through optical fiber.

(3) Receive the fault signal from the unit driver board and perform unit bypass and other processing.

(4) Communicate with the bypass control board and notify the faulty unit number that should be bypassed.

3.The working process of the main control part

The logical functions of the main control part are mainly completed by the sampling board, main control board, and optical fiber interface board. Its working process is as follows:

(1) The user tells the PLC the required operating frequency (or speed) through the touch screen or remote analog signal;
(2) The main control board and PLC communicate through the serial port to obtain the current operating frequency and voltage;
(3) The main control board generates PWM waveforms for all units in real time according to the required frequency and voltage;
(4) The main control board communicates with all unit driver boards at the same time (through the receiving and transmitting light module on the optical fiber interface board), sends the switch status of each unit to each driver board, and obtains the status of each unit at the same time;
(5) According to the fault condition of the unit (if any), make corresponding processing and report the working mode and fault condition to the PLC;
(6) The main control board sends a bypass command (if any unit needs to be bypassed), and at the same time receives and checks the status of the bypass actuators to verify whether they are in the required state.

The main control part of the CF80 series high-voltage inverter is between the PLC and the power unit, as shown in Figure 2-4 below.

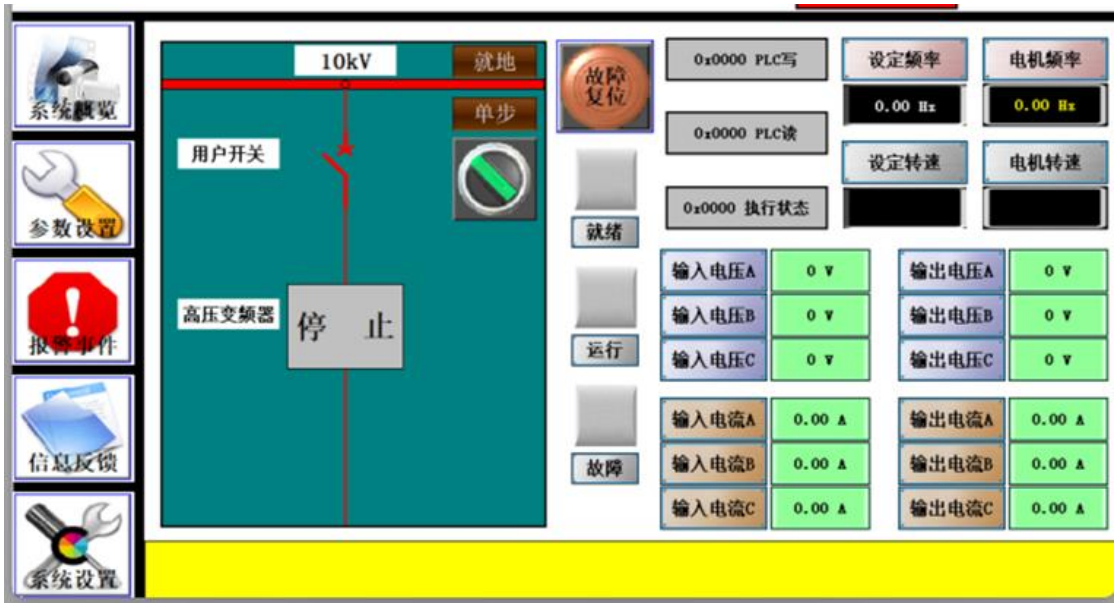


Figure 2-4 Schematic diagram of the control part of the high-voltage inverter

Chapter 3 Introduction to touch screen operation interface

1.Start Screen

After the touch screen is powered on, the start screen displays the system overview by default, with the following content:

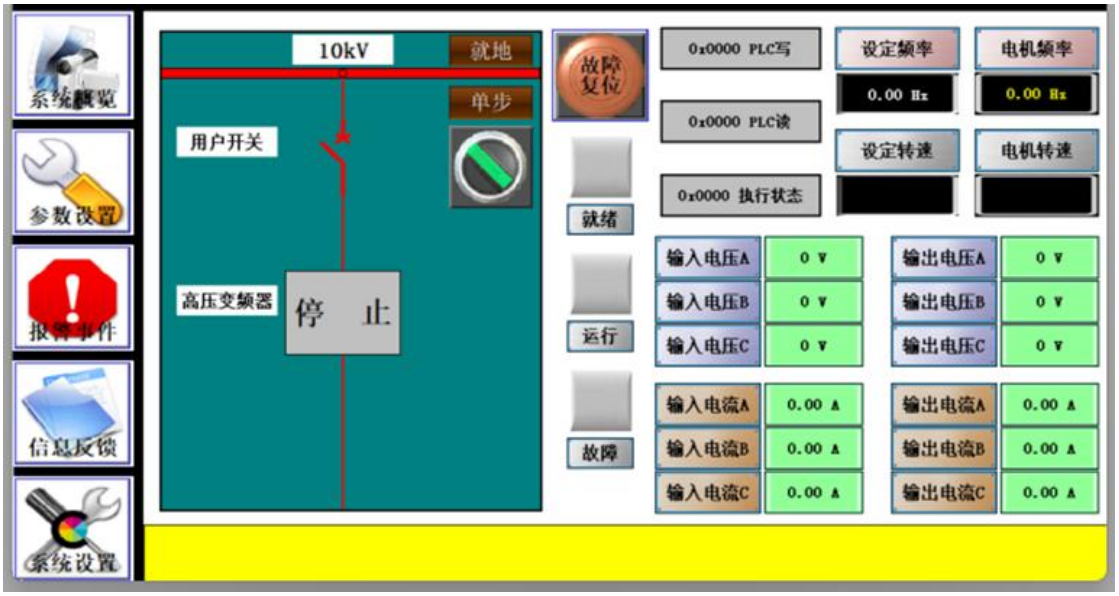


Figure 3-1 Start screen

Name	Character	Illustrate	Unit
Company name		Show company logo	
Product model		Show product detailed model	
Inverter working process		Display the working process status of the inverter	
Time Display Bar		Display PLC system time	
System overview	button	Click to enter the system overview interface	
parameter settings	button	Click to enter the parameter setting interface	
Alarm event	button	Click to enter the alarm event interface	
information feedback	button	Click to enter the information feedback interface	
System settings	button	Click to enter the system setting interface	
user switch	display	Indicates the switch status of the main circuit of the inverter.	
running/stop status	display	Displays the "Running" or "Stop" status of the inverter.	
local/far away	display	Display whether the inverter is under local or remote control	
Single step/automatic	Knob	Shows whether the inverter is in single-step or automatic mode	
Fault reset	button	When an alarm or fault message is triggered, click the "Alarm Reset" button to reset the alarm message.	
ready	indicator light	Indicates that the inverter is in ready state	
run	indicator light	Indicates that the inverter is running	
Fault	indicator light	Indicates a fault in the inverter	
PLC issues command	display	Display the content of instructions issued by PLC to the main control	
Master upload command	display	Display the command content being executed by the main control	
Master control	display	Display master control execution result feedback	

execution command feedback			
Set frequency	Input box	In the running state, the inverter sets the operating frequency.	Hz
Motor frequency	display box	In running state, the inverter outputs frequency.	Hz
Set speed	display box	In the running state, the motor is given a running speed.	r/min
Motor speed	display box	In running state, the actual speed of the motor.	r/min
Input voltage A	display box	Display system phase A input voltage	V
Input voltage B	display box	Display system B phase input voltage	V
Input voltage C	display box	Display system phase C input voltage	V
Input current A	display box	Display system phase A input current	A
Input current B	display box	Display system B phase input current	A
Input current C	display box	Display system phase C input current	A
Output voltage A	display box	Display the inverter output phase A voltage	V
Output voltage B	display box	Display the inverter output B-phase voltage	V
Output voltage C	display box	Display the inverter output C phase voltage	V
Output current A	display box	Display the inverter output phase A current	A
Output current B	display box	Display the inverter output phase B current	A
Output current C	display box	Display the inverter output C phase current	A
Alarm strip	display	Real-time display of system alarm details	

2. “Parameter Settings” Interface

In the start screen, press the "Parameter Settings" button to enter the "Parameter Settings" interface as shown below, which displays the basic parameter settings of the high-voltage inverter. This interface defaults to the motor startup parameter page, in which "Setting Input" is listed as the parameter setting area. "Master Control Stored" is listed as the actual storage result of the master control. Enter the parameters and click the write button in the upper right corner to save the change results.

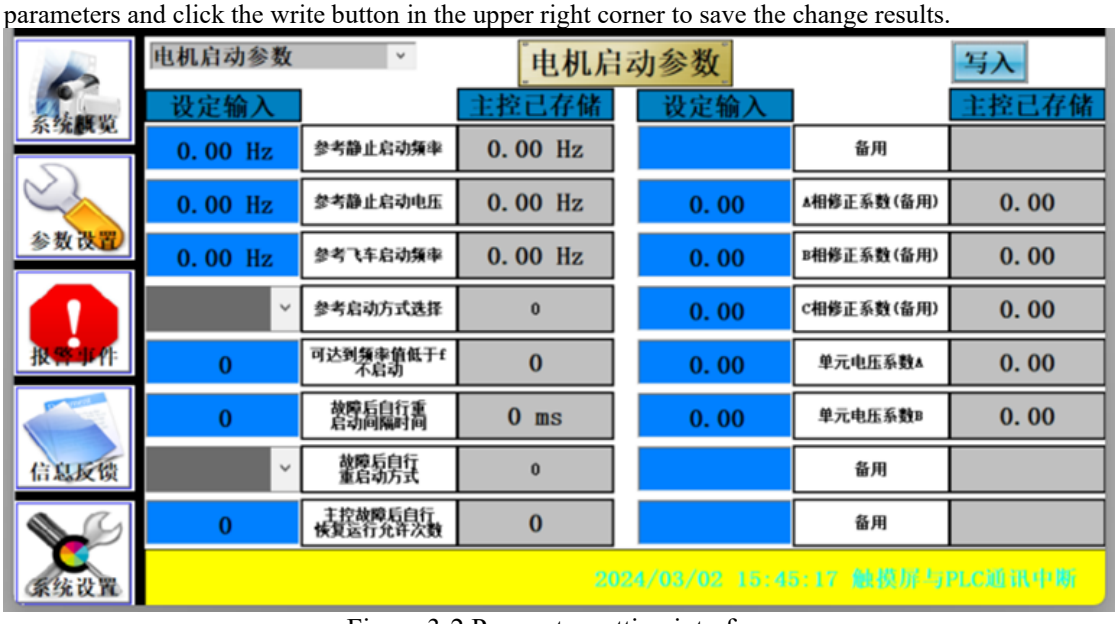


Figure 3-2 Parameter setting interface

No.	Illustrate	Character
1	Reference static starting frequency	Enter on the left, display on the right
2	Reference static starting voltage	Enter on the left, display on the right
3	Reference speed start frequency	Enter on the left, display on the right
4	Refer to startup method selection	Select on the left, display on the right
5	Does not start below the minimum frequency threshold	Enter on the left, display on the right
6	Restart time interval after inverter failure	Enter on the left, display on the right
7	Self-restart mode after inverter failure	Select on the left, display on the right
8	Allowed number of times to resume operation after master control failure	Enter on the left, display on the right
9	spare	Enter on the left, display on the right
10	A phase correction coefficient (standby)	Enter on the left, display on the right
11	B phase correction coefficient (standby)	Enter on the left, display on the right
12	C phase correction coefficient (standby)	Enter on the left, display on the right
13	Unit voltage coefficient A	Enter on the left, display on the right
14	Unit voltage coefficient B	Enter on the left, display on the right
15	Spare	Enter on the left, display on the right
16	Spare	Enter on the left, display on the right

3. "Basic Parameters Of Motor And Equipment" Interface

In the "Parameter Settings" interface, click the "Motor Startup Parameters" drop-down menu, and then click "Motor and Equipment Basic Parameters" to enter the "Motor and Equipment Basic Parameters" interface as shown in Figure 3-3. The user completes the high-voltage Set the basic parameters of the inverter motor and equipment, and then click the write button in the upper right corner to save the changes.

Figure 3-3 Motor and equipment basic parameter interface

No.	Instructions	Features
1	Rated frequency of motor	Enter on the left,Right display
2	Minimum motor operating frequency	Enter on the left,Right display
3	Rated voltage of motor	Enter on the left,Right display
4	Rated motor speed	Enter on the left,Right display
5	Motor rated slip	Enter on the left,Right display
6	Motor stator resistance	Enter on the left,Right display
7	Number of units	Enter on the left,Right display
8	Minimum operating unit	Enter on the left,Right display
9	No unit bypass function	Select on the left,Right display
10	Rated incoming voltage of the device	Enter on the left,Right display
11	Rated incoming voltage of the unit	Enter on the left,Right display
12	Motor output wiring phase sequence	Select on the left,Right display
13	Sampling measurement delay	Enter on the left,Right display
14	The motor is free to slow down at high speed	Enter on the left,Right display
15	Static rated voltage of the unit	Enter on the left,Right display
16	Unit 75% load rated voltage	Enter on the left,Right display

4 "Motor acceleration and deceleration" Interface

In the "Parameter Setting" interface, click the "Motor start parameter" drop-down menu, and then click the "Motor increase and deceleration" sub-menu to enter the "Motor increase and deceleration" interface as shown in Figure 3-4. The user completes the setting of the motor increase and deceleration parameter on this interface, and then click the "Write" button in the upper right corner to save the change result.

Figure 3-4 Motor acceleration and deceleration interface

No.	Instructions	Features
1	<1/32 segment increase frequency speed	Enter on the left,Right display
2	<1/32 segment drop frequency speed	Enter on the left,Right display
3	<1/8 segment increase frequency speed	Enter on the left,Right display
4	<1/8 segment drop frequency speed	Enter on the left,Right display
5	<2/8 segment increase frequency speed	Enter on the left,Right display
6	<2/8 segment drop frequency speed	Enter on the left,Right display
7	<3/8 segment increase frequency speed	Enter on the left,Right display
8	<3/8 segment drop frequency speed	Enter on the left,Right display
9	<4/8 segment increase frequency speed	Enter on the left,Right display
10	<4/8 segment drop frequency speed	Enter on the left,Right display
11	<5/8 segment increase frequency speed	Enter on the left,Right display
12	<5/8 segment drop frequency speed	Enter on the left,Right display
13	<6/8 segment increase frequency speed	Enter on the left,Right display
14	<6/8 segment drop frequency speed	Enter on the left,Right

		display
15	>6/8 segment increase frequency speed	Enter on the left,Right display
16	>6/8 segment drop frequency speed	Enter on the left,Right display

5 "Motor Resonance Point" Interface

In the "Parameter Setting" interface, click the "Motor starting parameter" drop-down menu, and then click the "motor resonance point" sub-menu to enter the "motor resonance point" interface as shown in Figure 3-5. On this interface, the user completes the setting of the motor resonance point parameter of the HV inverter, and then click the "write" button in the upper right corner to save the change result

Figure 3-5 Motor resonance point setting interface

No.	Instructions	Features
1	Resonance point width	Enter on the left,Right display
2	0 resonance point	Enter on the left,Right display
3	1 resonance point	Enter on the left,Right display
4	2 resonance point	Enter on the left,Right display
5	3 resonance point	Enter on the left,Right display
6	Standby	Enter on the left,Right display
7	Standby	Enter on the left,Right display
8	Standby	Enter on the left,Right display
9	Standby	Enter on the left,Right display
10	Standby	Enter on the left,Right display
11	Standby	Enter on the left,Right display
12	Standby	Enter on the left,Right display
13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display

15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

6 "Motor Running Curve"Interface

In the "Parameter Setting" interface, click the "Motor Starting parameter" drop-down menu, and then click the "Motor Running curve" submenu to enter the "Motor Running curve" interface as shown in Figure 3-6. On this interface, the user completes the parameter setting of the motor running curve of the HV inverter, and then click the "Write" button in the upper right corner to save the change result.

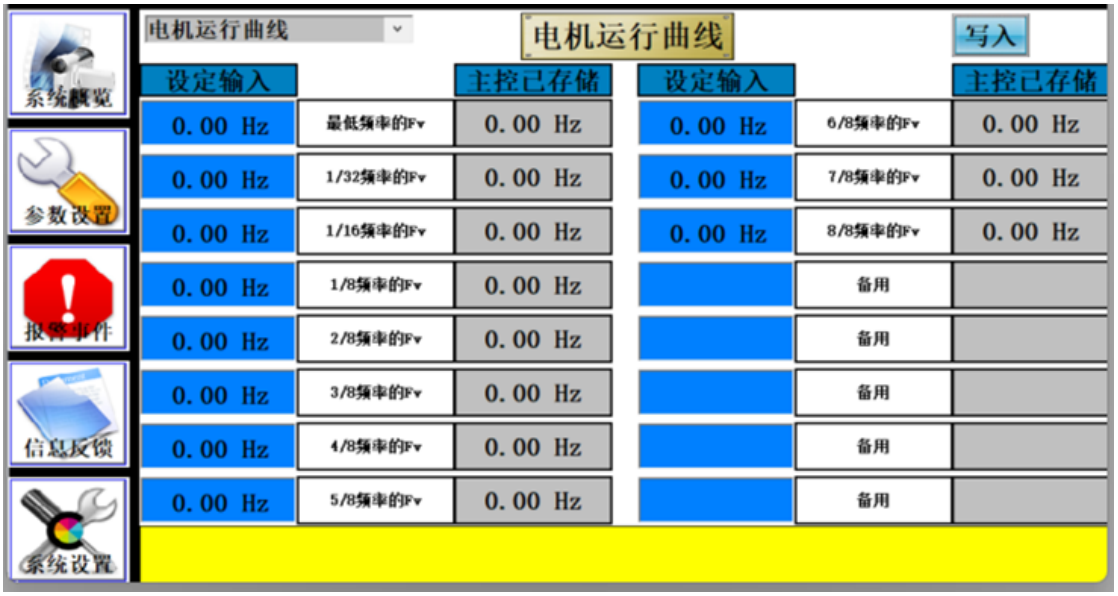


Figure 3-6 Motor running curve interface

No.	Instructions	Features
1	Lowest frequencyFv	Enter on the left,Right display
2	1/32 frequency Fv	Enter on the left,Right display
3	1/16 frequency Fv	Enter on the left,Right display
4	1/8 frequency Fv	Enter on the left,Right display
5	2/8 frequency Fv	Enter on the left,Right display
6	3/8 frequency Fv	Enter on the left,Right display
7	4/8frequency Fv	Enter on the left,Right display
8	5/8 frequency Fv	Enter on the left,Right display
9	6/8 frequency Fv	Enter on the left,Right display
10	7/8 frequency Fv	Enter on the left,Right display
11	8/8 frequency Fv	Enter on the left,Right display
12	Standby	Enter on the left,Right display
13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

7 “Protection Parameter”Interface

In the "Parameter Setting" interface, click the "Motor starting parameter" drop-down menu, and then click the "Protection parameter" submenu to enter the "Protection parameter" interface as shown in Figure 3-7. On this interface, the user completes the setting of the protection parameter of the high voltage inverter, and then click the "Write" button in the upper right corner to save the change result.

Figure 3-7 Protection Parameter Interface

No.	Instructions	Features
1	Rated current of motor	Enter on the left,Right display
2	Effective value of protection current	Enter on the left,Right display
3	Instantaneous maximum value of quick-break current	Enter on the left,Right display
4	Light overload current	Enter on the left,Right display
5	Heavy overload current	Enter on the left,Right display
6	Light overload allowable time	Enter on the left,Right display
7	Allowable time for heavy overload	Enter on the left,Right display
8	Output voltage quick break instantaneous maximum	Enter on the left,Right display
9	Instantaneous maximum value of input voltage quick break	Enter on the left,Right display
10	Minimum mode value of induced voltage	Enter on the left,Right display
11	Maximum output current imbalance	Enter on the left,Right display
12	Maximum output voltage unbalance	Enter on the left,Right display
13	Maximum input voltage imbalance	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

8 “Protection Enable”Interface

In the "Parameter Setting" interface, click the "Motor Start Parameter" drop-down menu, and then click the "Protection Enable" submenu to enter the "Protection Enable" interface as shown in Figure 3-7. On this interface, the user completes the setting of the protection of the HV inverter, and then click the "Write" button in the upper right corner to save the change result.

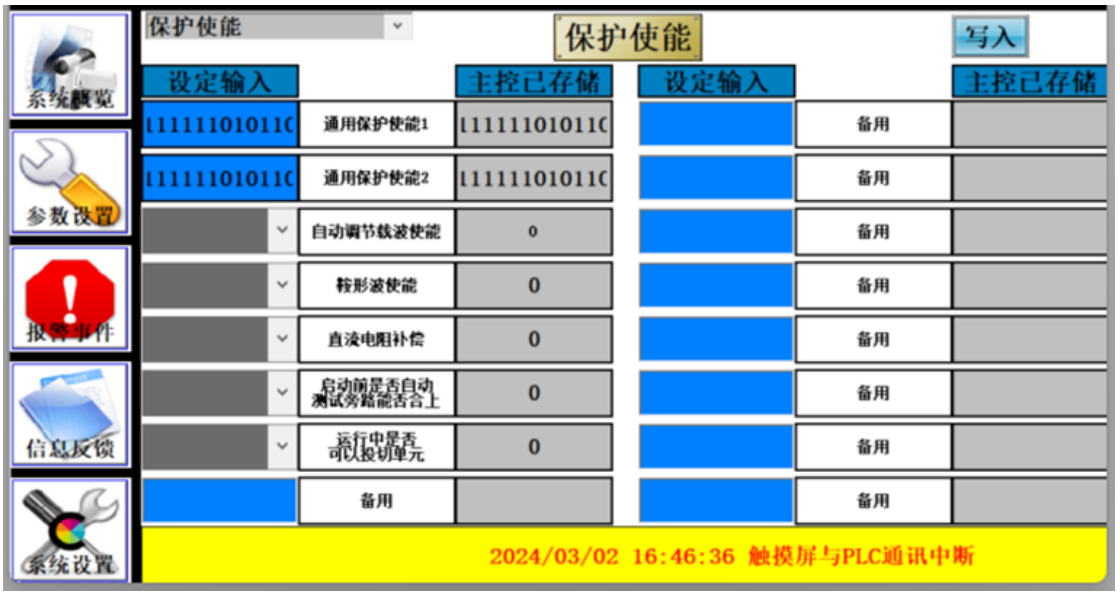


Figure 3-7 Protection enable Interface

No.	Instructions	Features
1	Universal protection enabled 1	Enter on the left,Right display
2	Universal protection enabled 2	Enter on the left,Right display
3	Enable automatic carrier adjustment	Select on the left,Right display
4	Saddle wave is enabled	Select on the left,Right display
5	DC resistance compensation	Select on the left,Right display
6	Check whether the bypass operation is normal before the startup	Select on the left,Right display
7	Whether the unit can be switched during operation	Select on the left,Right display
8	Standby	Enter on the left,Right display
9	Standby	Enter on the left,Right display
10	Standby	Enter on the left,Right display
11	Standby	Enter on the left,Right display
12	Standby	Enter on the left,Right display
13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

9 "Sampling zero setting" Interface

In the "Parameter Setting" interface, click the "Motor Starting Parameter" drop-down menu, and then click the "Sampling zero setting" submenu to enter the "Sampling zero setting" interface as shown in Figure 3-7. On this interface, the user completes the setting of sampling zero of the HV inverter, and then clicks the "Write" button in the upper right corner to save the change result.

Figure 3-8 Sampling zero setting Interface

No.	Instructions	Features
1	Sampling channel 0 Zero value	Enter on the left,Right display
2	Sampling channel 1 Zero value	Enter on the left,Right display
3	Sampling channel 2 Zero value	Enter on the left,Right display
4	Sampling channel 3 Zero value	Enter on the left,Right display
5	Sampling channel 4 Zero value	Enter on the left,Right display
6	Sampling channel 5 Zero value	Enter on the left,Right display
7	Sampling channel 6 Zero value	Enter on the left,Right display
8	Sampling channel 7 Zero value	Enter on the left,Right display
9	Sampling channel 8 Zero value	Enter on the left,Right display
10	Sampling channel 9 Zero value	Enter on the left,Right display
11	Sampling channel 10 Zero value	Enter on the left,Right display
12	Sampling channel 11 Zero value	Enter on the left,Right display
13	Sampling channel 12 Zero value	Enter on the left,Right display
14	Sampling channel 13 Zero value	Enter on the left,Right display
15	Sampling channel 14 Zero value	Enter on the left,Right display
16	Sampling channel 15 Zero value	Enter on the left,Right display

10 "Motor Parameters" Interface

In the "Parameter Settings" interface, click the "Motor Starting Parameters" drop-down menu, and then click the "Sampling Coefficient" submenu to enter the "Sampling Coefficient" interface as shown in Figure 3-8. The user completes the high-voltage inverter sampling coefficient on this interface. settings, and then click the write button in the upper right corner to save the changes.

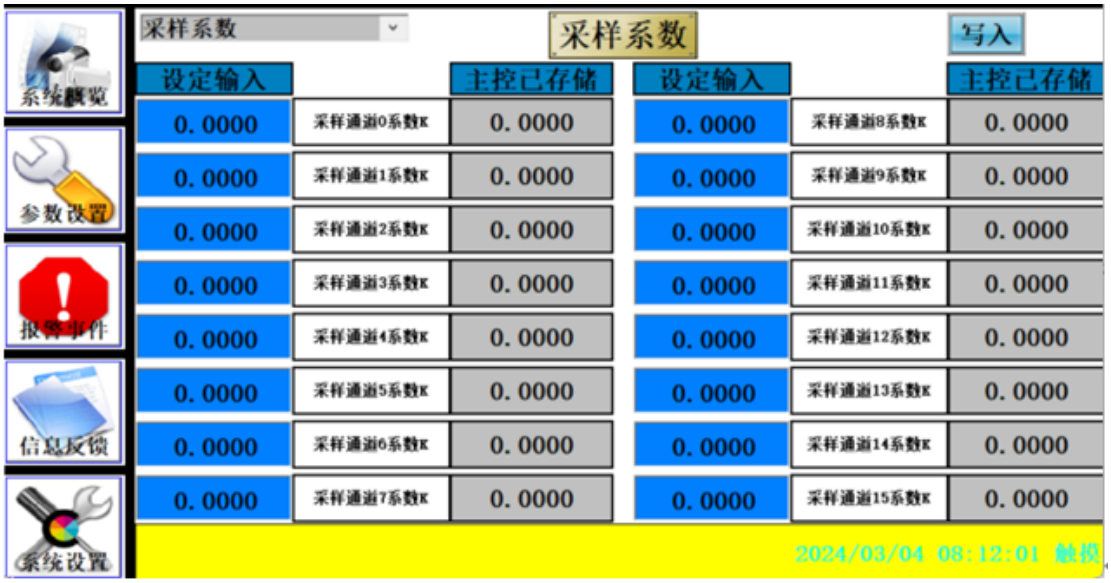


Figure 3-8 Sampling coefficient interface

No.	Instructions	Features
1	Sampling channel 0 coefficient K	Enter on the left,Right display
2	Sampling channel 1 coefficient K	Enter on the left,Right display
3	Sampling channel 2 coefficient K	Enter on the left,Right display
4	Sampling channel 3 coefficient K	Enter on the left,Right display
5	Sampling channel 4 coefficient K	Enter on the left,Right display
6	Sampling channel 5 coefficient K	Enter on the left,Right display
7	Sampling channel 6 coefficient K	Enter on the left,Right display
8	Sampling channel 7 coefficient K	Enter on the left,Right display
9	Sampling channel 8 coefficient K	Enter on the left,Right display
10	Sampling channel 9 coefficient K	Enter on the left,Right display
11	Sampling channel 10 coefficient K	Enter on the left,Right display
12	Sampling channel 11 coefficient K	Enter on the left,Right display
13	Sampling channel 12 coefficient K	Enter on the left,Right display
14	Sampling channel 13 coefficient K	Enter on the left,Right display
15	Sampling channel 14 coefficient K	Enter on the left,Right display
16	Sampling channel 15 coefficient K	Enter on the left,Right display

11 "PLC Retained Parameter Settings" Interface

In the "Parameter Settings" interface, click the "Motor Startup Parameters" drop-down menu, and then click the "PLC Retained Parameter Settings" submenu to enter the "PLC Retained Parameter Settings" interface as shown in Figure 3-9. The user completes the high-voltage The inverter PLC retains the parameter settings, and then click the write button in the upper right corner to save the changes.

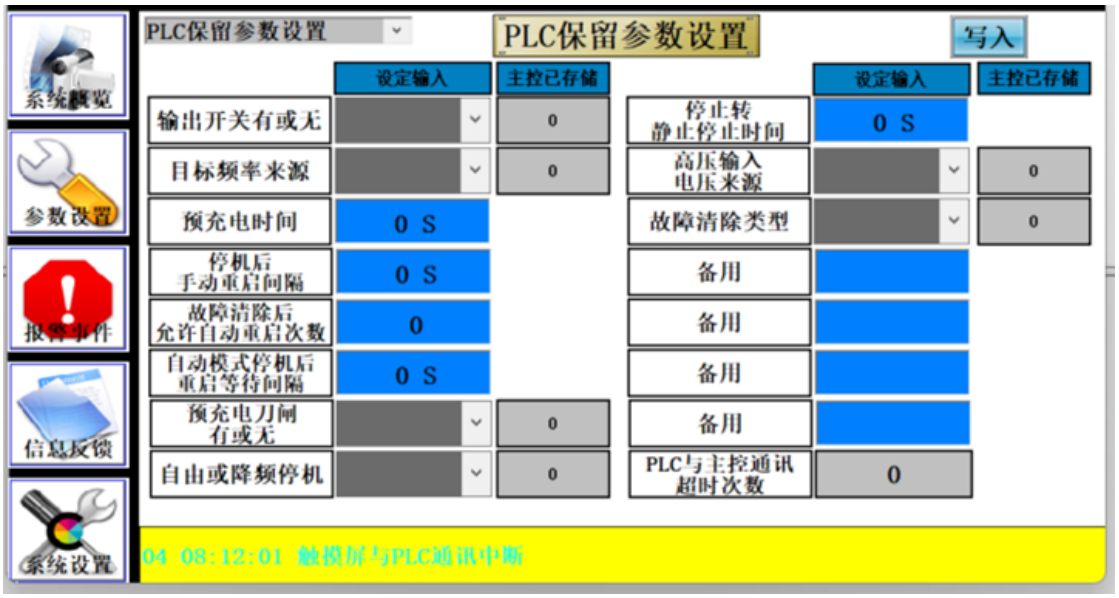


Figure 3-9 PLC retains parameter setting interface

No.	Instructions	Features
1	Output switch with or without	1 on the right is selected, 2 on the right is displayed
2	Target frequency source	1 on the right is selected, 2 on the right is displayed
3	Precharge time	Enter on the right
4	Manual restart interval after shutdown	Enter on the right
5	Number of automatic restarts allowed after the fault is cleared	Enter on the right
6	Waiting interval for restart after shutdown in automatic mode	Enter on the right
7	Pre-charged knife switch with or without	1 on the right is selected, 2 on the right is displayed
8	Free or reduced frequency shutdown	1 on the right is selected, 2 on the right is displayed
9	Stop to static stop waiting time interval	Enter on the right
10	High voltage input voltage signal source	1 on the right is selected, 2 on the right is displayed
11	Fault clearing type	1 on the right is selected, 2 on the right is displayed
12	Standby	Enter on the right
13	Standby	Enter on the right
14	Standby	Enter on the right
15	Standby	Enter on the right
16	Number of communication timeouts between PLC and main control	Display on the right

12 "Unit Hardware Fault Settings" Parameter Interface

In the "Parameter Settings" interface, click the "Motor Startup Parameters" drop-down menu, and then click the "Unit Hardware Fault Settings" submenu to enter the "" interface as shown in Figure 3-10 and Figure 3-11. The user completes the steps on this interface. Set the hardware fault of the high-voltage inverter unit, and then click the write button in the upper right corner to save the change results to simulate unit faults and test the protection action of the main controller.

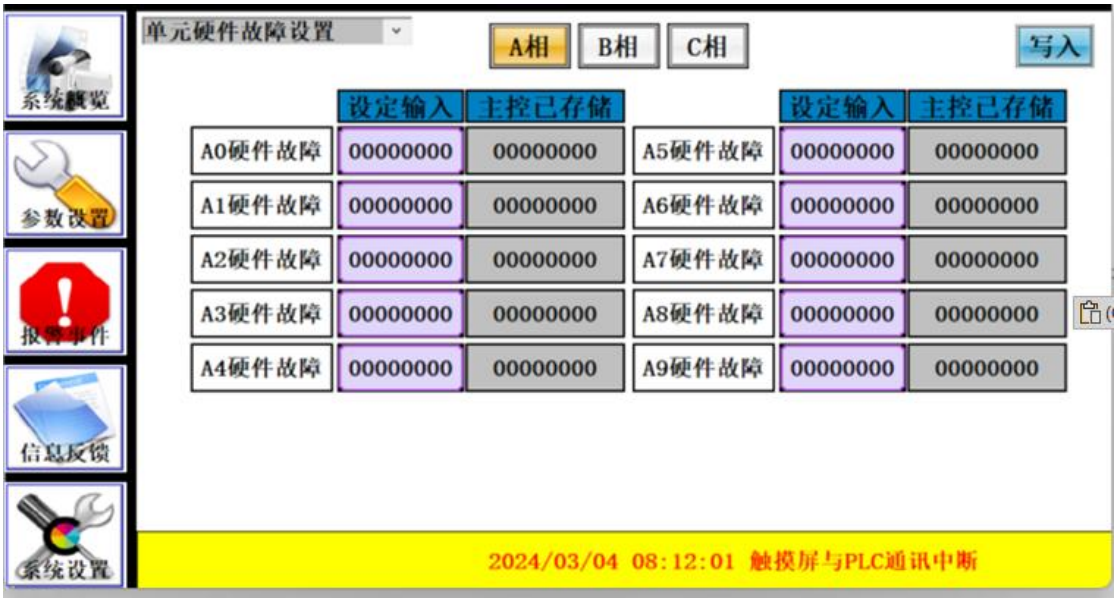


Figure 3-10 Unit Hardware Fault Setting Interface

No.	Instructions	Features
1	A0 unit hardware failure	1 on the right input, 2 on the right display
2	A1 unit hardware failure	1 on the right input, 2 on the right display
3	A2 unit hardware failure	1 on the right input, 2 on the right display
4	A3 unit hardware failure	1 on the right input, 2 on the right display
5	A4 unit hardware failure	1 on the right input, 2 on the right display
6	A5 unit hardware failure	1 on the right input, 2 on the right display
7	A6 unit hardware failure	1 on the right input, 2 on the right display
8	A7 unit hardware failure	1 on the right input, 2 on the right display
9	A8 unit hardware failure	1 on the right input, 2 on the right display
10	A9 unit hardware failure	1 on the right input, 2 on the right display
11	A10 unit hardware failure	1 on the right input, 2 on the right display
12	A11 unit hardware failure	1 on the right input, 2 on the right display
13	A12 unit hardware failure	1 on the right input, 2 on the right display
14	A13 unit hardware failure	1 on the right input, 2 on the right display
15	A14 unit hardware failure	1 on the right input, 2 on the right display
16	A15 unit hardware failure	1 on the right input, 2 on the right display

Click 1 to set the input on the right side of the A0 unit hardware fault. You can set the unit hardware fault type as shown in Figure 3-11. Normal means that the fault is not enabled, and fault means that the fault is enabled. The same is true for A-phase, B-phase and C-phase units.

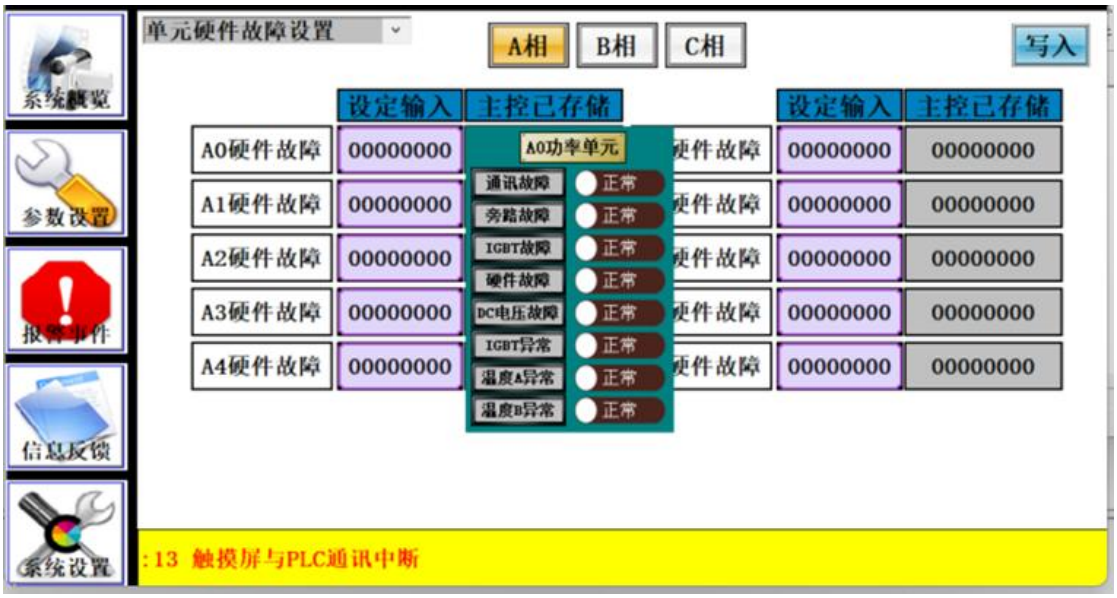


Figure 3-11 A phase power unit fault type setting

13 "Alarm Event" Interface

Click the alarm event button on the start interface of the touch screen, and the screen will jump to the real-time recording and historical recording screens. Click the real-time recording drop-down menu to switch the interface back and forth between real-time recording and historical recording. The screen content is as shown in Figure 3-12 and Figure 3- 13.

Figure 3-12 Real Time Recording

Figure 3-13 History Record

14 Information Feedback Interface

Click the information feedback button on the start interface of the touch screen. The screen jumps to the information feedback screen. The unit fault status interface is displayed by default. Click the unit lock fault observation page and unit fault status to go back and forth between the unit fault status and the unit lock fault observation page. Switch interface display, the screen content is as shown in Figure 3-14 and Figure 3-15.

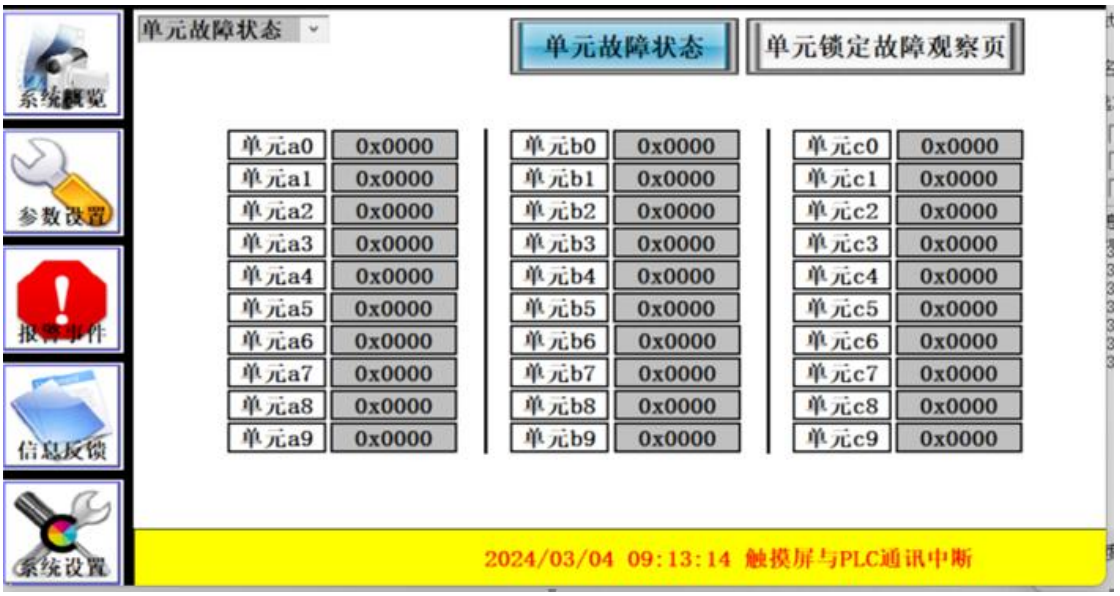


Figure 3-14 Unit Fault Status

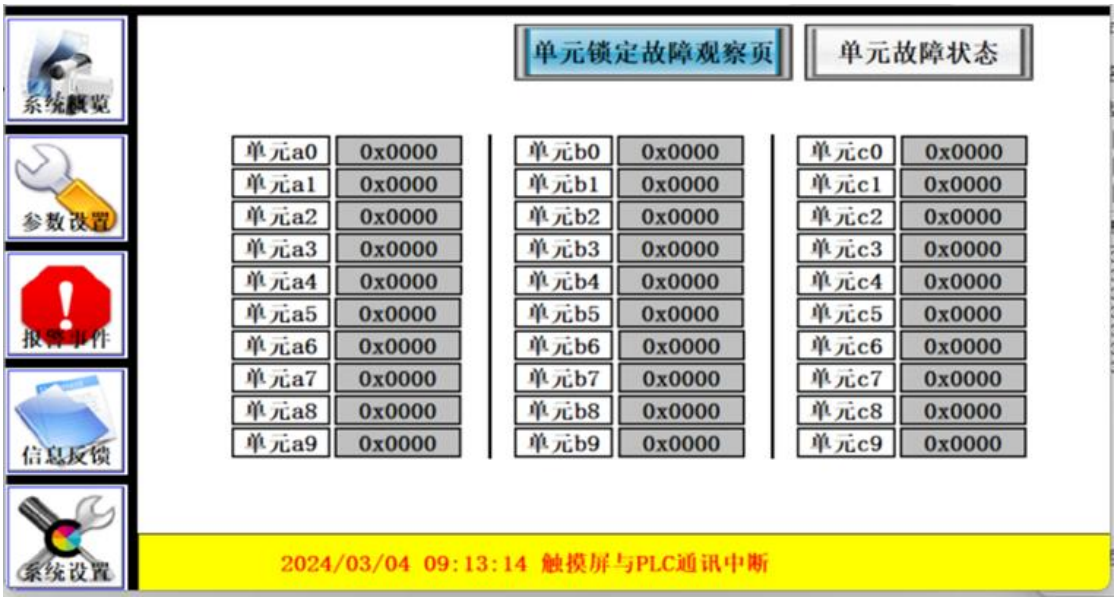


Figure 3-15 Unit Lock Fault Observation Page

15 Unit DC Voltage

In the information feedback interface, click the unit fault status drop-down menu and click unit DC voltage. The screen jumps to the unit DC voltage screen. The screen content is as shown in Figure 3-16.

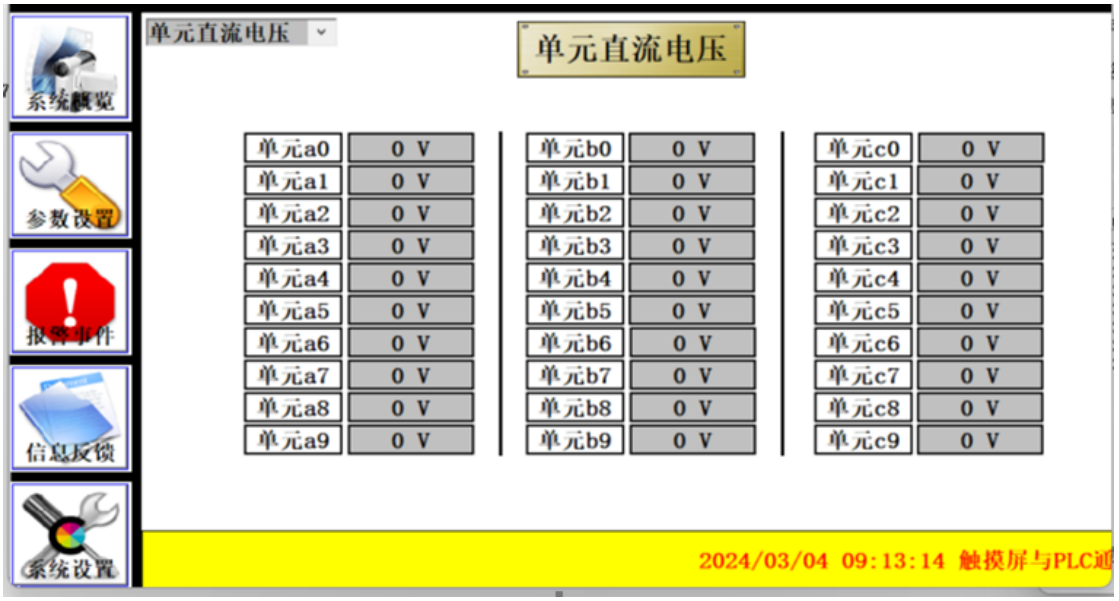


Figure 3-16 Unit DC voltage

16 Unit 5V Power Supply

In the information feedback interface, click the unit fault status drop-down menu and click the unit 5V power supply. The screen will jump to the unit 5V power supply screen. The screen content is as shown in Figure 3-17.

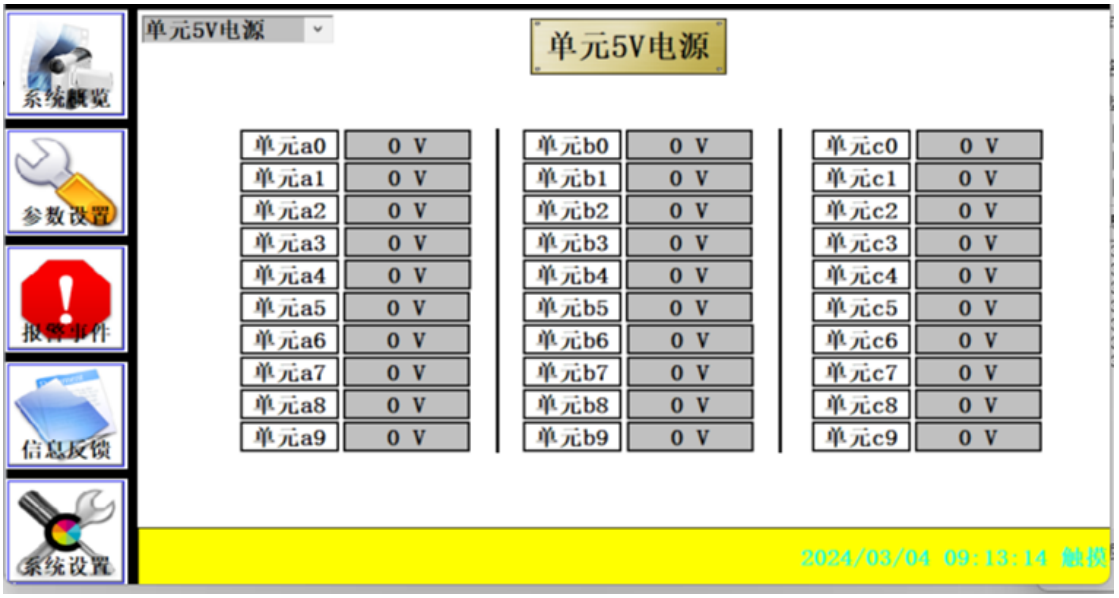


Figure 3-17 Unit 5V Power Supply

17 Unit Temperature

In the information feedback interface, click the unit fault status drop-down menu and click unit temperature. The screen jumps to the unit temperature screen. The screen content is as shown in Figure 3-18.

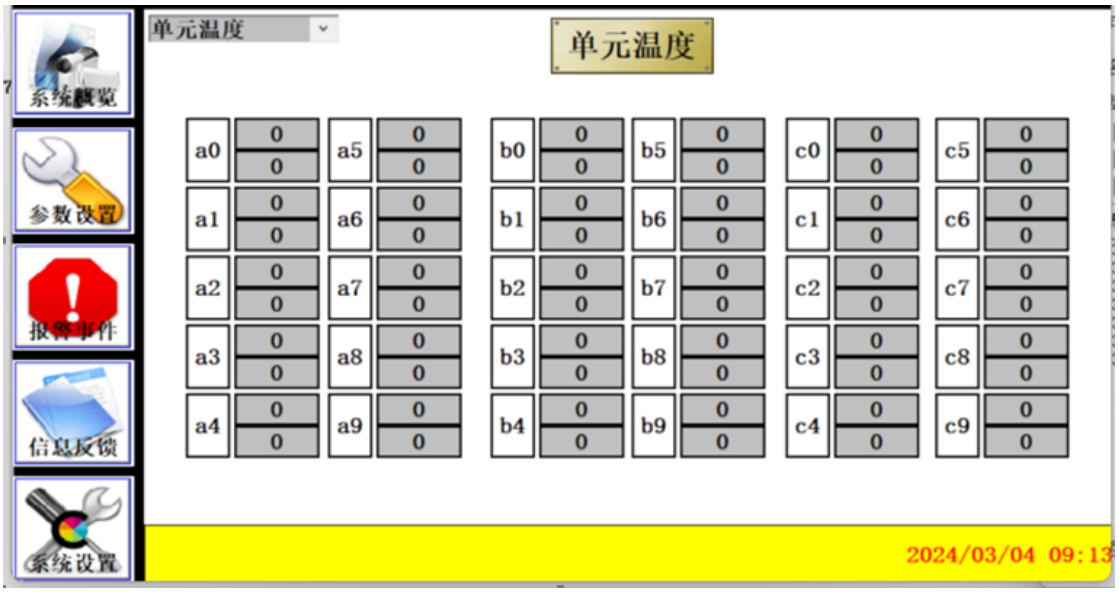


Figure 3-18 Unit Temperature

18 Sample Effective Value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling effective value submenu. The screen jumps to the sampling effective value screen. The screen content is as shown in Figure 3-19.

Figure 3-19 Sample Effective Value

19 Sampling instantaneous value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling instantaneous value submenu. The screen jumps to the sampling instantaneous value screen. The screen content is as shown in Figure 3-20.

Figure 3-20 Sampling Instantaneous Value

20 Sampling Instantaneous Value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling zero value submenu. The screen jumps to the sampling zero value screen. The screen content is as shown in Figure 3-21.

Figure 3-21 Sample Zero Value

21 Sampling Waveform Period

In the information feedback interface, click the unit fault status drop-down menu and click the sampling waveform period submenu. The screen jumps to the sampling waveform period screen. The screen content is as shown in Figure 3-22.

Figure 3-22 Sampling Waveform Period

22 Debug Data

In the information feedback interface, click the unit fault status drop-down menu and click the debugging data submenu. The screen jumps to the debugging data screen. The screen content is as shown in Figure 3-23. Enter the debugging page number to switch the debugging data page.

Figure 3-23 Debug Data

23 Unit Working Status

In the information feedback interface, click the unit fault status drop-down menu and click the unit working status submenu. The screen jumps to the unit working status screen. The screen content is as shown in Figure 3-24.

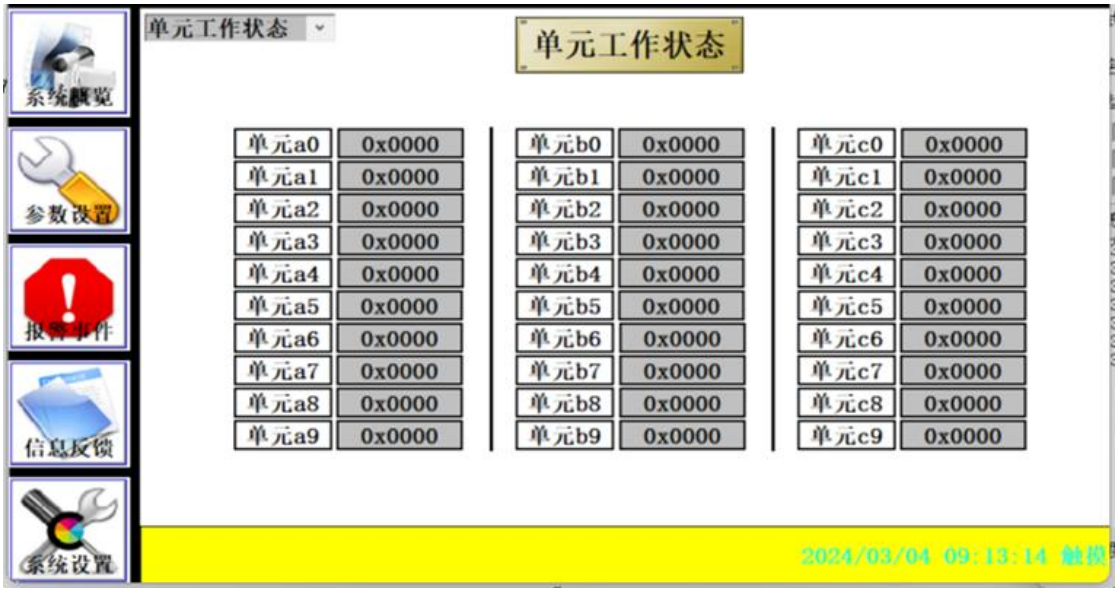


Figure 3-24 Unit Working Status

Chapter 4 User Installation and Debugging Steps and Procedures

In order to better guide customers to install and debug the series of high-voltage inverters, this chapter mainly introduces the steps and procedures for installation and debugging, as well as safety issues that need to be paid attention to during operation.

1 Final Customer Basic Information

user name			
Address			
zip code			
Contact Person			
Tele	Office Tele：	Fax：	Phone：

2 inverter and Motor Parameters

inverter		**Motor**	
Model		Model	
Manufacturer		Manufacturer	
Adaptation Power		Motor Power	
Input voltage		Rated voltage	
Device ID		Power Factor	
Is the center point grounded		Is the center point grounded	
Date of Manufacture		Date of Manufacture	

3 Main Parameters of Load

（When dragging one to two, you need to fill in load two）

Load One		**Load Two**	
Load Name		Load Name	
Load Function		Load Function	
Model		Model	
Manufacturer		Manufacturer	
Adaptation Power		Adaptation Power	
Application		Application	
User ID		User ID	
Date of Manufacture		Date of Manufacture	

4 Installation Environment

Temperature	
Corrosive gas nearby	
There are liquid/gas pipelines nearby	
Humidity	
Conductive dust nearby	
Are there rain/snow protection measures at the air inlet/outlet?	

5 Check and Confirm Before Powering On

No.	**Content**		**Result**
1	Civil Construction Inspection	The house is well sealed and does not leak.	
		The housing space meets the installation and commissioning requirements.	
		The doors and windows of the house are well installed.	

		The cable trenches or bridges in the house meet the specifications and there is no water accumulation.	
		The air duct installation is completed and there is no air leakage	
		The house has adequate air inlets (air inlets are equipped with filters)	
		The air duct outlet does not leak and can prevent rats, birds, etc.	
2	Cabinet Inspection	The cabinet fan is installed correctly and firmly	
		The cabinets are tight and there are no gaps	
		Cabinet and base are reliably connected	
		The cabinet door can be opened and closed easily, and the filter can be easily removed	
		cabinet level	
		Each power unit is in good contact with its upper part and the screws are fixed correctly.	
3	Equipment Grounding Check	Cabinet grounding	
		Knife switch and vacuum contactor ground	
		Control cabinet grounding	
		Transformer grounding point grounded	
		The third winding (auxiliary winding) on the secondary side of the transformer is grounded at XYZ	
		Lightning arrester and live indicator grounding	
		The shielding layer of the user's high-voltage cable must be grounded at the incoming cabinet end;	
		The shielding layer of the user interface incoming cable is grounded at the control cabinet end (single-ended grounding is required).	
4	High-voltage cable inspection (disconnect the user's grounding switch, the high-voltage cable ABC to the motor is connected, and the input cable ABC is blocked)	High-voltage cable from the user's high-voltage cabinet to the inverter entry cabinet (confirm with a multimeter)	
		High-voltage cable from the inverter entry cabinet to the inverter transformer (confirm with a multimeter)	
		The inverter outputs to the high-voltage cable of the incoming cabinet (confirm with a multimeter)	
		High-voltage cable from the incoming cabinet to the motor (confirm with a multimeter)	
		The distance between the outer sheath, shielding layer, armored layer of high-voltage cable and the high-voltage live body is greater than 125mm	
5	Is there any abnormality in the project on the right	Bypass control interface board (whether the optical fiber and power wiring are loose)	
		Main control system (whether the cover is tightly closed, whether fiber optic wiring, etc. are completed)	
		Terminal adapter board (whether the wiring is secure)	
		Sampling resistor (whether the resistance value is 1MΩ or 2MΩ)	
		Voltage Hall sensor (TVS tube)	
		Current Hall sensor (whether wiring is completed)	
		Vacuum contactor (clean or not)	
		Knife gate (whether the contact is good)	
6	Is the fiber optic connection reliable	Sending and receiving optical fibers of each unit	
		Optical fiber in the main control system	
		Bypass control panel fiber optics	
7	The voltage detection circuit is wired correctly	The A/B/C phase high voltage output terminal to the A/B/C phase sampling resistor is connected correctly	
		The A/B/C phase sampling resistor output line to the A/B/C phase Hall sensor detection terminal is connected correctly	
		The A/B/C phase Hall sensor signal output end to the input end of the terminal adapter board (AD1-1/ AD1-2/ AD1-3) is connected correctly	

8	Check the resistance to the cabinet ground and record it in detail	Control power supply A is connected to the cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		Control power supply B is connected to the cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		Control power supply C to cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		The control power supply L is connected to the cabinet earth (take the incoming and outgoing sides of the 2P circuit breaker)	
		The control power supply N is connected to the cabinet earth (take the incoming and outgoing sides of the 2P circuit breaker)	
		24V+ is blocked from the cabinet earth (measured on the switching power supply)	
		24V - No connection to the cabinet earth (measured on the switching power supply)	
		±15V is blocked from the cabinet ground (measured on the switching power supply)	
9	Cooling fan inspection (Record resistance value)	The fan blades are clean, rotate flexibly, and have no abnormal noise.	
		A to B resistance (3-15Ω)	
		B to C resistance (3-15Ω)	
		C to A resistance (3-15Ω)	
		The three-phase resistance of the fan should be balanced (the deviation is less than 10%)	
		The resistance of A, B and C to the cabinet earth is >1MΩ	
10	Power unit inspection	It is necessary to complete the first two contents of the power unit inspection record	See power unit inspection record form
11	Other Tests	The input side ±5% tap shorting piece of the phase-shifting transformer is connected correctly.	
		Tighten the wiring screws on the primary and secondary sides of the phase-shifting transformer. Pay special attention to the direct connection between the high-voltage cable nose from the secondary side to the power unit and the copper plate of the phase-shifting transformer (there must be no nuts in the middle)	

No.	Instructions	Features
1	Rated frequency of motor	Enter on the left,Right display
2	Minimum motor operating frequency	Enter on the left,Right display
3	Rated voltage of motor	Enter on the left,Right display
4	Rated motor speed	Enter on the left,Right display
5	Motor rated slip	Enter on the left,Right display
6	Motor stator resistance	Enter on the left,Right display
7	Number of units	Enter on the left,Right display
8	Minimum operating unit	Enter on the left,Right display
9	No unit bypass function	Select on the left,Right display
10	Rated incoming voltage of the device	Enter on the left,Right display
11	Rated incoming voltage of the unit	Enter on the left,Right display
12	Motor output wiring phase sequence	Select on the left,Right display
13	Sampling measurement delay	Enter on the left,Right display
14	The motor is free to slow down at high speed	Enter on the left,Right display
15	Static rated voltage of the unit	Enter on the left,Right display

16	Unit 75% load rated voltage	Enter on the left,Right display

4 "Motor acceleration and deceleration" Interface

In the "Parameter Setting" interface, click the "Motor start parameter" drop-down menu, and then click the "Motor increase and deceleration" sub-menu to enter the "Motor increase and deceleration" interface as shown in Figure 3-4. The user completes the setting of the motor increase and deceleration parameter on this interface, and then click the "Write" button in the upper right corner to save the change result.

Figure 3-4 Motor acceleration and deceleration interface

No.	Instructions	Features
1	<1/32 segment increase frequency speed	Enter on the left,Right display
2	<1/32 segment drop frequency speed	Enter on the left,Right display
3	<1/8 segment increase frequency speed	Enter on the left,Right display
4	<1/8 segment drop frequency speed	Enter on the left,Right display
5	<2/8 segment increase frequency speed	Enter on the left,Right display
6	<2/8 segment drop frequency speed	Enter on the left,Right display
7	<3/8 segment increase frequency speed	Enter on the left,Right display
8	<3/8 segment drop frequency speed	Enter on the left,Right display
9	<4/8 segment increase frequency speed	Enter on the left,Right display
10	<4/8 segment drop frequency speed	Enter on the left,Right display
11	<5/8 segment increase frequency speed	Enter on the left,Right display

12	<5/8 segment drop frequency speed	Enter on the left,Right display
13	<6/8 segment increase frequency speed	Enter on the left,Right display
14	<6/8 segment drop frequency speed	Enter on the left,Right display
15	>6/8 segment increase frequency speed	Enter on the left,Right display
16	>6/8 segment drop frequency speed	Enter on the left,Right display

5 "Motor Resonance Point" Interface

In the "Parameter Setting" interface, click the "Motor starting parameter" drop-down menu, and then click the "motor resonance point" sub-menu to enter the "motor resonance point" interface as shown in Figure 3-5. On this interface, the user completes the setting of the motor resonance point parameter of the HV inverter, and then click the "write" button in the upper right corner to save the change result

Figure 3-5 Motor resonance point setting interface

No.	Instructions	Features
1	Resonance point width	Enter on the left,Right display
2	0 resonance point	Enter on the left,Right display
3	1 resonance point	Enter on the left,Right display
4	2 resonance point	Enter on the left,Right display
5	3 resonance point	Enter on the left,Right display
6	Standby	Enter on the left,Right display
7	Standby	Enter on the left,Right display
8	Standby	Enter on the left,Right display
9	Standby	Enter on the left,Right display
10	Standby	Enter on the left,Right display
11	Standby	Enter on the left,Right display
12	Standby	Enter on the left,Right display

13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

6 "Motor Running Curve"Interface

In the "Parameter Setting" interface, click the "Motor Starting parameter" drop-down menu, and then click the "Motor Running curve" submenu to enter the "Motor Running curve" interface as shown in Figure 3-6. On this interface, the user completes the parameter setting of the motor running curve of the HV inverter, and then click the "Write" button in the upper right corner to save the change result.

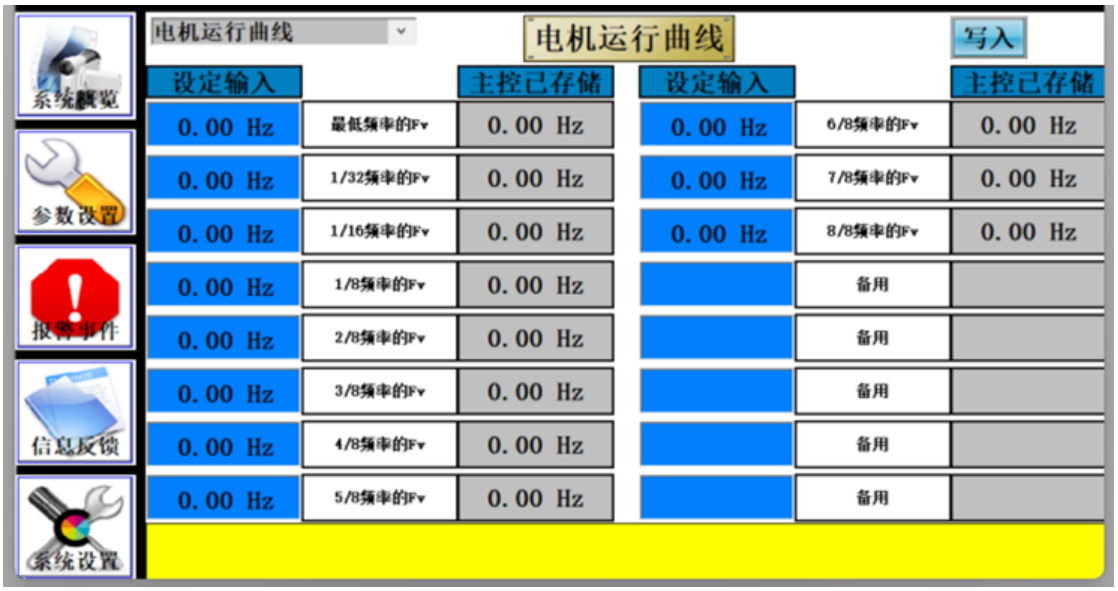


Figure 3-6 Motor running curve interface

No.	Instructions	Features
1	Lowest frequencyFv	Enter on the left,Right display
2	1/32 frequency Fv	Enter on the left,Right display
3	1/16 frequency Fv	Enter on the left,Right display
4	1/8 frequency Fv	Enter on the left,Right display
5	2/8 frequency Fv	Enter on the left,Right display
6	3/8 frequency Fv	Enter on the left,Right display
7	4/8frequency Fv	Enter on the left,Right display
8	5/8 frequency Fv	Enter on the left,Right display
9	6/8 frequency Fv	Enter on the left,Right display
10	7/8 frequency Fv	Enter on the left,Right display
11	8/8 frequency Fv	Enter on the left,Right display
12	Standby	Enter on the left,Right display
13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display

15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

7 “Protection Parameter”Interface

In the "Parameter Setting" interface, click the "Motor starting parameter" drop-down menu, and then click the "Protection parameter" submenu to enter the "Protection parameter" interface as shown in Figure 3-7. On this interface, the user completes the setting of the protection parameter of the high voltage inverter, and then click the "Write" button in the upper right corner to save the change result.

Figure 3-7 Protection Parameter Interface

No.	Instructions	Features
1	Rated current of motor	Enter on the left,Right display
2	Effective value of protection current	Enter on the left,Right display
3	Instantaneous maximum value of quick-break current	Enter on the left,Right display
4	Light overload current	Enter on the left,Right display
5	Heavy overload current	Enter on the left,Right display
6	Light overload allowable time	Enter on the left,Right display
7	Allowable time for heavy overload	Enter on the left,Right display
8	Output voltage quick break instantaneous maximum	Enter on the left,Right display
9	Instantaneous maximum value of input voltage quick break	Enter on the left,Right display
10	Minimum mode value of induced voltage	Enter on the left,Right display
11	Maximum output current imbalance	Enter on the left,Right display
12	Maximum output voltage unbalance	Enter on the left,Right display
13	Maximum input voltage imbalance	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

8 “Protection Enable”Interface

In the "Parameter Setting" interface, click the "Motor Start Parameter" drop-down menu, and then click the "Protection Enable" submenu to enter the "Protection Enable" interface as shown in Figure 3-7. On this interface, the user completes the setting of the protection of the HV inverter, and then click the "Write" button in the upper right corner to save the change result.

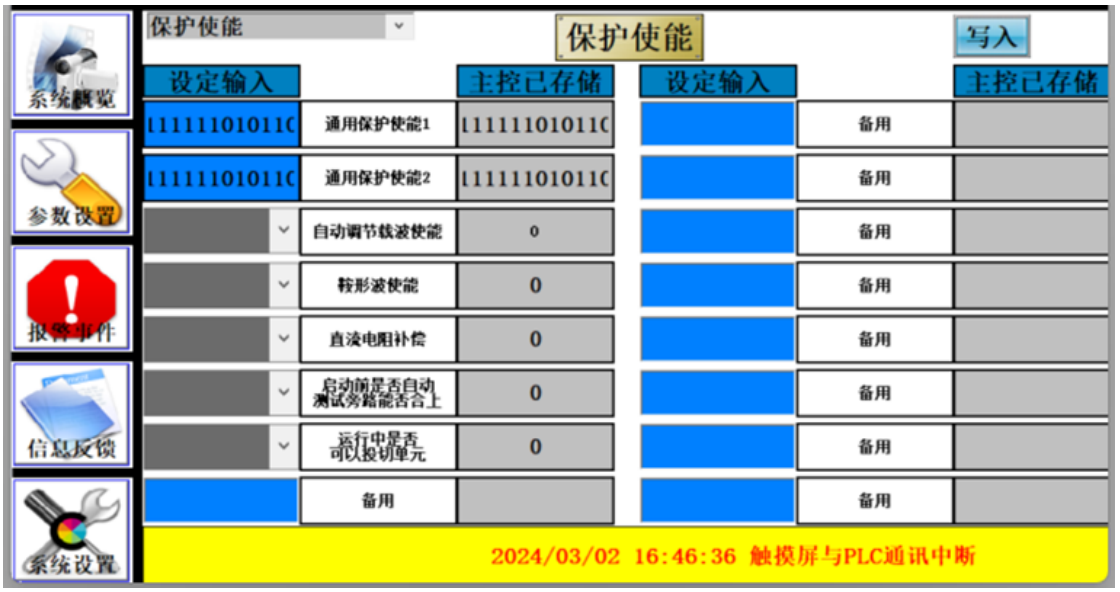


Figure 3-7 Protection enable Interface

No.	Instructions	Features
1	Universal protection enabled 1	Enter on the left,Right display
2	Universal protection enabled 2	Enter on the left,Right display
3	Enable automatic carrier adjustment	Select on the left,Right display
4	Saddle wave is enabled	Select on the left,Right display
5	DC resistance compensation	Select on the left,Right display
6	Check whether the bypass operation is normal before the startup	Select on the left,Right display
7	Whether the unit can be switched during operation	Select on the left,Right display
8	Standby	Enter on the left,Right display
9	Standby	Enter on the left,Right display
10	Standby	Enter on the left,Right display
11	Standby	Enter on the left,Right display
12	Standby	Enter on the left,Right display
13	Standby	Enter on the left,Right display
14	Standby	Enter on the left,Right display
15	Standby	Enter on the left,Right display
16	Standby	Enter on the left,Right display

9 "Sampling zero setting" Interface

In the "Parameter Setting" interface, click the "Motor Starting Parameter" drop-down menu, and then click the "Sampling zero setting" submenu to enter the "Sampling zero setting" interface as shown in Figure 3-7. On this interface, the user completes the setting of sampling zero of the HV inverter, and then clicks the "Write" button in the upper right corner to save the change result.

Figure 3-8 Sampling zero setting Interface

No.	Instructions	Features
1	Sampling channel 0 Zero value	Enter on the left,Right display
2	Sampling channel 1 Zero value	Enter on the left,Right display
3	Sampling channel 2 Zero value	Enter on the left,Right display
4	Sampling channel 3 Zero value	Enter on the left,Right display
5	Sampling channel 4 Zero value	Enter on the left,Right display
6	Sampling channel 5 Zero value	Enter on the left,Right display
7	Sampling channel 6 Zero value	Enter on the left,Right display
8	Sampling channel 7 Zero value	Enter on the left,Right display
9	Sampling channel 8 Zero value	Enter on the left,Right display
10	Sampling channel 9 Zero value	Enter on the left,Right display
11	Sampling channel 10 Zero value	Enter on the left,Right display
12	Sampling channel 11 Zero value	Enter on the left,Right display
13	Sampling channel 12 Zero value	Enter on the left,Right display
14	Sampling channel 13 Zero value	Enter on the left,Right display
15	Sampling channel 14 Zero value	Enter on the left,Right display
16	Sampling channel 15 Zero value	Enter on the left,Right display

10 "Motor Parameters" Interface

In the "Parameter Settings" interface, click the "Motor Starting Parameters" drop-down menu, and then click the "Sampling Coefficient" submenu to enter the "Sampling Coefficient" interface as shown in Figure 3-8. The user completes the high-voltage inverter sampling coefficient on this interface. settings, and then click the write button in the upper right corner to save the changes.

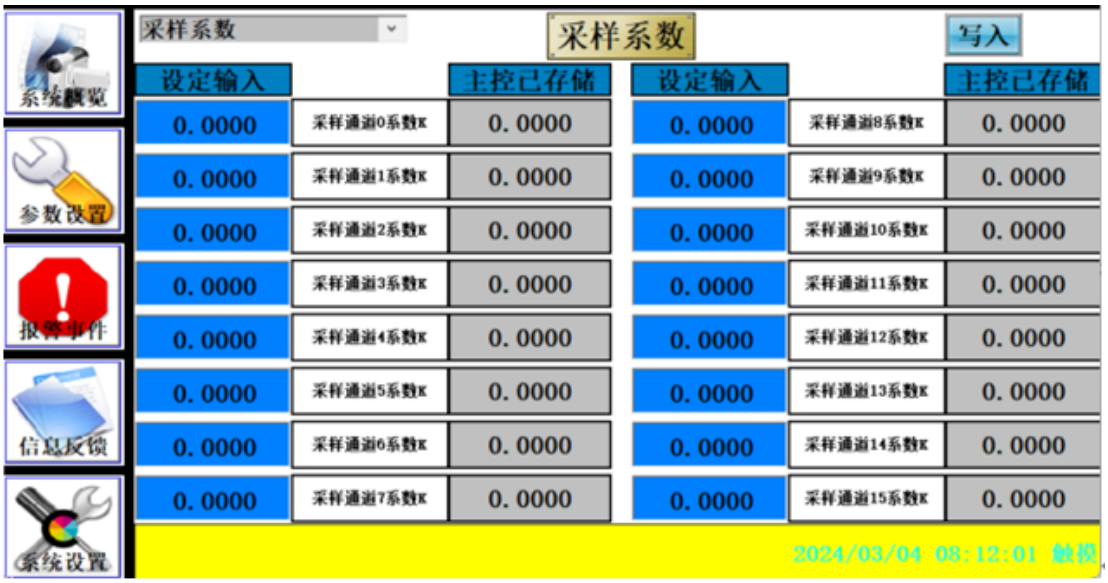


Figure 3-8 Sampling coefficient interface

No.	Instructions	Features
1	Sampling channel 0 coefficient K	Enter on the left,Right display
2	Sampling channel 1 coefficient K	Enter on the left,Right display
3	Sampling channel 2 coefficient K	Enter on the left,Right display
4	Sampling channel 3 coefficient K	Enter on the left,Right display
5	Sampling channel 4 coefficient K	Enter on the left,Right display
6	Sampling channel 5 coefficient K	Enter on the left,Right display
7	Sampling channel 6 coefficient K	Enter on the left,Right display
8	Sampling channel 7 coefficient K	Enter on the left,Right display
9	Sampling channel 8 coefficient K	Enter on the left,Right display
10	Sampling channel 9 coefficient K	Enter on the left,Right display
11	Sampling channel 10 coefficient K	Enter on the left,Right display
12	Sampling channel 11 coefficient K	Enter on the left,Right display
13	Sampling channel 12 coefficient K	Enter on the left,Right display
14	Sampling channel 13 coefficient K	Enter on the left,Right display
15	Sampling channel 14 coefficient K	Enter on the left,Right display
16	Sampling channel 15 coefficient K	Enter on the left,Right display

11 "PLC Retained Parameter Settings" Interface

In the "Parameter Settings" interface, click the "Motor Startup Parameters" drop-down menu, and then click the "PLC Retained Parameter Settings" submenu to enter the "PLC Retained Parameter Settings" interface as shown in Figure 3-9. The user completes the high-voltage The inverter PLC retains the parameter settings, and then click the write button in the upper right corner to save the changes.

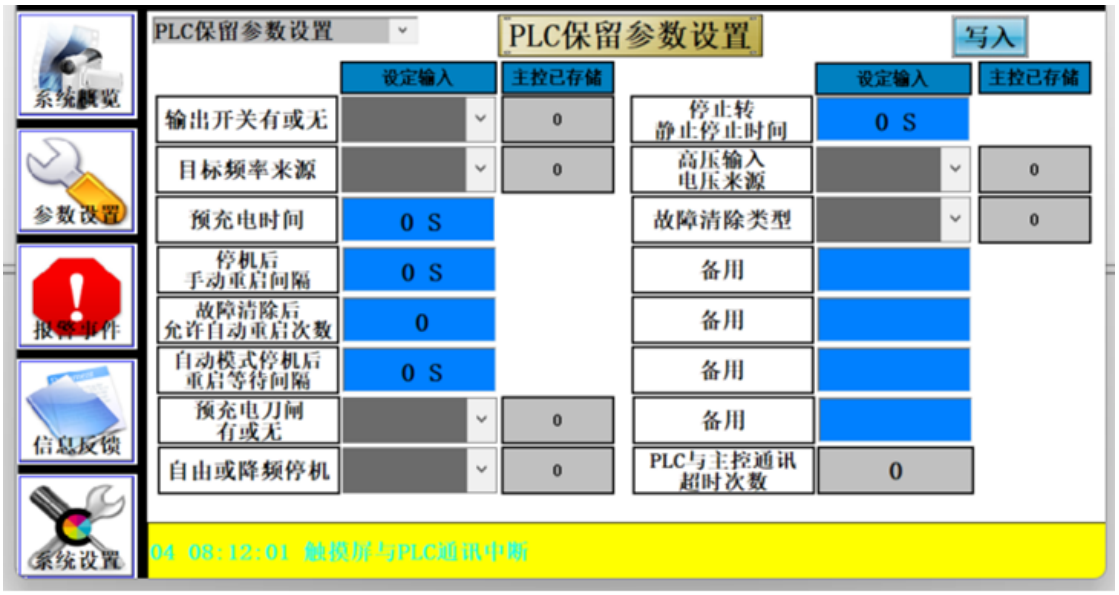


Figure 3-9 PLC retains parameter setting interface

No.	Instructions	Features
1	Output switch with or without	1 on the right is selected, 2 on the right is displayed
2	Target frequency source	1 on the right is selected, 2 on the right is displayed
3	Precharge time	Enter on the right
4	Manual restart interval after shutdown	Enter on the right
5	Number of automatic restarts allowed after the fault is cleared	Enter on the right
6	Waiting interval for restart after shutdown in automatic mode	Enter on the right
7	Pre-charged knife switch with or without	1 on the right is selected, 2 on the right is displayed
8	Free or reduced frequency shutdown	1 on the right is selected, 2 on the right is displayed
9	Stop to static stop waiting time interval	Enter on the right
10	High voltage input voltage signal source	1 on the right is selected, 2 on the right is displayed
11	Fault clearing type	1 on the right is selected, 2 on the right is displayed
12	Standby	Enter on the right
13	Standby	Enter on the right
14	Standby	Enter on the right
15	Standby	Enter on the right
16	Number of communication timeouts between PLC and main control	Display on the right

12 "Unit Hardware Fault Settings" Parameter Interface

In the "Parameter Settings" interface, click the "Motor Startup Parameters" drop-down menu, and then click the "Unit Hardware Fault Settings" submenu to enter the "" interface as shown in Figure 3-10 and Figure 3-11. The user completes the steps on this interface. Set the hardware fault of the high-voltage inverter unit, and then click the write button in the upper right corner to save the change results to simulate unit faults and test the protection action of the main controller.

Figure 3-10 Unit Hardware Fault Setting Interface

No.	Instructions	Features
1	A0 unit hardware failure	1 on the right input, 2 on the right display
2	A1 unit hardware failure	1 on the right input, 2 on the right display
3	A2 unit hardware failure	1 on the right input, 2 on the right display
4	A3 unit hardware failure	1 on the right input, 2 on the right display
5	A4 unit hardware failure	1 on the right input, 2 on the right display
6	A5 unit hardware failure	1 on the right input, 2 on the right display
7	A6 unit hardware failure	1 on the right input, 2 on the right display
8	A7 unit hardware failure	1 on the right input, 2 on the right display
9	A8 unit hardware failure	1 on the right input, 2 on the right display
10	A9 unit hardware failure	1 on the right input, 2 on the right display
11	A10 unit hardware failure	1 on the right input, 2 on the right display
12	A11 unit hardware failure	1 on the right input, 2 on the right display
13	A12 unit hardware failure	1 on the right input, 2 on the right display
14	A13 unit hardware failure	1 on the right input, 2 on the right display
15	A14 unit hardware failure	1 on the right input, 2 on the right display
16	A15 unit hardware failure	1 on the right input, 2 on the right display

Click 1 to set the input on the right side of the A0 unit hardware fault. You can set the unit hardware fault type as shown in Figure 3-11. Normal means that the fault is not enabled, and fault means that the fault is enabled. The same is true for A-phase, B-phase and C-phase units.

Figure 3-11 A phase power unit fault type setting

13 "Alarm Event" Interface

Click the alarm event button on the start interface of the touch screen, and the screen will jump to the real-time recording and historical recording screens. Click the real-time recording drop-down menu to switch the interface back and forth between real-time recording and historical recording. The screen content is as shown in Figure 3-12 and Figure 3- 13.

Figure 3-12 Real Time Recording

Figure 3-13 History Record

14 Information Feedback Interface

Click the information feedback button on the start interface of the touch screen. The screen jumps to the information feedback screen. The unit fault status interface is displayed by default. Click the unit lock fault observation page and unit fault status to go back and forth between the unit fault status and the unit lock fault observation page. Switch interface display, the screen content is as shown in Figure 3-14 and Figure 3-15.

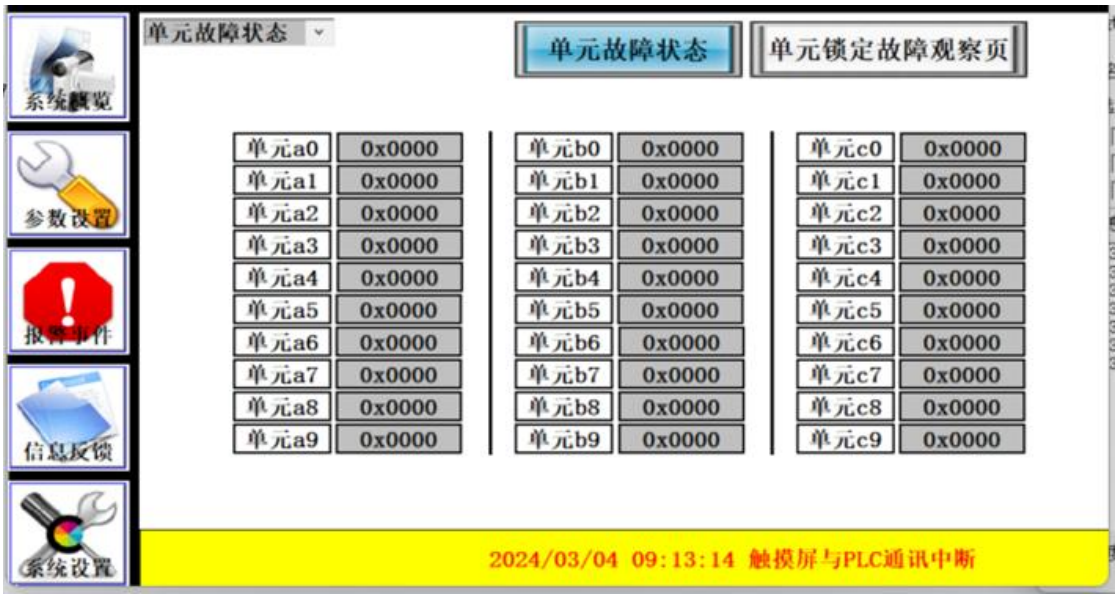


Figure 3-14 Unit Fault Status

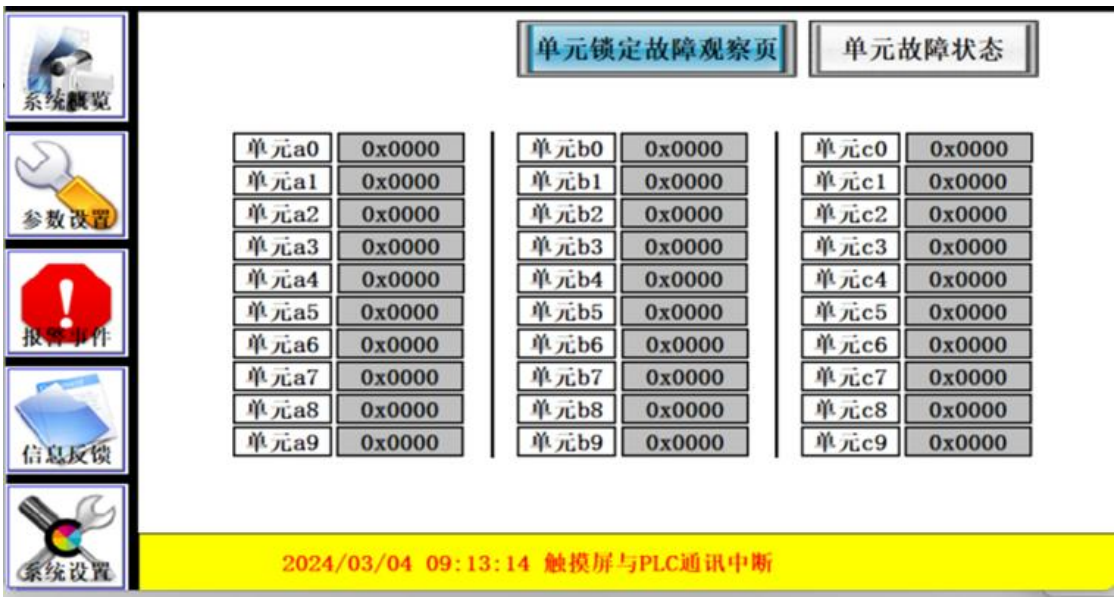


Figure 3-15 Unit Lock Fault Observation Page

15 Unit DC Voltage

In the information feedback interface, click the unit fault status drop-down menu and click unit DC voltage. The screen jumps to the unit DC voltage screen. The screen content is as shown in Figure 3-16.

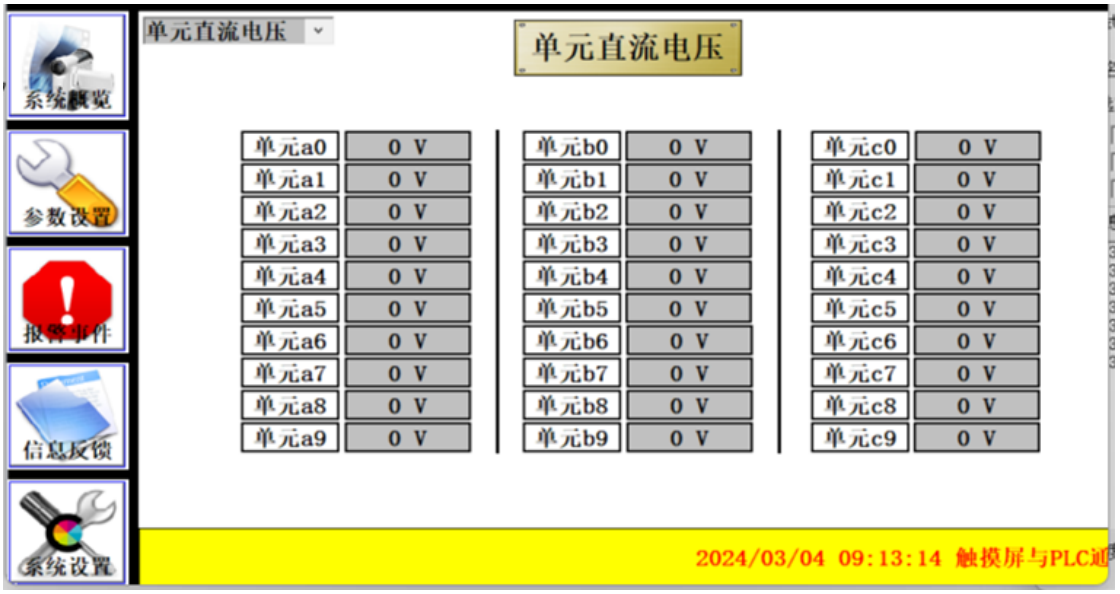


Figure 3-16 Unit DC voltage

16 Unit 5V Power Supply

In the information feedback interface, click the unit fault status drop-down menu and click the unit 5V power supply. The screen will jump to the unit 5V power supply screen. The screen content is as shown in Figure 3-17.

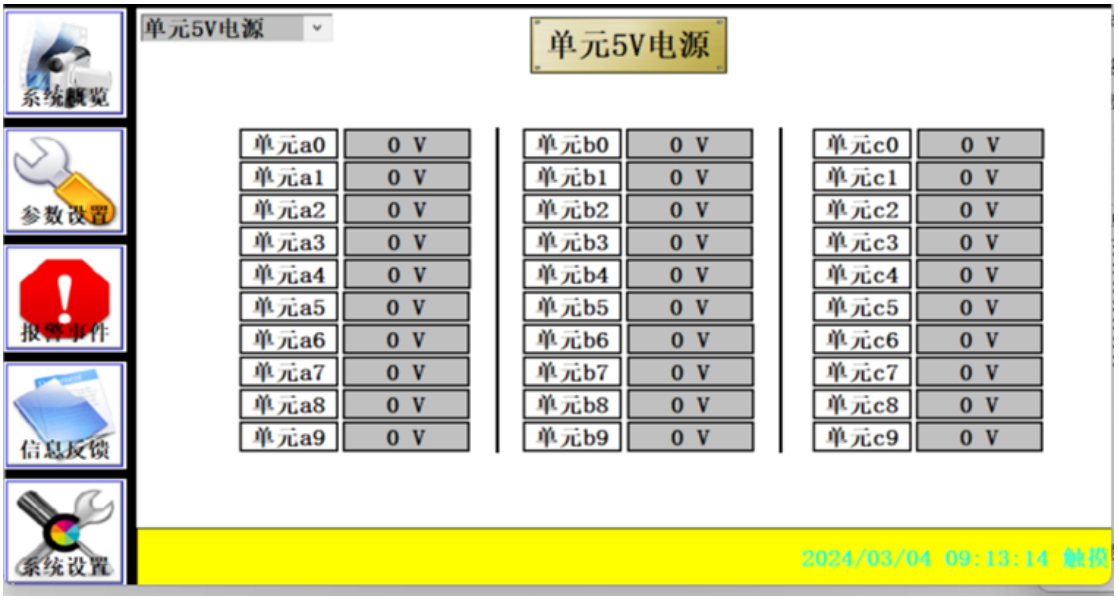


Figure 3-17 Unit 5V Power Supply

17 Unit Temperature

In the information feedback interface, click the unit fault status drop-down menu and click unit temperature. The screen jumps to the unit temperature screen. The screen content is as shown in Figure 3-18.

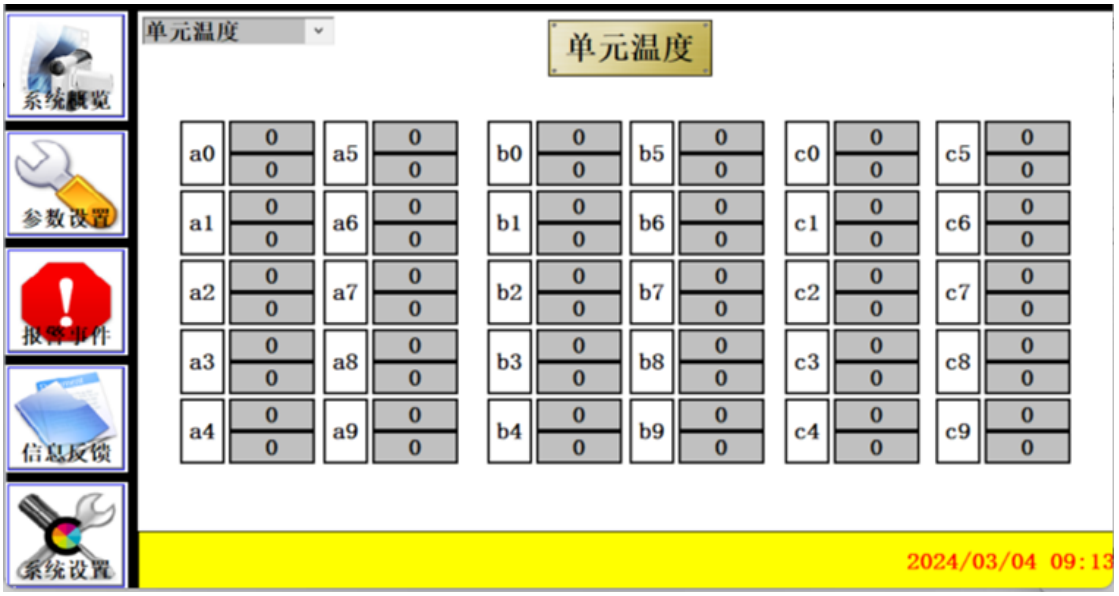


Figure 3-18 Unit Temperature

18 Sample Effective Value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling effective value submenu. The screen jumps to the sampling effective value screen. The screen content is as shown in Figure 3-19.

Figure 3-19 Sample Effective Value

19 Sampling instantaneous value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling instantaneous value submenu. The screen jumps to the sampling instantaneous value screen. The screen content is as shown in Figure 3-20.

Figure 3-20 Sampling Instantaneous Value

20 Sampling Instantaneous Value

In the information feedback interface, click the unit fault status drop-down menu and click the sampling zero value submenu. The screen jumps to the sampling zero value screen. The screen content is as shown in Figure 3-21.

Figure 3-21 Sample Zero Value

21 Sampling Waveform Period

In the information feedback interface, click the unit fault status drop-down menu and click the sampling waveform period submenu. The screen jumps to the sampling waveform period screen. The screen content is as shown in Figure 3-22.

Figure 3-22 Sampling Waveform Period

22 Debug Data

In the information feedback interface, click the unit fault status drop-down menu and click the debugging data submenu. The screen jumps to the debugging data screen. The screen content is as shown in Figure 3-23. Enter the debugging page number to switch the debugging data page.

Figure 3-23 Debug Data

23 Unit Working Status

In the information feedback interface, click the unit fault status drop-down menu and click the unit working status submenu. The screen jumps to the unit working status screen. The screen content is as shown in Figure 3-24.

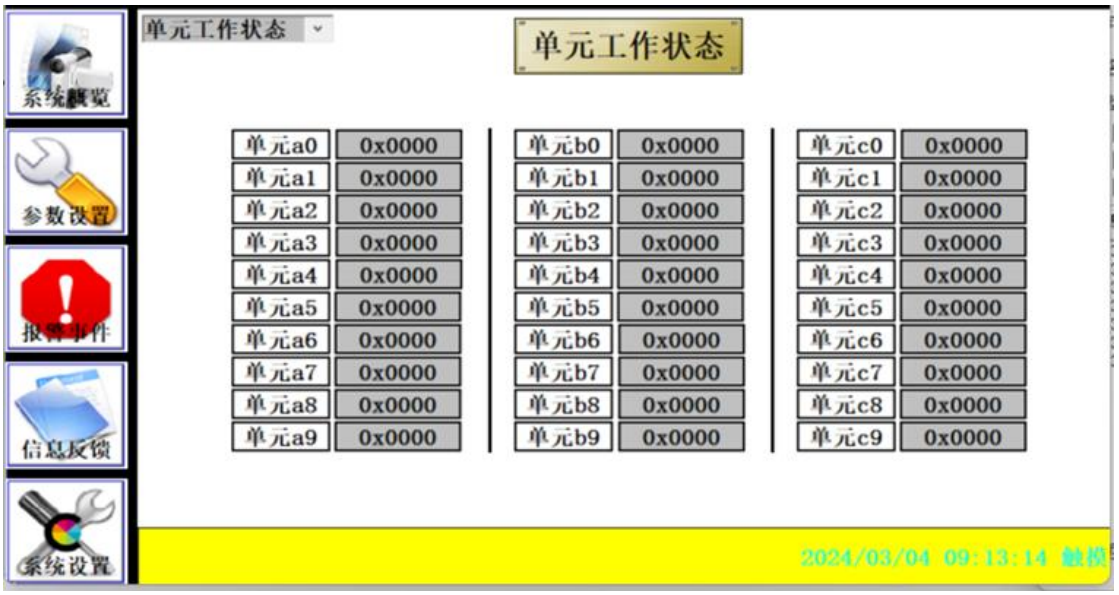


Figure 3-24 Unit Working Status

Chapter 4 User Installation and Debugging Steps and Procedures

In order to better guide customers to install and debug the series of high-voltage inverters, this chapter mainly introduces the steps and procedures for installation and debugging, as well as safety issues that need to be paid attention to during operation.

1 Final Customer Basic Information

user name			
Address			
zip code			
Contact Person			
Tele	Office Tele：	Fax：	Phone：

2 inverter and Motor Parameters

inverter		**Motor**	
Model		Model	
Manufacturer		Manufacturer	
Adaptation Power		Motor Power	
Input voltage		Rated voltage	
Device ID		Power Factor	
Is the center point grounded		Is the center point grounded	
Date of Manufacture		Date of Manufacture	

3 Main Parameters of Load

（When dragging one to two, you need to fill in load two）

Load One		**Load Two**	
Load Name		Load Name	
Load Function		Load Function	
Model		Model	
Manufacturer		Manufacturer	
Adaptation Power		Adaptation Power	
Application		Application	
User ID		User ID	
Date of Manufacture		Date of Manufacture	

4 Installation Environment

Temperature	
Corrosive gas nearby	
There are liquid/gas pipelines nearby	
Humidity	
Conductive dust nearby	
Are there rain/snow protection measures at the air inlet/outlet?	

5 Check and Confirm Before Powering On

No.	**Content**		**Result**
1	Civil Construction Inspection	The house is well sealed and does not leak.	
		The housing space meets the installation and commissioning requirements.	
		The doors and windows of the house are well installed.	

		The cable trenches or bridges in the house meet the specifications and there is no water accumulation.	
		The air duct installation is completed and there is no air leakage	
		The house has adequate air inlets (air inlets are equipped with filters)	
		The air duct outlet does not leak and can prevent rats, birds, etc.	
2	Cabinet Inspection	The cabinet fan is installed correctly and firmly	
		The cabinets are tight and there are no gaps	
		Cabinet and base are reliably connected	
		The cabinet door can be opened and closed easily, and the filter can be easily removed	
		cabinet level	
		Each power unit is in good contact with its upper part and the screws are fixed correctly.	
3	Equipment Grounding Check	Cabinet grounding	
		Knife switch and vacuum contactor ground	
		Control cabinet grounding	
		Transformer grounding point grounded	
		The third winding (auxiliary winding) on the secondary side of the transformer is grounded at XYZ	
		Lightning arrester and live indicator grounding	
		The shielding layer of the user's high-voltage cable must be grounded at the incoming cabinet end;	
		The shielding layer of the user interface incoming cable is grounded at the control cabinet end (single-ended grounding is required).	
4	High-voltage cable inspection (disconnect the user's grounding switch, the high-voltage cable ABC to the motor is connected, and the input cable ABC is blocked)	High-voltage cable from the user's high-voltage cabinet to the inverter entry cabinet (confirm with a multimeter)	
		High-voltage cable from the inverter entry cabinet to the inverter transformer (confirm with a multimeter)	
		The inverter outputs to the high-voltage cable of the incoming cabinet (confirm with a multimeter)	
		High-voltage cable from the incoming cabinet to the motor (confirm with a multimeter)	
		The distance between the outer sheath, shielding layer, armored layer of high-voltage cable and the high-voltage live body is greater than 125mm	
5	Is there any abnormality in the project on the right	Bypass control interface board (whether the optical fiber and power wiring are loose)	
		Main control system (whether the cover is tightly closed, whether fiber optic wiring, etc. are completed)	
		Terminal adapter board (whether the wiring is secure)	
		Sampling resistor (whether the resistance value is 1MΩ or 2MΩ)	
		Voltage Hall sensor (TVS tube)	
		Current Hall sensor (whether wiring is completed)	
		Vacuum contactor (clean or not)	
		Knife gate (whether the contact is good)	
6	Is the fiber optic connection reliable	Sending and receiving optical fibers of each unit	
		Optical fiber in the main control system	
		Bypass control panel fiber optics	
7	The voltage detection circuit is wired correctly	The A/B/C phase high voltage output terminal to the A/B/C phase sampling resistor is connected correctly	
		The A/B/C phase sampling resistor output line to the A/B/C phase Hall sensor detection terminal is connected correctly	
		The A/B/C phase Hall sensor signal output end to the input end of the terminal adapter board (AD1-1/ AD1-2/ AD1-3) is connected correctly	

8	Check the resistance to the cabinet ground and record it in detail	Control power supply A is connected to the cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		Control power supply B is connected to the cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		Control power supply C to cabinet earth (take the incoming and outgoing sides of each 3P circuit breaker) >1M	
		The control power supply L is connected to the cabinet earth (take the incoming and outgoing sides of the 2P circuit breaker)	
		The control power supply N is connected to the cabinet earth (take the incoming and outgoing sides of the 2P circuit breaker)	
		24V+ is blocked from the cabinet earth (measured on the switching power supply)	
		24V - No connection to the cabinet earth (measured on the switching power supply)	
		±15V is blocked from the cabinet ground (measured on the switching power supply)	
9	Cooling fan inspection (Record resistance value)	The fan blades are clean, rotate flexibly, and have no abnormal noise.	
		A to B resistance (3-15Ω)	
		B to C resistance (3-15Ω)	
		C to A resistance (3-15Ω)	
		The three-phase resistance of the fan should be balanced (the deviation is less than 10%)	
		The resistance of A, B and C to the cabinet earth is >1MΩ	
10	Power unit inspection	It is necessary to complete the first two contents of the power unit inspection record	See power unit inspection record form
11	Other Tests	The input side ±5% tap shorting piece of the phase-shifting transformer is connected correctly.	
		Tighten the wiring screws on the primary and secondary sides of the phase-shifting transformer. Pay special attention to the direct connection between the high-voltage cable nose from the secondary side to the power unit and the copper plate of the phase-shifting transformer (there must be no nuts in the middle)	

		The backup UPS (if installed) input and output plugs are firm and the voltage specifications meet the requirements.	
		Make sure all cabinets are clean and free of foreign matter	
		The control and detection signal wiring from the control cabinet to the high-voltage switch cabinet and transformer cabinet is completed, and the wiring is consistent with the drawings.	
		The user-side interface signal wiring is completed and the wiring is consistent with the drawing.	
		The user-side high-voltage switch signal wiring is completed, and the wiring is consistent with the drawing.	
		The 220V and 380V power cable wiring is completed, the wiring is consistent with the drawing, and the 380VAC power supply phase sequence is correct.	
		The communication cable connections between PLC and touch screen and PLC and main control are firm and reliable.	
		The communication cable connection between the terminal adapter board and the sampling interface board is firm and reliable.	

6. Control power supply power-on debugging

No.	Content		result
1	Preparation before debugging	The user side switch is turned off and the switch cabinet trolley is pushed out.	
2	control power supply	Close each circuit breaker in turn, backup UPS power supply	
3	User controlled power detection	380V $_{AC}$±10%	
		220V$_{AC}$±10%	
	Main control switching power supply detection	220V$_{AC}$±10%	
		+24V$_{DC}$±5%	
		＋15V$_{DC}$±5%	
		－15V$_{DC}$±5%	
	Bypass switching power supply detection	+24V$_{DC}$±5%	
4	User side switch opening and closing test	The user-side high-voltage switch is in the debugging position (do experiments on opening and closing actions, check the user-side switch feedback on the touch screen, and whether the PLC can correctly separate the user-side switch.)	
		Can the simulated fault trip signal (start the inverter in the variable frequency state and trip on high-voltage detection faults) trip the user-side high-voltage switch?	
5	Check whether the power supply and operation of various items on the right are normal.	Bypass control interface board (indicator light flashes 1Hz)	
		Main control system (indicator light flashes 1Hz)	
		PLC (RUN indicator light is on)	
		Voltage Hall sensor (±15VDC power supply normal)	
		Current Hall sensor (±15VDC power supply normal)	
		Touch screen (no alarm)	
6	User interface detection	In the debugging state, local frequency conversion starts and stops the inverter, and the logic is normal.	
		Remotely start and stop the inverter in debugging state, the logic is normal.	
		In the debugging state, the frequency is increased or decreased through the remote speed setting. During the frequency increasing process, the remote frequency locking is normal and the remote frequency feedback is normal.	
		For example, if it is a knife gate cabinet, when it is stopped, if it is set to an automatic trip switch, check whether the user-side switch is tripped.	

		The hardware triggers the user-side switch signal, fault signal, alarm signal, and inverter ready signal, and the relevant display actions are normal.	
		Other user interface tests are normal	
7	Power frequency inspection	Power frequency and frequency conversion interlocking are correct	
		Power frequency closing is normal.	
		The user's other interlocks are correct.	
8	Bypass check	It is necessary to complete the relevant content of the power unit inspection record.	See power unit inspection record form
9	Fan rotation confirmed	Start the fan on the touch screen and check whether the fan is normal. If not, change the phase of the input power supply.	

***Bold fonts are key experimental parts**

7. Current limiting resistor reverse power supply debugging

No.		operate	Content (observed phenomenon)	Result (value)
1	Confirm status before debugging	in debugging state		
		Disengage from the user's motor (via knife gate or vacuum switch)		
		If the user's incoming line wiring is completed, there will be high voltage in the user-side high-voltage switch cabinet during the test, which requires user confirmation.		
		Communicate with users about experimental projects, confirm emergency measures, and explain safety precautions		
		The input power supply of the current limiting resistor is connected to 380VAC, and the output is connected to the third winding ABC of the phase-shifting transformer through a 10A circuit breaker (at the secondary side 220VAC auxiliary winding)		
		It is necessary to check whether XYZ at the secondary side 220VAC auxiliary winding is reliably grounded.		

		Confirm whether the primary side of the phase-shifting transformer is grounded after passing through the incoming line cabinet of the inverter and entering the user-side switch cabinet (grounding is not allowed). That is, the grounding switch of the user's high-voltage switch cabinet is not allowed to be grounded.		
		Remove the main circuit power detection contactor coil wiring (bandage to prevent short circuit or grounding).		
2	test process	Close the circuit breaker, and the user's AC380 power supply charges the unit through the current limiting resistor to the auxiliary winding of the phase-shifting transformer.		
		Optical fiber self-test: In debugging state, when the frequency is <1Hz, set on the touch screen to start fiber self-test.	The IGBT indicator lights from units A1, A2, A3 to A9 light up in sequence for 3 seconds.	
		Start in debugging state and set the target frequency to 0.5Hz.	The communication normal indicator light (3, green) of all units flashes at 0.1 Hz (unit self-test)	
		Set the target frequency to 0.9Hz.	Observe whether there is any unit failure. If necessary, troubleshoot the problem first.	
			Simulate a unit failure. To recover from the unit failure, you need to stop the inverter, power on the current limiting resistor again, and pay attention to restoring the optical fiber.	
		Set the target frequency to 50Hz.	Observe whether the three-phase voltages are consistent and change linearly, and whether the indicator lights of all units are consistent.	
3	Test completed	Stop (press the emergency stop button or reduce the frequency first and then press the stop button).	Block IGBT indicator light (5, red) is on, feedback frequency is 0Hz	
		Remove the input and output wires of the current limiting resistor.		
		Restore the main circuit power supply and detect the contactor coil wiring.		

Note: ① The current limiting resistor has the same function as the voltage regulator; if a voltage regulator is used, the test method is the same.

② If the inverter is equipped with a pre-charging function, install a current-limiting resistor, and use the current-limiting resistor to reverse power supply, please refer to the relevant regulations for the operating steps.

③ If the inverter is equipped with a precharge function, since the high voltage part and the low voltage are connected through a current limiting resistor, if the relevant signal is accidentally triggered, the inverter can reversely supply power to the high voltage by controlling the power supply. Therefore, when working in a power cabinet or switch cabinet, be sure to disconnect the incoming line circuit breaker of the current-limiting resistor. Otherwise, serious consequences may occur, including personal injury or equipment damage.

8. High-voltage power-on debugging test

No.	operate	Content (observed phenomenon)	Result (value)	Remark
1	Confirm before powering on	Confirm to remove the current limiting resistor input and output lines;		
		Communicate with users about experimental projects, confirm emergency measures, and explain safety precautions;		
2	Set startup status	Set local control, debugging status, frequency control; check whether they are consistent on the touch screen;		
3	Set motor parameters	According to the motor nameplate, enter the motor parameters on the **"Motor Parameters"** interface of the touch screen, and press the parameter confirmation button. It will be valid after the **"Parameter Setting Successful"** sign is displayed; Turn off the switch between the inverter and the motor, measure the resistance value between the two phases of the motor end with a multimeter in the outlet cabinet, and input it into the motor parameters;		Motor rated voltage; motor rated current; motor rated power; motor rated speed; motor power factor; motor direct resistance; motor rated frequency, etc.
4	Dual power supply switching experiment	After the high voltage is powered on, manually start the fan and perform a dual power switching test to confirm that the switching is normal and that the fan rotates correctly during the switching process;		
5	start up	If it is an automatic cabinet, the vacuum contactor K1 closes normally; the unit indicator light displays normally; the high-voltage live indicator light is on; the electromagnetic lock of the switch cabinet cannot operate.		
6	Set target frequency to 25Hz	When the frequency rises above 1Hz, the indicator lights of the unit display the same situation. Observe the voltage value of the touch screen at 25Hz, 3KV (6KV inverter) or 5KV (10KV inverter);		Record voltage value
	Set target frequency to 50Hz			
8	Set target frequency to 0Hz	Observe whether the frequency drops to 0Hz.		

9. High-voltage power-on load test

No.	operate	Content (observed phenomenon)	Result (value)

1	Power frequency starting motor	Motor turns normally	
		Motor current is normal	
		Motor vibration is normal	
2	Preparation before frequency conversion start-up	Set motor protection parameters and operating status	
		Check whether the internal wiring of the inverter is correct	
3	Start the inverter, set the target frequency to 20Hz, and start the motor	Confirm that the motor is turning, running normally, without pulsation, and the sound is normal.	
4	Set target frequency to 50Hz	Observing the motor operation conditions (vibration, sound, temperature) allows the user's motor maintenance personnel to make judgments. And record the maximum output current (50Hz).	
5	The voltage detection signal is correct and the current detection signal is correct. Correct the voltage and current parameters if necessary.	If the displayed value of the voltage differs by more than 10% from the corresponding value of the theoretical voltage at the frequency point or the phase-to-phase deviation is large (10%), find the relevant reasons and record the process parameters.	
		If the phase-to-phase deviation of the current display value is greater than 10%, find the relevant reasons and record the process parameters. If it is less than 10%, correct the three-phase current parameters until they are balanced.	
6	Stop the inverter	The motor coasts to stop and the speed decreases	
7	Set the inverter **flying start permission function**, start the inverter, and observe the motor running status	The motor runs normally during the search process, has no pulsation, and the sound is normal.	
		The touch screen displays the success sign of flying car start	
		inverter increases frequency to 40Hz	
		The inverter increases the frequency to 50Hz. During the frequency increase process, the motor operates normally without pulsation and the sound is normal.	
8	User interface analog speed given test	The touch screen is set to **speed control**. The user gives a 4-20mA signal from a distance and corrects it to 0-100% on the touch screen analog setting interface. The motor speed changes as the input signal changes.	
		After the frequency is stable, disconnect the 4-20mA signal source, the touch screen will display the 4-20mA signal loss alarm message, and lock the current frequency output. Restore 4-20mA signal, frequency changes accordingly	
9	The inverter runs at 50Hz, user interface analog frequency feedback test	When the frequency is 50Hz, TB5:41-TB5:42 (motor speed output) output 20mA, record the signal current value, and the deviation from the recommended value is within 10%.	
10	Run continuously for 4 hours	Observe whether there is any abnormality in the inverter.	

Appendix 1 Power unit inspection record

unit number	Check the control power supply before powering on		Check after powering on the control power supply					Current limiting resistor is powered on
	Transformer to power unit wiring inspection	Fast fuse and fastening screw inspection	Bypass action check					Unit communication Fiber inspection
			Normal (record resistance value)		Bypass (pull-in action)	Bypass (record resistance value)		
			Normally open	Normally closed		Normally open	Normally closed	
A1								
A2								
A3								
A4								
A5								
A6								
A7								
A8								
A9								
B1								
B2								
B3								
B4								
B5								
B6								
B7								
B8								
B9								
C1								
C2								
C3								
C4								
C5								
C6								
C7								
C8								
C9								

Transformer to power unit wiring inspection: Use a multimeter to check the high-voltage cables connecting the phase-shifting transformer and the power unit one by one.
Check the fast fuse and fastening screws: Use a multimeter to check whether the fast fuse is blown, and use a wrench to check whether the power unit screws are tight.
Check the contact between the power unit and the guide groove: Use a multimeter to check whether the contact between the power unit and the guide groove is good.
Check the bypass operation: first manually bypass on the bypass board to see if the bypass operates.
In the normal state, **when the left neutral point is interconnected** (the inverter output line is led from A6/B6/C6), there is no communication between A(n-1)-1 and An-1 **and the resistance is greater than 0.1 MΩ**, A(n-1)-1 and An-5 are connected **and the resistance value is less than 1 ohm**; when the neutral point on the right side is interconnected (the inverter output line is led from

A1/B1/C1), An-1, A(n+ 1) There is no connection between -1 and the resistance is greater than 0.1 MΩ, there is connection between An-5 and A(n+1)-1 and the resistance is less than 1 ohm;
In the bypass state, the resistance is exactly the opposite. Other units can be deduced in the same way.

Notice: When the **neutral points on the left are interconnected**, when measuring unit A1, under normal conditions, there is no communication between A1-1 and B1-5 **and the resistance is greater than 0.1 MΩ**, and there is communication between A1-5 and B1-5 **and the resistance is less than 1 ohm**;Units B1, C1 and so on. **In the bypass state, the resistance is exactly the opposite.**
When **the neutral points on the right are interconnected**, when measuring unit A9, under normal conditions, there is no communication between A9-1 and B9-5 **and the resistance is greater than 0.1 MΩ**, and there is communication between A9-5 and B9-5 **and the resistance is less than 1 Ohm**; B1, C1 units and so on. **In the bypass state, the resistance is exactly the opposite.**

Appendix 2 Parameter records during debugging

No.	Parameter name	Factory default value	Field modified value	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
……				

Appendix 3: Records of problems left on site

No.	Phenomenon	Responsible party	Handling method and handling time limit
1			
2			
3			

pay attention :

(1) When conducting insulation tests on the high-voltage incoming lines of the motor and the inverter, the cables connected to the inverter must be disconnected, and the inverter equipment itself cannot be tested for high voltage.

(2) When the high-voltage inverter inputs high voltage or reversely feeds power, there will be life-threatening high voltage in the inverter. Do not open the cabinet door or touch the potentially live parts;

(3) Do not connect the high-voltage input and output cables of the high-voltage inverter incorrectly, otherwise equipment damage and personal injury may occur;

(4) When the high-voltage inverter is running, the normal operation of the cooling fan and the smooth flow of the cooling air duct must be ensured;

The customer's on-site engineer signs and confirms:

The debugging engineer signs and confirms:

date:

Chapter 5 Principle

1.Introduction

High voltage inverters are designed for standard three-phase AC high voltage induction motor applications. Asynchronous motors are widely used due to their durability, simple structure, strong adaptability, and low price. On the other hand, synchronous motors are used in situations that require relatively high efficiency. However, when powered by the utility grid (60 or 50Hz), the motor speed is fixed. The CF80 series high-voltage inverter can adjust the speed without affecting the performance of the motor. It changes motor speed by converting fixed-frequency, fixed-voltage utility power into variable-frequency, variable-voltage power. This conversion is electronic and has no moving parts. Unlike old-fashioned inverters, series high-voltage inverters do not produce unwanted side effects during the conversion process. Features:

- Will not cause obvious harmonic distortion in the factory power distribution system; does not require power filters; has no interference with sensitive equipment; will not cause resonance problems in power factor compensation capacitors.
- The power factor is very high, typically 95% or higher over the entire speed range, eliminating the need for power factor compensation.
- No need to derate the motor in any way due to output harmonics. Compared to direct application of the mains voltage, the motor generates no additional heat.
- No torque pulsation causing mechanical resonance is generated.
- Compared with directly using the grid power supply, the motor noise will not be significantly increased.
- Compared with direct use of grid power, it will not have a significant impact on the motor insulation.
- The rated torque of the motor does not need to be limited within the entire motor speed range, but is only affected by the overheating limit of the motor itself.
- Fan noise is typically less than 75 decibels, so normal conversations can be had even next to the inverter running at full load.
- Fully modular construction allows damaged modules to be replaced within minutes. Advanced microprocessor-based diagnostics pinpoint the location of any fault.

2.Main circuit

The CF80 series high-voltage inverter obtains medium and high voltage by superimposing the output of multiple low-voltage power units. The low voltage power unit is a simple modification of the standard low voltage PWM (Pulse Width Modulation) motor converter that has been widely used for many years. Figure 5-1 shows the typical circuit topology of the 3000V series inverter, using a 630V unit. Each phase of the motor is driven by three power units connected in series. The series connection adopts star connection and the neutral line is floating. Each unit is powered by the isolated secondary winding of an isolation transformer. Each of the nine secondary windings is

rated at 630VAC and the power is one-ninth of the total power. The insulation level of the power unit and its corresponding transformer secondary winding to ground is 5kV. For different output voltage levels, it is only necessary to expand the number of units connected in series for each phase, and the basic principle is the same. For a 4000V inverter, Figure 5-1 should be expanded to 4 power units per phase in series, and the isolation transformer has 12 secondary windings. The 5400V inverter has 5 power units in series for each phase, and the isolation transformer has 15 secondary windings.

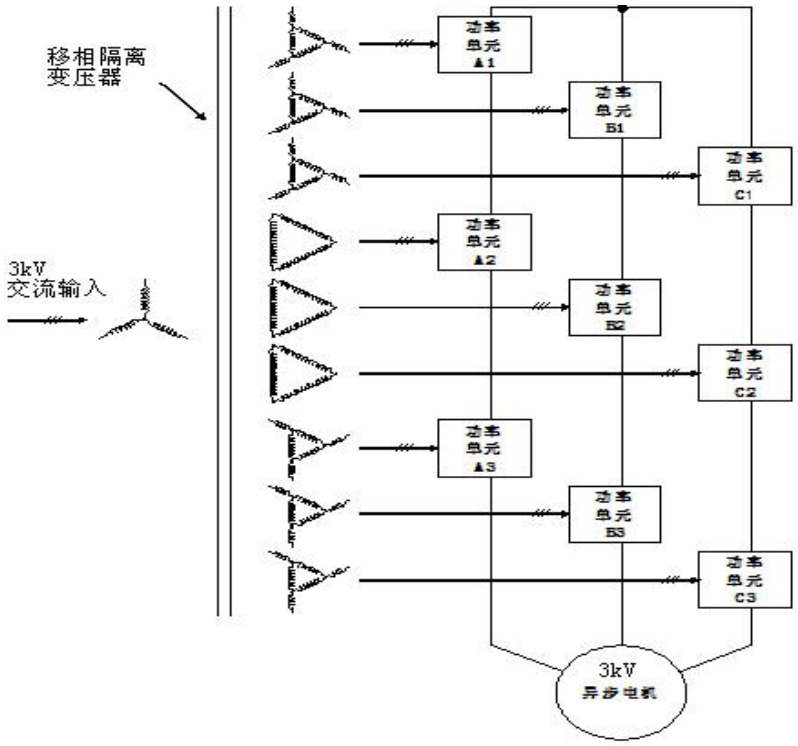


Figure 5-1 Schematic diagram of high-voltage inverter topology (three units per phase, output 3000 VAC)

Three 630VAC power units per phase can generate a phase voltage of 1890V AC when connected in series. When five 630V AC power units are connected in series, the phase voltage generated is 3150V AC, and the line voltage can reach 5400V AC. Other unit voltage levels can also be provided. For different output voltages, the number of units will be different, but the basic principle is the same. All power units receive instructions from the same central controller. These instructions are transmitted via fiber optic cables ensuring an insulation level of 5kV.

The secondary windings of the transformer that provide power to the power unit have a certain phase difference between them when they are wound. This eliminates most of the harmonic currents caused by independent power units, so the primary current is approximately a sine wave, so the power factor can Keep it high, typically above 95% at full load.

3. Unit control mode

The schematic diagram of a typical power unit is shown in Figure 5-2. In this example, a three-phase diode rectifier powered by a 630VAC secondary charges the DC capacitor bank to

approximately 900VDC, which is supplied to a single-phase H-bridge inverter circuit consisting of IGBTs.

At any moment, each unit has only three possible output voltages. If Q1 and Q4 are on, the output from T1 to T2 will be +900V. If Q2 and Q3 are on, the output will be -900V. If Q1 and Q3 are on, the output will be -900V. Or Q2 and Q4 are turned on, then the output is 0V.

With three power units per phase, the circuit shown in Figure 5-1 can provide seven different phase voltages (±2700V, ±1800V, ±900V or 0V). Five power units per phase provide 11 different voltage levels. The ability to provide many different voltage levels allows the inverter to produce an output waveform that is very close to a sine wave.

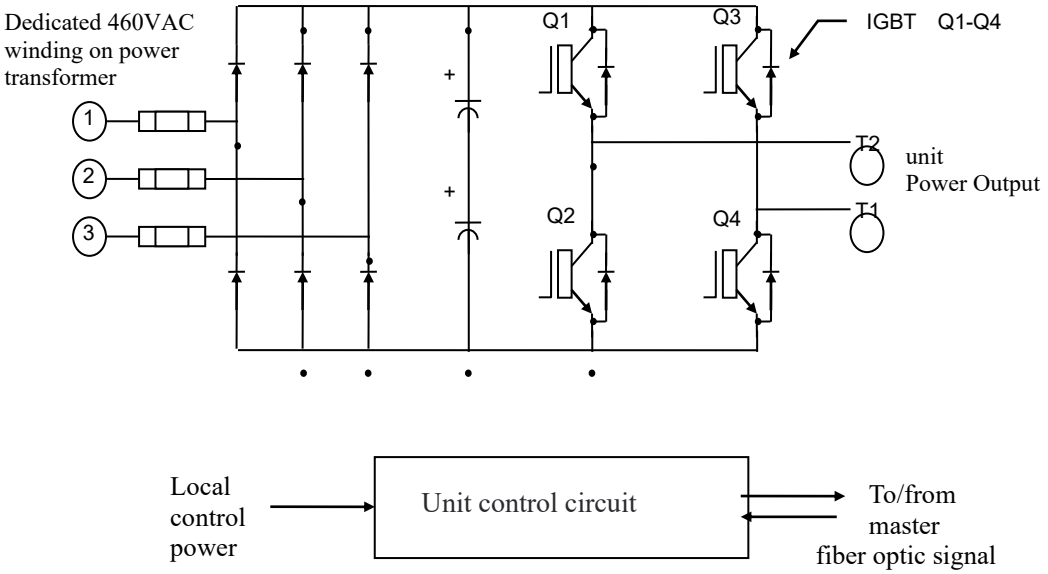


Figure 5-2 Typical power unit schematic diagram

The following explains how these waveforms are generated in the case of 3 units per phase. First, a reference signal is established for each phase, which is a digital model of the ideal waveform to be approximated. In Figure 5-3, RA is the reference signal of phase A, which is compared with three triangular carriers. The three carriers are identical except for a certain phase difference in sequence.

As long as the reference signal is larger than the first carrier (no phase shift), the signal L1 is high, otherwise L1 is low. L1 is used to control the transistor pair Q1 and Q2 in unit A1 (see the left transistor pair in Figure 5-2). As long as the reference signal is greater than the inversion of the first carrier, signal R1 is high, otherwise R1 is low. R1 is used to control the transistor pair Q3 and Q4 in unit A1 (see the right transistor pair in Figure 5-2). The difference between L1 and R1 gives the output waveform of unit A1, as shown in A1 in Figure 5-3 Phase A waveform.

In the same way, the reference signal is compared with a second carrier (60 degrees phase-shifted from the carrier of A1) and its inverse to produce the control signals L2 and R2 for the transistor pair in unit A2. The output waveform of unit A2 is as A2.

Finally, the reference signal is compared with a third carrier (120 degrees phase-shifted from carrier A1) and its inverse to produce control signals L3 and R3 for the transistors in unit A3. The output waveform of unit A3 is as A3.

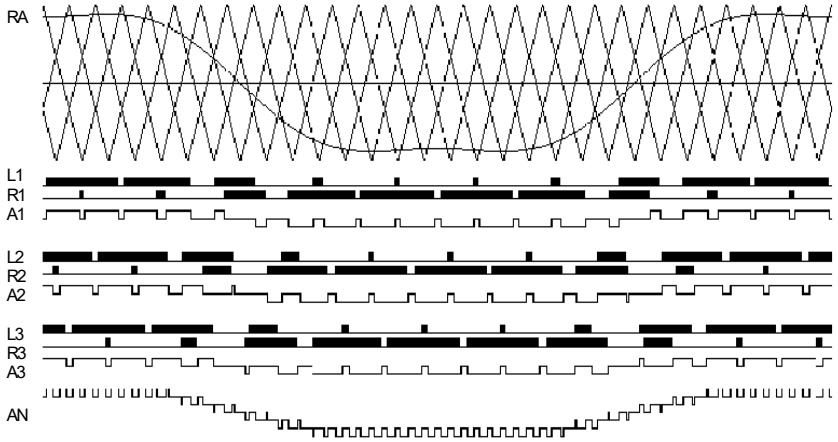


Figure 5-3 Phase A waveform

The sum of the output voltages of units A1, A2 and A3 generates the A-phase output phase voltage of the inverter, as shown in AN in Figure 5-3. As mentioned before, there are 7 different voltage levels. Note that this voltage is defined as the voltage between terminal A and the floating neutral line in the inverter, not the motor neutral line.

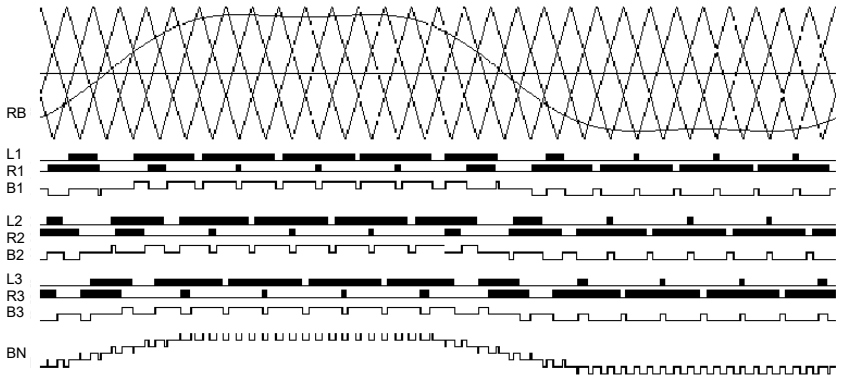


Figure 5-4 B-phase waveform

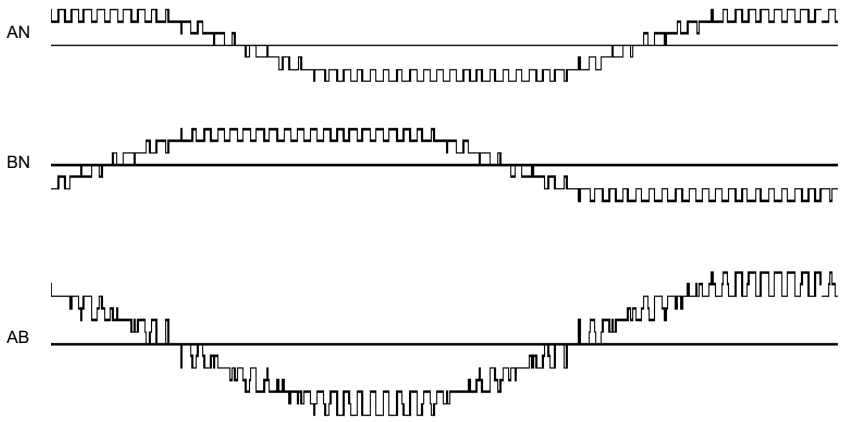


Figure 5-5 Line voltage waveform

Figure 5-4 shows the same signal of phase B. The three carrier signals are the same as Figure 5-3, but there is a certain angle phase shift between the carrier signals corresponding to A. The reference signal RB is also the same as Figure 5-3, but Phase lag is 120 degrees (at reference frequency). The sum of the output voltages of units B1, B2 and B3 generates the B-phase voltage of the inverter, as shown in BN in Figure 5-4. Figure 5-5 repeats the waveforms of phase voltages AN and BN. The difference between AN and BN forms the line voltage applied to the motor, as shown in AB in Figure 5-5.

Chapter 6 Alarms, Faults And Handling Measures

For all alarms, faults, and messages, the touch screen displays the sign "Arrival" when the alarm is activated, and the touch screen displays the sign "Leave" when the alarm is cleared.

If a fault or alarm occurs, it will be displayed on the panel. The main control software and hardware detect faults and alarms and save them in the fault recorder. The fault can be a directly detected hardware fault or may be generated by the software.

Unit faults are detected by unit control system logic on the unit control board within each power unit. Each power unit has its own detection circuit. The main control system explains, displays and records unit faults according to the faulty unit and the content of the fault.

Normally, all faults will cause the inverter to immediately stop supplying power to the motor and prohibit the inverter from running. Some user-defined faults can control the response of the inverter through the system program. Alarms will be displayed and logged, but generally do not inhibit drive operation.

No.	Category	Prompt message	Treatment measures	Remark
1	information	The inverter is in running state and is not allowed to start;	Start again after pressing stop button	
2		The user side switch is not closed and is not allowed to start;	Turn on the user side switch and start again	
3		The variable frequency/power frequency/debugging switch is in the wrong position and is not allowed to start.	Adjust the knob position and start again	
4		The switch position of the incoming line cabinet is wrong and startup is not allowed;	Adjust the positions of K1, K2 and K3 and start again	
5		The emergency stop button is not reset and is not allowed to start;	Reset the emergency stop button and start again	
6		Fan failure feedback, starting is not allowed;	Check the fan and start it again	
7		The motor stops time protection and is not allowed to start;	Adjust the protection value or wait 10 minutes before starting again	
8		The bypass system is not powered on and is not allowed to start;	Check bypass power and start again	
9		The remote/local knob is in the wrong position and is not allowed to start;	Adjust the knob position and start again	
10		Precharge failed;	Check precharge circuit	
11		Fan closing failed;	Check the fan or closing circuit	
12		Fan opening failed	The fan cannot open normally. Check the circuit and press the stop button to open it again.	
13		Failed to block IGBT	Check main control and communication lines	
14		Switchgear vacuum contactor failed to close	Check vacuum contactor and control circuit	
15		Switchgear vacuum contactor failure to open	Check vacuum contactor and control circuit	
16		Main control parameters are set successfully	Main control parameters are set successfully	
17		Main control parameter setting failed	Reset main control parameters	
18		Frequency conversion local start	Frequency conversion local start recording	
19		Frequency conversion remote start	Frequency conversion remote start recording	
20		Frequency conversion stops operation	Frequency conversion stops recording	
21		K3 bypass action, power frequency starts	K3 bypass action, power frequency starts	

22		Power frequency remote start	Power frequency remote start recording	
23		Power frequency stops	Power frequency stop recording	
24		Frequency conversion emergency stop operation	Frequency conversion emergency stop recording	
25	alarm	A1 unit communication failure	The inverter will operate in bypass mode and will be inspected during the next shutdown.	
26		A1 unit voltage is high	The unit voltage is too high and alarms.	
27		A1 unit voltage is low	The unit voltage is too low and alarms.	
28		A1 unit overcurrent	The inverter will operate in bypass mode and will be inspected during the next shutdown.	
29		A1 unit IGBT failure	The inverter will operate in bypass mode and will be inspected during the next shutdown.	
30		A1 unit over temperature	The unit will alarm when it is over-temperature, and it will be inspected when it is shut down next time.	
31		Wind turbine failure alarm occurs during operation.	The inverter continues to run and can only be started after the next shutdown for maintenance of the fan.	
32		The wind turbine stops alarming during operation.	The fan feedback is abnormal during operation. The fan can only be started after the next shutdown and maintenance.	
33		During operation, the main circuit power failure alarm occurs.	Check the main circuit power supply of the inverter.	
34		During operation, the control circuit will give an alarm when the power fails.	Check the inverter control power supply and circuit.	
35		The bypass system will give an alarm when the power fails during operation.	Check the power circuit of the inverter bypass system.	
36		Current imbalance alarm.	Detect the main circuit and detection circuit of the power unit.	
37		Overload alarm	Check the inverter overload protection parameter settings, frequency increase and decrease time settings and load characteristics, etc.	
38		Overcurrent alarm	Check the overcurrent protection parameter settings of the inverter and check the main circuit and load characteristics, etc.	
39		Voltage imbalance alarm	Check the power unit and detection circuit, etc.	
40		PLC communication timeout alarm during operation.	Check the communication connection between the main control and the PLC.	
41		Transformer over temperature alarm.	Check the transformer cooling fan and temperature controller.	
42		During operation, the remote given signal 4-20mA is lost and alarms.	Check the corresponding analog input control cable	
43		Single-phase grounding alarm during operation.	Check the system interface board.	
44		During operation, the main circuit fails to restart after power failure.	Check the main circuit of the inverter system.	
45		Alarm for failure to start the speed car.	Check the main control system and current detection circuit.	
46		Voltage tracking fault alarm during operation.	Check the main control system and voltage detection circuit.	
47		During operation, the main control communication verification error alarm occurs.	Check the main control communication connection.	

48		Alarm for bypass communication failure during operation.	Check the connection between main control and bypass system.	
49		Main control hardware failure alarm during operation.	Check the main control system loop.	
50		Unit overcurrent and fault alarms during operation.	Check the main circuit and load characteristics of the power unit.	
51	Fault	The wind turbine fails and stops suddenly during operation.	Check the fan before starting it.	
52		The fan stopped and made an emergency stop during operation.	Check the fan before starting it.	
53		During operation, the main circuit loses power and makes an emergency stop.	Check the main circuit power supply of the inverter.	
54		During operation, the control circuit will be powered off and stop immediately.	Check control power supply and circuit of the inverter .	
55		During operation, the bypass system has an emergency stop due to power failure.	Check the power circuit of the inverter bypass system	
56		Emergency stop due to current imbalance.	Detect the main circuit and detection circuit of the power unit.	
57		Overload emergency stop.	Check the inverter overload protection parameter settings, frequency increase and decrease time settings and load characteristics, etc.	
58		Overcurrent emergency stop.	Check the overcurrent protection parameter settings of the inverter and check the main circuit and load characteristics, etc.	
59		Emergency stop due to voltage imbalance.	Check the power unit and detection circuit, etc.	
60		During operation, PLC communication times out and emergency stops.	Check the communication connection between the main control and the PLC.	
61		Transformer over-temperature tripping emergency stop.	Check the transformer cooling fan and temperature controller.	
62		During operation, the main circuit loses power and fails to restart.	Check the main circuit of the inverter system.	
63		The speed car failed to start and stopped suddenly.	Check the main control system and current detection circuit.	
64		Emergency stop due to voltage tracking failure during operation.	Check the main control system and voltage detection circuit.	
65		During operation, the main control communication verification error caused an emergency stop.	Check the main control communication connection.	
66		Emergency stop due to bypass communication failure during operation.	Check the connection between main control and bypass system.	
67		During operation, the main control blocks the emergency stop due to abnormality.	Check the main control system loop.	
68		Emergency stop occurs due to main control hardware failure during operation.	Check the main control system loop.	
69		During operation, the unit will stop due to overcurrent or failure.	Check the main circuit and load characteristics of the power unit.	

Chapter 7 Start, Stop, Frequency Increase And Decrease Operation Of The inverter

1. Operation control method

For motor loads, the equipment has three control methods:

a: Closed-loop control with pressure and flow as control objects: automatic control is realized based on the input 4~20mA analog value;

b: Open-loop control with speed as the control object: This method is operated remotely (operated on DCS or remote operation box). The user can set the speed according to the working conditions. The inverter uses this speed as the control value. In this mode, the frequency The change is based on the analog value input by the user, 4mA corresponds to 0 speed, and 20mA corresponds to the rated speed;

c: Open-loop control with frequency as the control object: In this method, the output frequency is set directly from the touch screen in local operation (operating on the device body), and the inverter uses this frequency as the control target value;

Users can set the above three control methods through the human-machine interface (touch screen) to meet different working conditions.

2. Start, stop, frequency increase and decrease operation steps of the inverter

Step	project	step	remark
1	Control power on.	Close the air switches of the control cabinet.	
2	Check before closing the user side switch.	Is the position of the incoming knife gate correct?	
3		Is the transformer cabinet door locked?	
4		Is the entrance cabinet door locked?	
5		Whether the power unit cabinet door is locked.	
6		Is the filter clean?	
7		Confirm whether the switch closing permission signal on the user side of the inverter is valid.	
8		Whether the inverter has alarm or fault feedback.	
9	High voltage power on	Close the user side switch.	
10	Local control of inverter	Make sure the remote/local knob is in the local position.	
11		Confirm that the frequency conversion/power frequency/debugging knob is in the frequency conversion position.	
12		Confirm that the frequency/speed control is in the frequency control position.	
13		Press the frequency conversion start button of the control cabinet.	
14		If it cannot be started, follow the messages on the touch screen.	
15		Control the inverter by setting the frequency.	
16		Stop the inverter through frequency conversion stop and emergency stop button.	
17	Remote control inverter	Make sure the remote/local knob is in the remote position.	
18		Confirm that the frequency conversion/power frequency/debugging knob is in the frequency conversion position.	

19		Verify that the frequency/speed control is in the speed control position.	
20		Confirm whether the inverter ready signal is valid.	
21		Provide remote start signal to the inverter.	
22		If it cannot be started, follow the messages on the touch screen.	
23		The inverter is controlled by the speed given. If there is no speed given, the inverter runs at the lower limit frequency.	
24		During frequency modulation, if the frequency fluctuates, the frequency is locked through the frequency lock signal.	
25		Stop the inverter through frequency conversion stop and emergency stop button.	
26	The inverter operates in power frequency bypass.	Frequency conversion stops the inverter.	
27		Turn off the user side switch.	
28		Disconnect K1 and K2, and close K3.	
29		Turn on the user side switch and start the motor.	
30	Routine inspection of inverter operation.	Check whether the filter is clean.	
31		Check whether the inverter has alarm or fault information.	
32		Check whether there is any abnormality in the motor sound.	
33		Check whether the output voltage and output current of the touch screen inverter are balanced.	
34		Check whether the inverter cooling fan is operating normally.	

Chapter 8 Equipment Packaging, Transportation, Storage and Installation

1 package

The equipment packaging must comply with the relevant packaging and transportation specifications to ensure that the product is not mechanically damaged during transportation and storage, and has the ability to prevent rain, snow and dust. The equipment comes with the following documents:

□ Packing list (including spare parts) 1 copy □ Factory information list 1 copy

□ 1 certificate of conformity □ 1 factory report of the complete machine

□ 1 set of random documents for dry-type transformer □ 1 instruction manual for isolating switch

□ 3 copies of the high voltage inverter instruction manual □ 3 copies of the user electrical drawings

2. Transportation

(1) The equipment can be transported by cars, trains, ships and other means of transportation. The equipment must be handled with care during transportation, and it is strictly prohibited to be exposed to rain or sunlight. It should not be subject to severe vibration, impact, or inversion. The transportation temperature should be within the range of -20~+65℃.

(2) The maximum height of the equipment is 2750mm, and the total height after packaging is 2650mm (package after removing the fan). When selecting a transportation tool, you must also consider whether there are factors such as limited height during transportation.

3. Storage

The equipment should be able to be stored under the environmental conditions specified in GB4798.1, which requires:
□ Ambient temperature grade 1K4: -15～+55℃;
□ Relative humidity level 1K3: 5% ~ 95%;
□ The equipment must not be exposed to the sun, rain or snow, and should be stored in a ventilated, dry and dust-free warehouse;
□ The equipment should be stored to prevent rodent intrusion and mold erosion;
□ The equipment should be protected from corrosion by salt spray, dangerous gases, corrosive liquids, etc.

4 Civil Engineering Installation

1 Environmental requirements

In order for the inverter to operate stably and reliably for a long time, the installation environment of the inverter has the following requirements:

(1) The minimum temperature is -10℃, the maximum ambient temperature is 50℃, and the change in working environment temperature should not be greater than 5℃/h. If the ambient temperature exceeds the allowable value, appropriate air conditioning equipment should be considered;

(2) The installation height should be less than 1,000 meters above sea level. If the installation height exceeds 1,000 meters, the equipment needs to be derated;

(3) Under the ambient temperature of 20°C, the humidity requirement is less than 90%, and the relative humidity change rate does not exceed 5% per hour to avoid condensation;

(4) Do not install the inverter in an environment with air pollution such as large dust, corrosive or explosive gas, conductive dust, etc.;

(5) The inverter should be installed on a solid and vibration-free site;

(6) A reliable grounding point should be provided (the grounding point should have an obvious grounding mark).

2 Equipment installation and civil engineering layout drawing (Note: The following takes 6KV/710KW＜P≤1250KW one-to-one inverter as an example)

□ The load-bearing pressure of the ground foundation P>4000Pa;
□ The base is a 10# national standard channel steel welded closed frame to form a whole. It is polished smooth after welding and the surface is required to be flat;
□The base support channel steel frame requires two coats of anti-rust paint primer;
□After the inverter is in place, the inverter base and the basic base channel steel are spot welded, and the factory network is grounded;

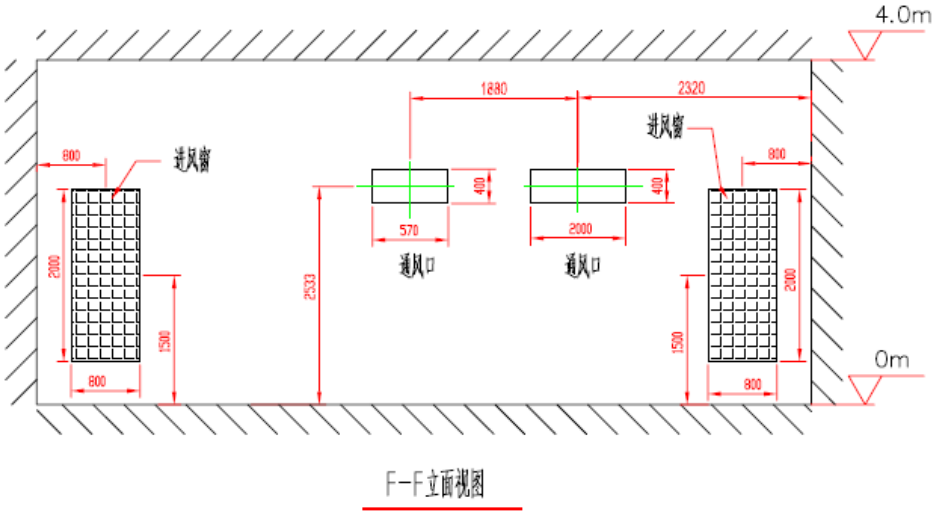


Figure 8-1 Civil construction layout (elevation view)

□ During the civil construction of the factory building, one wall should be reserved as an opening, and the wall should be built after the inverter equipment is transferred and in place.

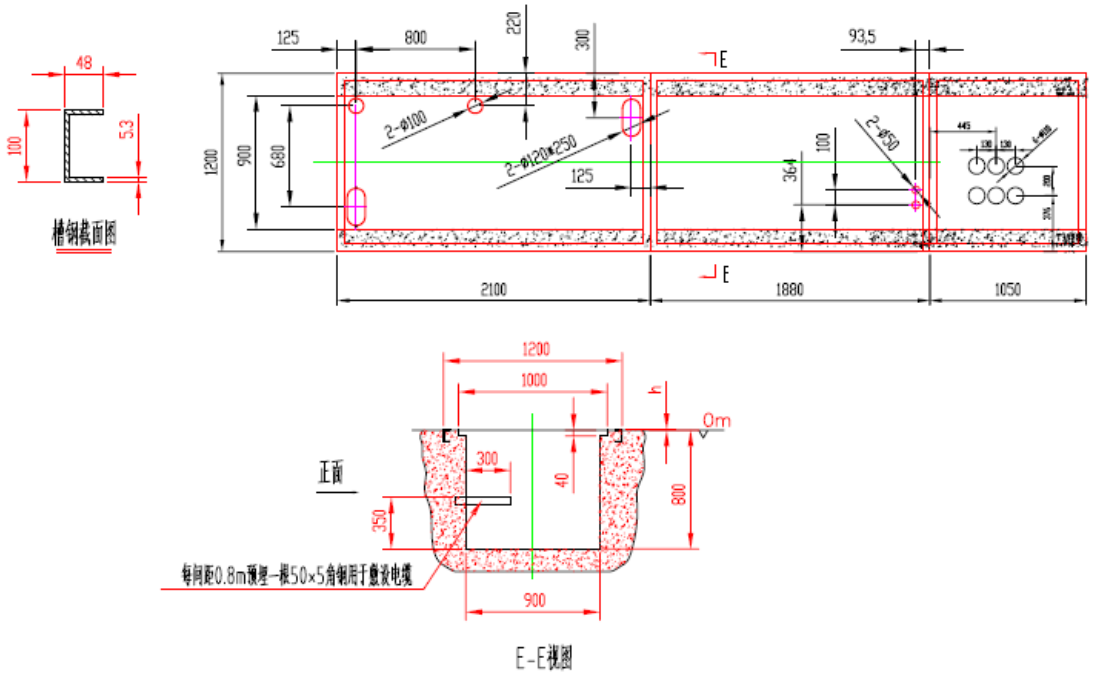


Figure 8-2 Basic drawing of cable trench and channel steel

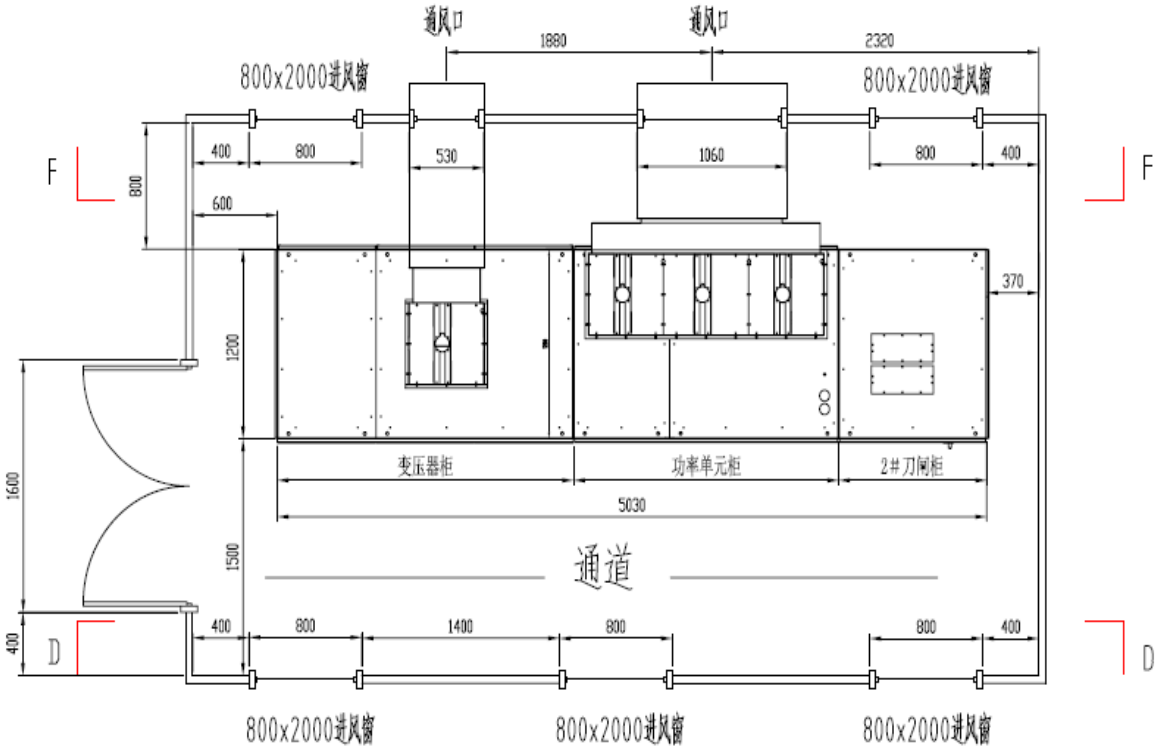


Figure 8-3 Civil construction layout (plan)

□ The reference value of "h" height from the ground is 2mm, which can be slightly adjusted according to on-site technical requirements;

□ The user shall dig a cable trench to connect with this cable trench according to the actual conditions on site. The air inlet window is the air inlet of the high-voltage inverter. In order to prevent larger dust particles from entering the high-voltage inverter, a flat-type primary filter (G4) must be installed to filter the air;

□ The lower part of the double door is closed and the upper part is made of stainless steel filter;

□ The inverter and the surrounding walls should be evenly spaced at intervals;
□ The load-bearing pressure of the ground foundation is P>4000Pa;
□ The walls are painted white, and a 4mm thick insulating rubber mat is laid on the cement floor;
□ Install 3 lights on the top of the channel.

3 Cabinet installation

When installing inverter equipment, consider the needs of ventilation, heat dissipation and operating space. It is recommended that the distance between the back of the entire device and the wall is not less than 500mm, that the distance between the top of the device and the roof space is not less than 1000mm, and that the distance between the front of the device and the wall is not less than 1500mm. All cabinets should be firmly installed on the base and reliably connected to the ground of the factory. Each cabinet should be connected to each other to form a whole. During the installation process, it is necessary to prevent the inverter from being hit and vibrated. All cabinets must not be inverted and the tilt angle must not exceed 30 degrees.

5. Electrical installation

Electrical installation mainly includes the input and output high-voltage cables from the cabinet to the site, the connecting lines between cabinets, and the wiring of control and signal lines between the cabinet and the site.

1 Input and output high-voltage cables and control cables

(1) Appendix: Recommended selection of high-voltage cables and control cables

Control cable 1: KVVP22-3×1.0 (analog), 3 cables are required according to the standard user interface;

Control cable 2: KVVP22-10×1.0 (switch value), 2 cables are required according to the standard user interface;

Control cable 3: KVVP22-5×1.5 (to the user switch cabinet), 1 cable is required according to the standard user interface;

Control power cable model: KVVP22-4×2.5, one cable is required according to the standard user interface.

Table 8-2 High-voltage cable selection table (taking 6kV as an example)

Inverter model	Adapted motor (kW)	Input cable
-Y6KV/500	300－500	YJV-6KV-3*50
-Y6KV/800	700－800	YJV-6KV-3*70
-Y6KV/1000	900－1000	YJV-6KV-3*95
-Y6KV/1350	1100－1250	YJV-6KV-3*120
-Y6KV/1600	1400－1600	YJV-6KV-3*150
-Y6KV/2000	1800－2000	YJV-6KV-3*185

The high-voltage cables of 3KV and 10KV inverters are converted according to the rated current of the motor. Please refer to the above table for selection. If the length of the input high-voltage cable from the high-voltage switch cabinet to the inverter and the length of the output high-voltage cable from the inverter to the motor exceeds 1000 meters, the recommended cable diameter should be a cable with a larger specification.

(2) High-voltage cable and control cable wiring diagram 8-5

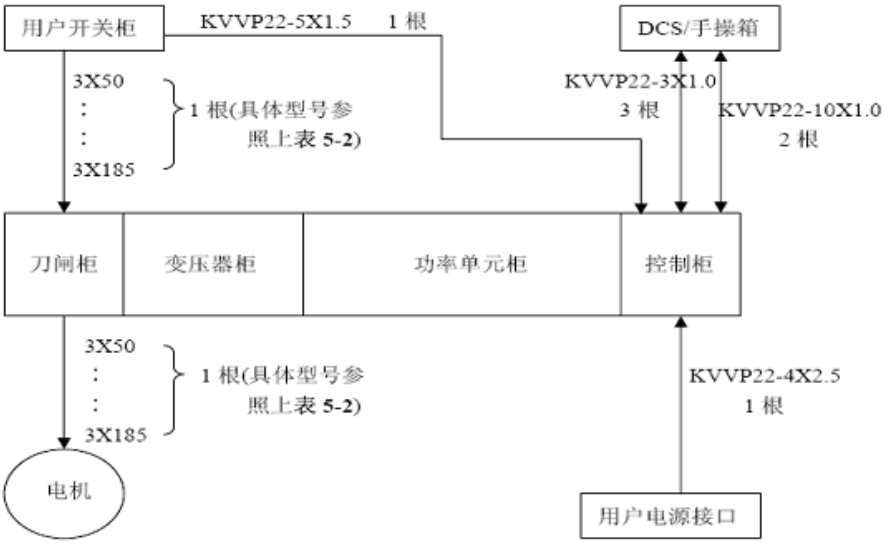


Figure 8-5 Schematic diagram of high-voltage cable and control cable wiring

2 Connecting wires between cabinets.

3. Connection of power cables and control signal cables.

Table 8-3 User interface table

No.	Signal description	Line number
1	Remote frequency conversion start signal.	Standard_Start+
		Standard_Start-
2	Remote frequency conversion stop signal.	Standard_Stop+
		Standard_Stop-
3	Remote reset signal.	Standard_Reset+
		Standard_Reset-
4	frequency lock signal	Fre_locked+
		Fre_locked-
5	emergency stop signal	E_Stope+
		E_Stope-
6	Remote power frequency start	Bypass_Start+
		Bypass_Start-
The following 4 public terminals		COM1
7	inverter operation instructions.	HVF_Running
8	Inverter ready indication.	HVF_Ready
9	inverter fault indication.	HVF_Tripped
10	inverter alarm indication.	HVF_Alarm
11	A given frequency in the distance.	Freq_Input+
		Freq_Input-
12	AI backup.	Spare_AI1+
		Spare_AI1-
13	Motor current output AO.	Moter_Amps+
		Moter_Amps-

14	Motor speed output AO.	Moter_Freq+
		Moter_Freq-
15	User switch 1 closing is allowed.	Sw_Permitting1+
		Sw_Permitting1-
16	Jump user high voltage switch 1.	HVF_OffInputCom1
		HVF_OffInputNo1
		HVF_OffInputNc1
17	User switch 2 closing is allowed.	Sw_Permitting2+
		Sw_Permitting2-
18	Jump user high voltage switch 2.	HVF_OffInputCom2
		HVF_OffInputNo2
		HVF_OffInputNc2