STEP®

Shanghai Sigriner STEP Motor Co., Ltd

ME800 Series High Voltage Inverter

User Manual

Shanghai Sigriner STEP Electric Co.,Ltd

Shanghai, China

1560# Siyi Road, Jiading district, Shanghai

Postcode：201801

Hotline：400-821-0325

ME800 Series High Voltage Inverter

Release state： Standard

Product version： V3.0

Foreword

ME800 series high voltage inverter is a new kind of inverter designed and manufactured by Shanghai Sigriner STEP Electric Co., Ltd. The ME800 series high voltage inverter meets the social requirements for energy saving and emission reduction. Thank you for your choice to use our inverter. This manual contains the correct method which you must follow when installing, operating and servicing the inverter. If ignored, physical injury or death may follow, or damage may occur to the inverter and the motor. Read all the contents before you work on the unit.

This manual only applies to ME800 series high voltage inverter produced by STEP.

The operating instruction is kept with the inverter properly, which is very convenient for use at any time.

Summary

This manual is intended for personnel

This manual gives a comprehensive and systematic description about safety cautions, installation, wiring, debugging, parameter setting, maintenance and so on. Read the manual before working on the inverter to ensure safe and correct installation.

Audience

User

Engineering maintenance staff

Technical support staff

Content description

Supplement and modification may be made to the content of this instruction, please visit our company website regularly for update. Website: www.stepelectric.com/sigriner

Signs and notices related to safety

This manual contains the following signs which relate to safety instructions. The instructions are very important, please observe them strictly.

DANGER

Incorrect use can cause physical injury even death and damage to the equipment.

NOTICE

Incorrect use may cause minor/severe personal injury and damage to the equipment

Important

User must observe important notices.

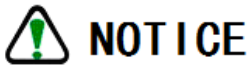
Contents

Chapter Ⅰ Notice for Inverter Use

1.1 Safety notice

Important

- To ensure correct use, contents in this instruction must be known well before installation, wiring, operation and maintenance inspection. Conditions of the machines driven and the process as well as all related safety notices also should be understood during use.
- This series of high voltage inverter only applies to 3-phase high voltage induction motor. If misused, unpredictable faults or dangers may follow.
- The discarded elements and parts should be treated as industrial rubbish.



Wiring notice

- Wiring operation must be executed in accordance with the related electric safety operation standard under the guide of our professionals.
- High voltage breaker for circuit protection must be provided on the power supply side of high voltage inverter.
- Wiring operation will be started only after the equipment body is mounted in place.
- Ground wire must be connected reliably.
- Phase of input power must be confirmed, and rated input voltage shall be consistent with the rated voltage of inverter.

Transportation and storing notice

- In all process of transporting, storing and installing the equipment in place, it can't allow the water into the inverter, or it will damage the equipment.
- During lifting equipment, enough load bearing must be guaranteed, and its rise and fall

shall be slow and gentle.

- When moving, transporting and placing the equipment, its placement location shall be level and smooth.
- Don't install inverter or put it into operation when its components are damaged.
- Protective guard must be provided in the necessary position (marked with Danger High Voltage), which cannot be moved away during equipment operation.
- Don't drop (leave) foreign matters such as wire residue, paper scrap, metal chip or tool into inverter.

Storing notice

NOTICE			
× Rainfall	**×Outside**	**× Conductive dust**	**× Direct sunlight**
× Flammability or explosive gas		**× Corrosive gas**	**× Salt lampblack and dust, etc**

DANGER

- Operation can be started only after no voltage is in the control circuit or main circuit.
- Input and output HV cable must be connected following the directions, or it may cause equipment damage will be caused.
- Input and output HV cable will conform to the requirements of insulation and carrying capacity, or it may cause the danger of short circuit once powered on.
- Inverter shall be mounted on the flame retardant, such as metal support and cement ground.
- Inverter must be operated by HV electrician if high voltage passes through it. Doors except for control cabinet shall not be opened after powering on.

1.2 Out of box audit

NOTICE
Do not install inverter with damaged or missing parts, or it may cause fire and human injury hazards.

When unpacking, please confirm carefully that there is damage during transportation, and that model and specification in the nameplate is consistent with order requirement. If not consistent or any part is missing, contact factory or supplier as early as possible.

1.3 Description of inverter model

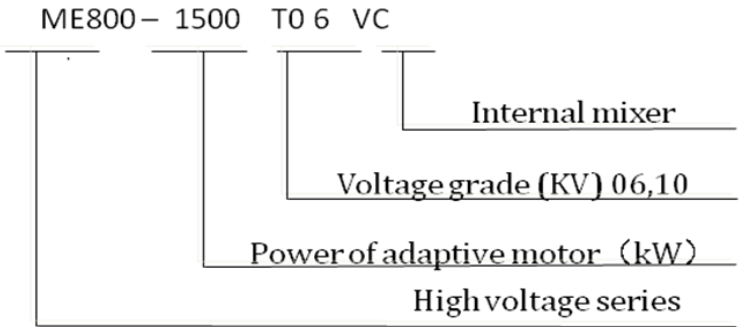


Fig.1-1 Description of inverter model

1.4 Description of inverter nameplate

For inverter nameplate, see Fig.1-2. Nameplate of inverter records inverter model, specification, machine No and order No, etc.

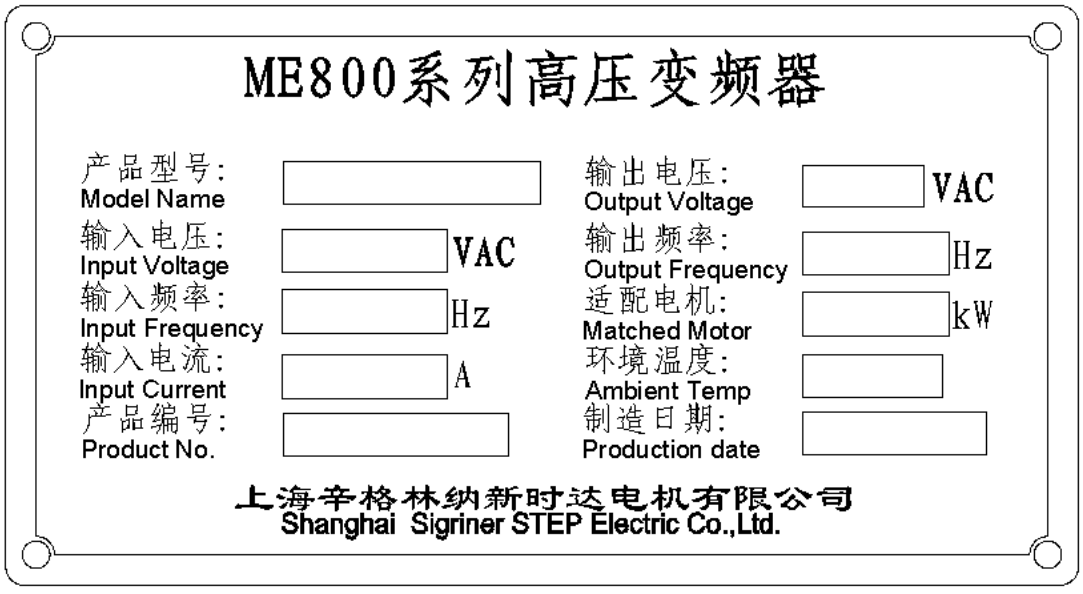


Fig.1-2 Inverter nameplate

1.5 Discard as useless notice

A discard as useless inverter needs to be handled as industrial refuse.

1.5.1 Capacitor handling

Electrolytic capacitors in main circuit and printed circuit board may explode while burning. It is prohibited to burn them.

1.5.2 Plastic piece handling

There are many plastic pieces in inverter, and burning plastic piece will produce toxic gas. Therefore, it is prohibited to burn them.

Chapter Ⅱ Overview of Inverter

2.1 Technical characteristics

As a new generation of high-high voltage inverter designed and manufactured by our company, ME800 series HV inverter is able to suppress input harmonic current at the network side by the shift-phase rectify transformer, and realize voltage overly by cascading multistage H bride power unit, so as to obtain the perfect high voltage sine wave output. It will directly drive high voltage motor, without any filter. ME800 series HV inverter applies to the standard high voltage (3kV，6kV and 10kV)3-phase AC motor, with following characteristics:

2.1.1 High-quality input characteristics

ME800 series high voltage inverter applies shift-phase multiple rectification technology at the power supply side, with small pollution to the harmonic on grid side and high power factor, meeting GB 14549－9 and IEEE std 519-1992 in terms of voltage and current harmonic distortion degree, without harmonic interference to other electrical equipment on the same grid, as shown in Fig.2-1 and Fig.2-2.

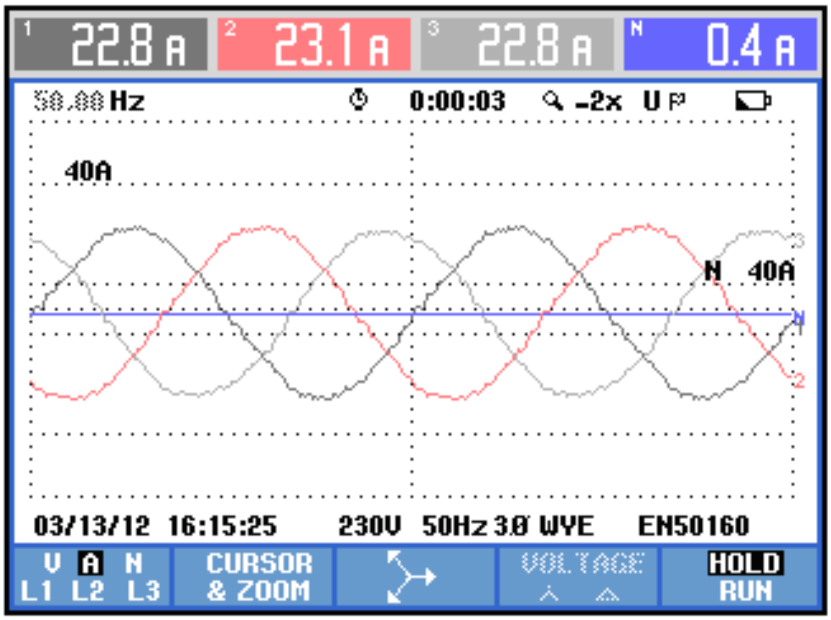


Fig.2-1 Input 3-phase current wave form

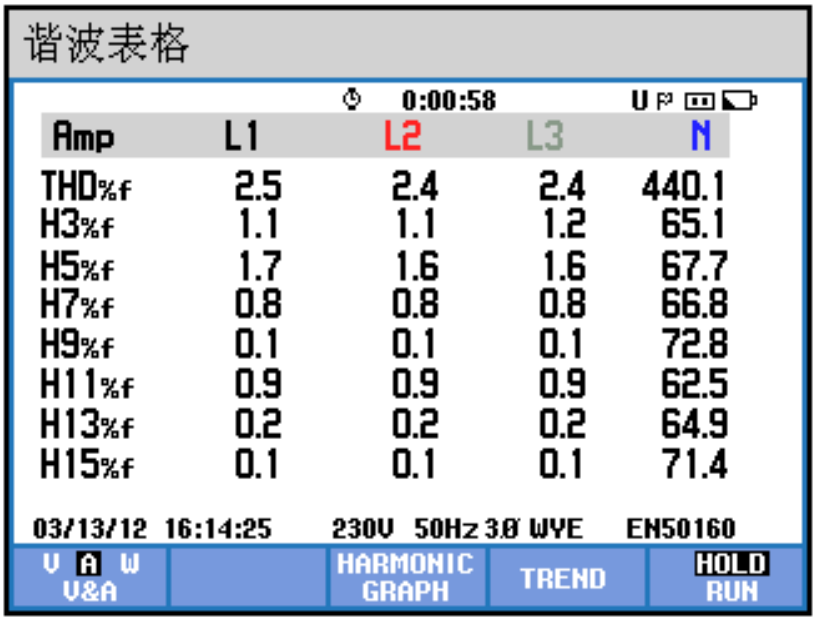


Fig.2-2 Input 3-phase current total harmonic

2.1.2 Low output harmonic

Output side of ME800 series high voltage inverter uses phase-shift multiple pulse width modulation technology with very small output harmonic, which is applicable to various motors without any output filter device. Because of low output voltage distortion degree and good sine degree of wave form, motor has low noise, small torque ripple and low heat productivity, therefore scope of output cable length is wide.

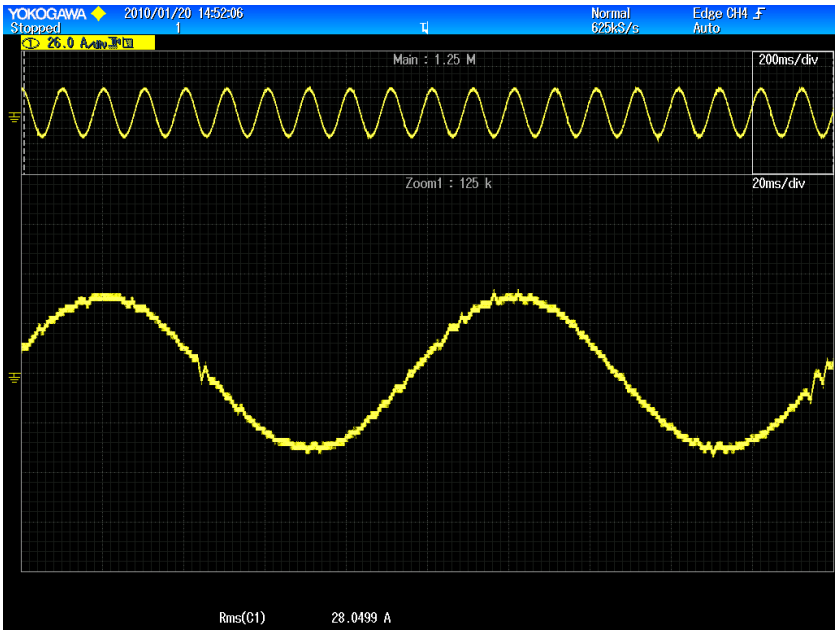


Fig.2-3 Output current wave form of sine wave

2.1.3 High power factor

ME800 series high voltage inverter belongs to the constant voltage type, which will keep high power factor within full speed range, and its full load power factor can be over 0.95, so as to reduce low equipment utilization rate of the user power transformer and power factor compensation problem of the user side caused by low power factor. Fig.2-4 shows power factor comparison between high voltage inverter and phase control thyristor.

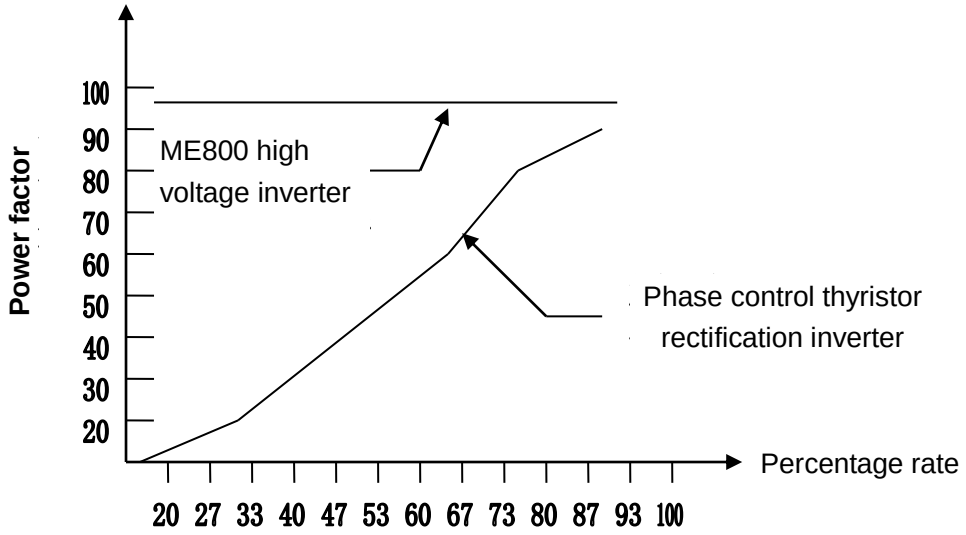


Fig.2-4 Power factor comparison between ME800 high voltage inverter and phase control thyristor

2.1.4 Power failure and system continues to run

During system operation, the Inverter can continue to run 1.2 seconds after instant power failure of the grid (less than 1.2 seconds). During this time the system continues to run if power on again to avoid the loss caused by unnecessary shutdown. Beyond the time, the system will report the fault of power outages and then shutdown.

2.1.5 High reliability and convenient maintenance

IGBT power module of ME800 high voltage inverter has bigger voltage and current design margin, whose trigger and overcurrent protection uses the special driver module circuit with very high reliability. Control signal of inverter is transferred via optical fiber, realizing the reliable electrical isolation of high and low voltage weak current.

ME800 series high voltage inverter adopts modular design, with perfect structural process design and generality for the unit module with the same capacity. If any fault occurs, the simple tool will be used to replace it within several minutes, conveniently and quickly.

2.1.6 Alarm and fault protection function

ME800 series inverter provides the perfect alarm and protection function, with the fault message relating to power unit and the complete machine, which will be viewed via remote monitoring interface or site operator.

If any fault appears, inverter will automatically record its operation environmental message.

2.1.7 Selection of bypass function of power unit

When any power unit of the inverter fails, bypass it through bypass function and inverter will operate for dated capacity, to greatly improve its reliability.

Warning: Before replacing the faulty power unit, it must be shutdown and cut off the drive high-voltage input power.

2.1.8 Selection of system variable frequency/power frequency switching

If it is required by process or high voltage inverter fails, the user can manually or automatically realize system variable frequency/power frequency switching by choosing function parameters.

2.1.9 Soft start

ME800 series high voltage inverter has the feature of soft start. Start time is set by user, with the built-in functions of acceleration, overcurrent and speed limit to control impact current of motor start, guarantee safe operation of motor and lengthen its service life. Overcurrent shock-free quick start for the grid and motor can be realized. This function also will effectively avoid motor faults such as cage bar breakage of the motor squirrel cage.

2.1.10 Reducing motor abrasion and saving maintenance cost

Such loads as fan and pump adopt ME800 high voltage inverter to adjust output through adjusting motor speed, which will not only reach the objective of energy conservation, but greatly reduce mechanical wear of the motor and its load, as well as save maintenance cost for user.

2.1.11 Rich user terminal interface

ME800 series high voltage inverter is designed with rich I/O ports for users. Users can build specific application system with these I/O ports (4-channel analog input, 4-channel analog output and 16-channel switching input and 8-channel relay output) supplied by system; and partial of terminals are programmable ones, so as to guarantee good system adaptability. Users can also expand I/O port according to the actual needs.

2.1.12 Friendly human-machine interface

ME800 series high voltage inverter human-machine interface adopts touch screen and digital keyboard, with the rich functions of setting, display and operating, as well as friendly human-machine interface. Users can conveniently understand the running status message of system via human-machine interface, and control high voltage inverter as required by process control.

2.2 Function brief

2.2.1 Frequency setting

Given way of the operation frequency:

- Given by panel
- Given by communication (for remote monitoring interface)
- Given by analog signal input
- Given by multi-speed: the inverter can set several frequency sections and acceleration & deceleration time, with switching among these frequency sections by terminal flexibly. Choose the relative parameters within digital multi-velocity parameter to configure the settings relating to operation frequency; Choose selection of frequency given way by setting frequency/speed channel selection parameter.

2.2.2 Operation Control Mode

Start mode of inverter:

- Normal start;
- DC braking and restart (for the fan-type load, reverse rotation may be driven by load. Firstly hold on the motor by DC braking, and then restart it, so as to avoid the huge impact current during start).
- Speed tracking start，The inverter firstly tracks the current speed of motor, then directly starts on the basis of current speed.

Parking mode:

- Deceleration and park，control the motor speed according to deceleration curve, until it stops after zero frequency.
- Inertia parking，Directly block PWM output, the motor stops as its own inertia.

- DC braking and parking，quick braking and parking are realized by adding DC in motor coil.

Given ways for start and parking command of inverter:

- Panel control
- Terminal control
- Communication control

Set the given way of start and parking command by touch screen

2.2.3 Acceleration and Deceleration Protection Function

No overcurrent appears to the protection motor during the accelerating process and no overvoltage during the decelerating process. Once overcurrent or overvoltage alarm (protection value hasn't been reached yet) appears, the inverter will automatically keep the current frequency unchanged, until the voltage or current returns to the normal level and accelerate or decorate again.

2.2.4 Frequency Hopping Function

ME800 series inverter supports to set frequency hopping, 3 frequency hopping points are available.

- Frequency hopping: in order to avoid equipment damage such as motor caused by that the inverter run at point of resonance of mechanical equipment, users can avoid this point of resonance by setting frequency hopping.
- Frequency hopping bandwidth: frequency width, when the inverter hops frequency, shall not be too large, for example (0.5-2), or it may cause overcurrent or overvoltage.

2.2.5 Torque Lifting Function Controlled by V/F

ME800 series high voltage speed governing system provides low frequency torque lifting function, the user may set torque lifting amplitude and speed scope that the torque needs to lift within user-defined V/F parameters adopting the relevant parameter.

2.2.6 Configuration of Programmable User Terminal

ME800 series high voltage inverter provides rich terminal functions for users, in addition, it may expand these I/O terminals as the user's actual needs. The terminals may be programmable ones, so as to guarantee the flexible system expandability and good adaptability.

2.2.7 Real Time Monitoring Function for Operating Parameters

ME800 series high voltage inverter is of the rich parameter monitoring functions.

Operation frequency, given frequency, current speed, input voltage, output voltage, input current, output current, running speed, output frequency, terminal status, analog value, unit bus voltage, unit temperature, unit optical fiber communication status, unit running status, unit bypass state transformer temperature can be monitored under all conditions.

2.2.8 Comprehensive Fault Inspection and Protection Function

ME800 series high voltage inverter provides classification protection over 220 faults, and may automatically send an alarm or report fault treatment and record according to severity of fault. Users may view fault message via the operator or remote monitoring interface, and the system will provide alarm prompt interface at the same time, to avoid element damage due to serious fault.

In addition, system provides EEPROM detection function. When EEPROM error is detected, it will be presented to the user by remote monitoring interface.

2.2.9 Multi-level User Right Management

ME800 series high voltage inverter provides three-level user right such as visitor, operator and administrator, and provides the related rights according to user level, making the operation become more safe and convenient.

2.2.10 Convenient Parameter Backup Function

Remote monitoring interface provides the convenient backup function for parameters and other configuration message, the users can restore the backup parameters into the system by means of simple operation.

2.2.11. Communication Function

ME800 series high voltage inverter provides the external Modbus (standard configuration) and Profibus-DP (selective configuration) communication interface. The user may control and set inverter with his own system via protocol.

2.3 Composition and working principle of inverter

2.3.1 Composition

The standard configuration of ME800 series inverter cabinet is different, which is based on the

inverter, model and quantity of units as well as other factors. But it is generally composed of the following cabinet:

- Transformer cabinet
- System control cabinet
- Power unit cabinet
- System bypass cabinet(selective configuration)
- Start cabinet(selective configuration)

Fig.2-5 is the appearance of typical ME800 inverter.

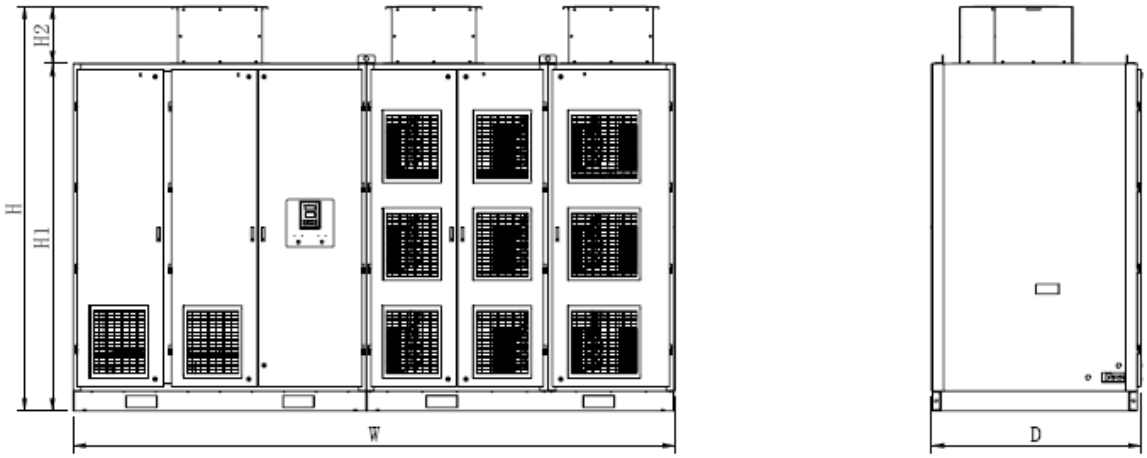


Fig.2-5 Appearance of ME800 Inverter

2.3.1.1 Transformer cabinet

Transformer part of ME800 inverter mainly includes phase-shift rectification transformer and its cabinet. Input power line enters inverter from this cabinet and output power line to motor also is led from here. Input and output power line applies both up and down incoming line. One or several fans are also needed to cool the transformer. See Fig.2-6.

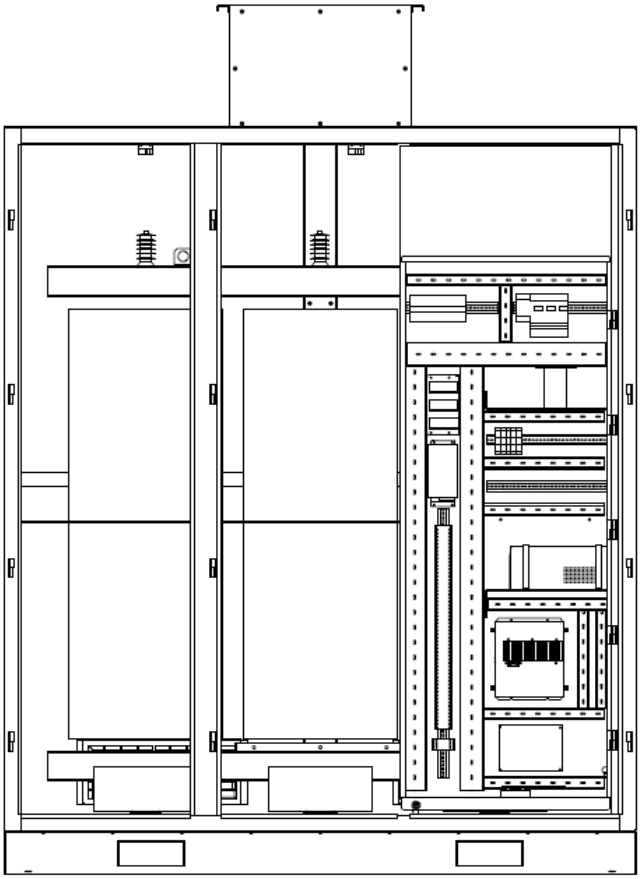


Fig.2-6 Inside of transformer cabinet

2.3.1.2 System control cabinet

System control part is included in the control cabinet whose doors can be opened during operation. This part mainly includes: master control system formed by microprocessor (ARM) and site programmable logic gate array (FPGA), acquisition system of inverter status signal as well as low voltage power supply system composed of UPS and switch power supply.

2.3.1.3 Power unit cabinet

As the critical part of system rectification and inverter, power unit is composed of rectifier bridge, energy storage capacitor and IGBT. Power unit at each level provides a level grade of output voltage. Change from low voltage to high voltage is realized by series connection output of multiple units. See the Fig.2-7.

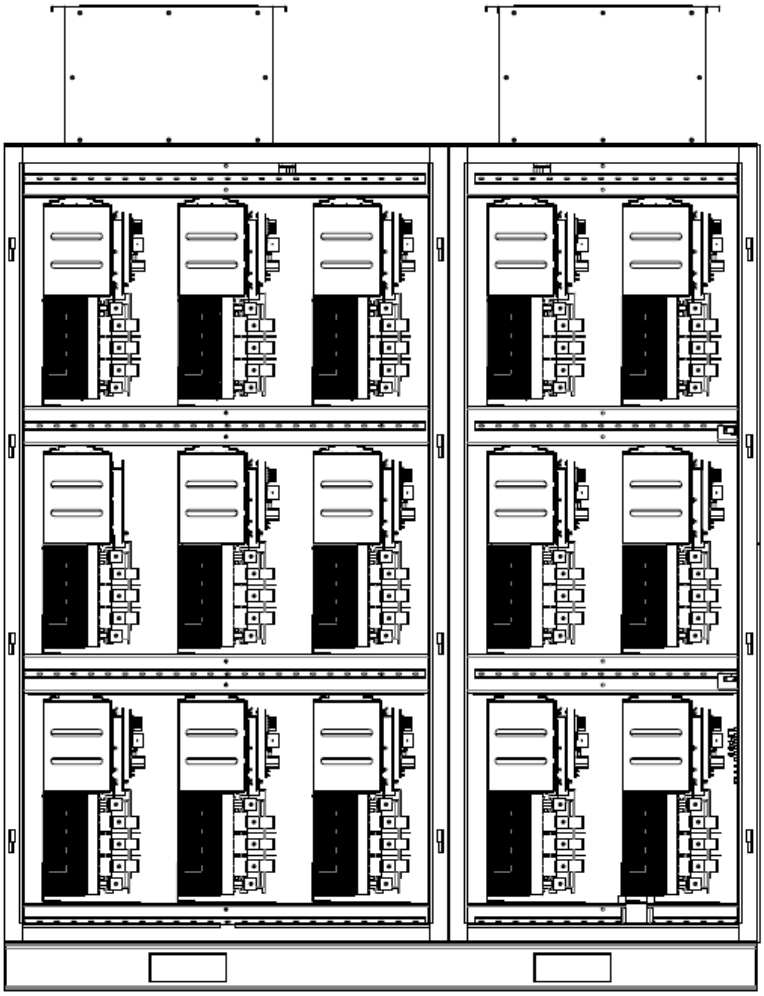


Fig.2-7 Inside of power unit cabinet

2.3.1.4 System bypass cabinet (selective configuration)

Users can select the bypass function according to practical application of the field. The main part of the system bypass is the system bypass cabinet. The main function of the system bypass is to let motor directly connect to the common frequency power network to ensure the continuity of production and improve system stability, when the inverter has faults. There are two basic configuration of system bypass cabinet: manual bypass cabinet and automatic bypass cabinet. If you have any special requirements of the bypass part, please describe them in the technical agreement.

2.3.1.5 Start cabinet (selective configuration)

When the inverter connect with the high-voltage, the momentary field current from phase-shift rectification transformer and the charge current from Units at all levels of the DC-Link capacitor

circuit will be very large, and this will cause a power supply cabinet malfunction. Start cabinet can effectively prevent this from happening.

2.3.2 Working principle

2.3.2.1 Main circuit

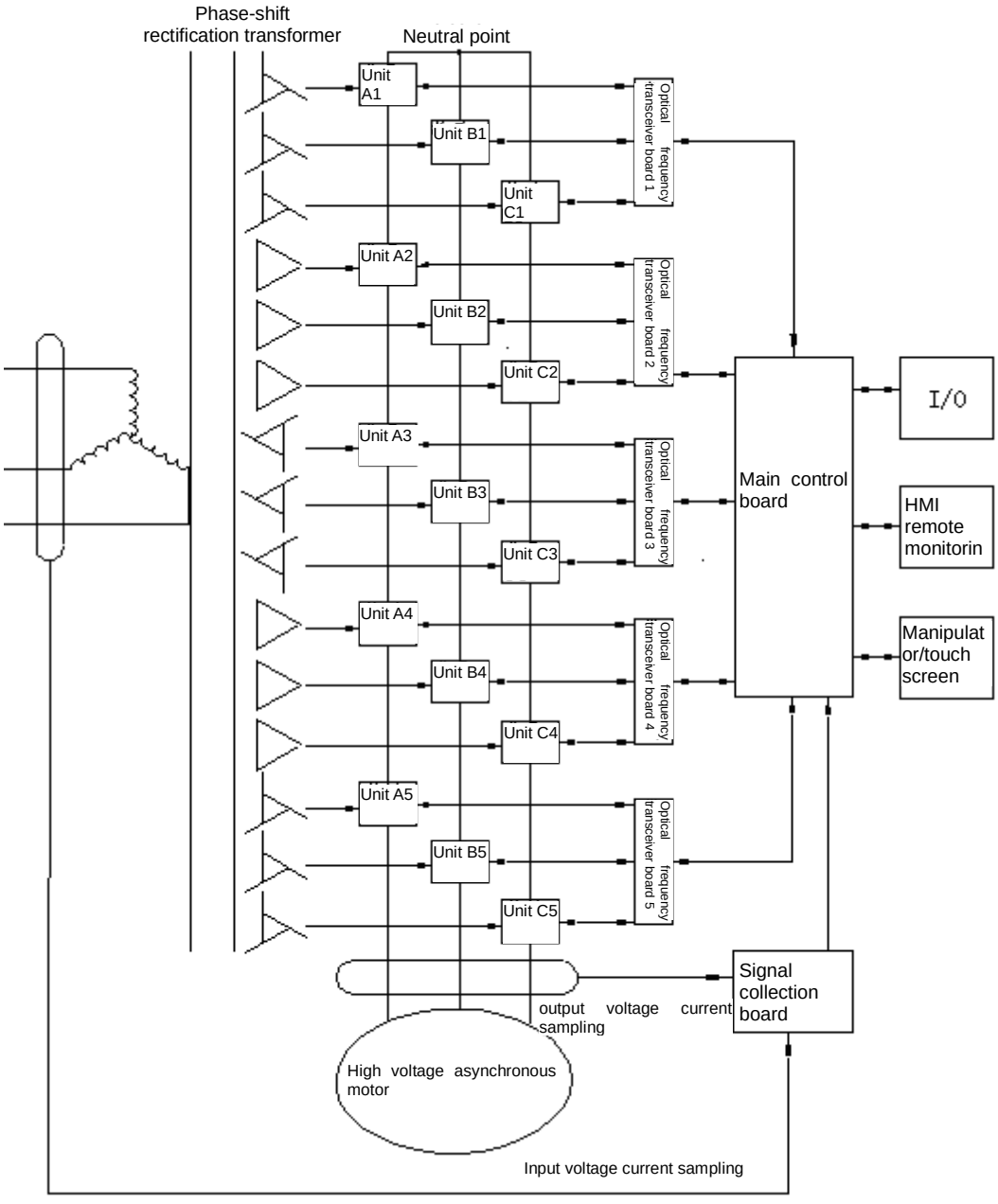


Fig.2-8 Principle diagram of high voltage inverter system(6KV as an example)

Fig.2-8 shows the typical circuit topological graph of 6KV ME800 series inverter which adopts 690V power unit. Each phase of the motor is driven by 5 power units in series, with phase

voltage 5*690=3450V and line voltage 3450*1.732=6000V. Star connection is adopted for serial mode, with floating neutral point. Each unit is supplied by isolation secondary winding of an isolation transformer. Unit input voltage is 690VAC and power is 1/15 of total power. As figure 2-8 shows Insulation class among A, B, C three - phase power unit and each unit apart from the ground is 6kV.

2.3.2.2 Power unit

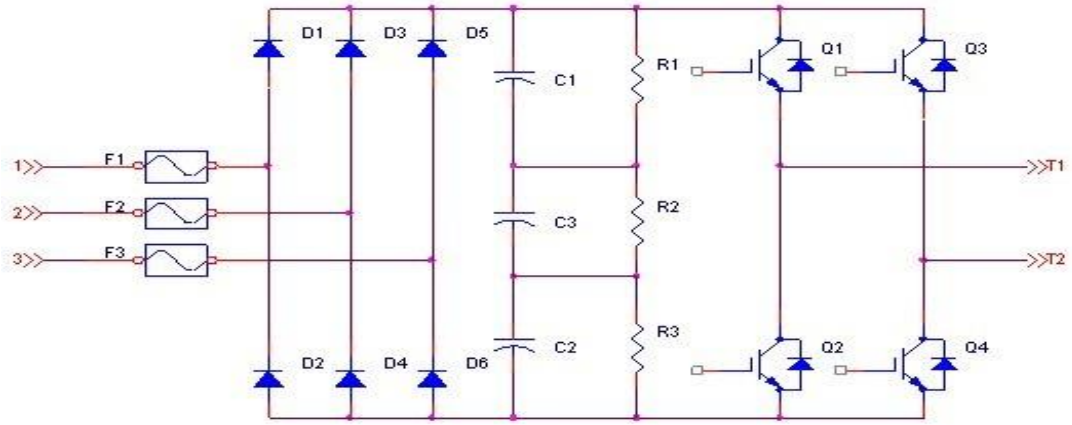


Fig.2-9 Power unit topological diagram

Fig.2-9 shows the topological diagram of power unit. It is composed of three parts. Part Ⅰ is rectification section, and the three - phase input voltage 690V will change into DC after the three-phase non-controlled rectifier. Part Ⅱ is DC Bus part, and the main components of this part is large-capacity electrolytic capacitor and equalizing resistance. Part Ⅲ is inverter part, which adopts H-bridge inverter and the power device is IGBT.

2.3.2.3 Control system

Fig.2-8 shows that how to realize the control system of ME800 inverter. Control system is composed of main control board, optical transceiver board, signal collection board, I/O, operator/touch screen and remote monitoring interface.

Chip of the master control system adopts microprocessor (ARM) and field programmable logic gate array (FPGA). Control of the motor is realized by use of 3-phase voltage command of pulse width modulation PWM produced from sine space vector algorithm.

Optical transceiver board is used to change optical signal into electric signal. It changes electric signal from the master control system into optical signal, then transfer it to the related power

unit, at the same time collect the real time message from power unit, which is switched into electric signal to transfer to the master control board. Therefore the master will take control actions timely.

Signal collection board is used to collect current signal and voltage signal from input and output side, and then transfer them to the master control board after data processed. These voltage and current signals are the important basis for control, sending overcurrent and overvoltage alarm or emergency parking.

I/O board provides various interfaces for digital and analog input & output. The collected Signals are the important control basis, such as external analog given, multi-velocity digital given, PID feedback signal and inverter' s own state detection, etc.

Touch screen is the standard configuration of inverter, which not only may send various modes, but completely monitor and record different states from power unit to complete machine, as well as may view and modify inverter parameters conveniently.

2.3.2.4 System bypass (selective configuration)

As previously mentioned, the main function of the system bypass is to make the motor directly connect to the power frequency network. There are two basic configuration of system bypass cabinet: manual bypass cabinet and automatic bypass cabinet. The electrical diagrams are shown in Fig. 2-10 and 2-11. KM2 and KM3 of the automatic bypass cabinet have vacuum contactor with mechanical interlock. KM2 and KM3 cannot be closed at the same time, which avoids power frequency supply directly connecting to the output of inverter. QS2-1 and QS2-2 are SPDT knife switches in the manual bypass cabinet, which have the same function as KM2 and KM3.

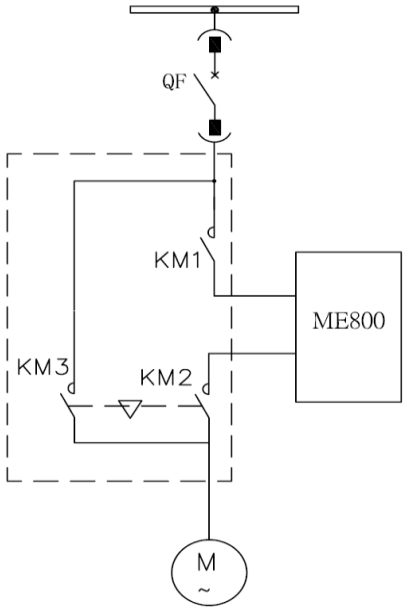


Fig.2-10 Automatic system bypass cabinet electrical diagrams

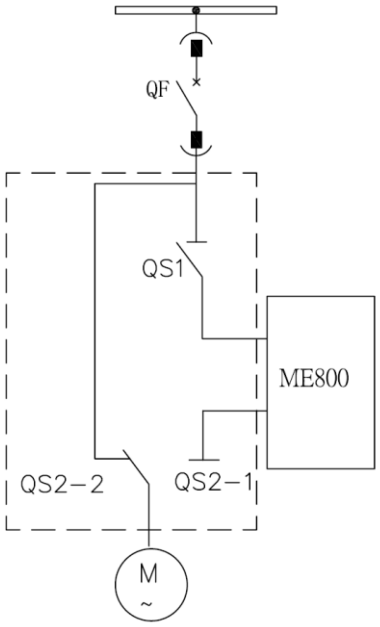


Fig.2-11 Manual system bypass cabinet electrical diagrams

2.4 The technical parameters of the ME800 series high-voltage inverter

Table 2-1 gives the technical parameters of the ME800 series high-voltage inverter.

Table 2-1 Public Specifications of standard ME800 inverter

Item		Description
Main standards applied	National standard	GB/T 12668.4-2006
	Industrial standard	DL/T994 -2006
Input	Input line voltage	3.0/6.0/10.0kV (-10%～+10%)
	Input rated power	50Hz(-2%～+2%)
	Input power factor	It is more than 0.95 when the load exceeds 20%.
	Control power supply	3-phase four-wire system 380V，5～20KVA(depending on power level)
Output	Output line voltage	0～3.0/6.0/10.0kV
	Output frequency drift	±0.5%
	Output frequency resolution	0.01Hz
Control parameters	Speed range	0.5～120Hz(relating to motor)
	Overload capability	120%，60S；150 immediate protection(designing as per the user's requirements)
	Control mode	V/F control or vector control

	Control precision	±0.5% of maximum frequency number
	Load torque characteristic	Square torque load and constant torque load
	Acceleration and deceleration time	10～3200S(relating to load characteristic)
	Signal input and output	4-channel analog input, 4-channel analog output, 16-channel digital input, 8-channel digital output (expanded as needed).
	Main control functions	Soft start, no shutdown control for transient power failure, curve acceleration and deceleration control, frequency hopping, speed tracking start, power unit bypass and line voltage self-equalization.
	Major protection functions	Overvoltage, undervoltage, overcurrent, short circuit, overheating, power unit fault, cooling fan abnormal, power failure switching of control power supply, etc.
	Communication function	Standard configuration： Modbus； selective configuration： Profibus-DP, etc
Display		LED touch screen
Input transformer	Insulation grade	H
Constitution	Protection grade	IP30
Constitution	Cooling model	Force-air cooling
	Maintenance	Before and after the maintenance
Environmental conditions	Ambient operating temperature	0～+40℃
	Storage and transport temperature	-20℃～+70℃
	Humidity	<95%,No condensation
	Vibration	Less than 0.9g
	Operation site	Non-corrosiveness , no-explosive gas，no dust chamber，altitude of less than 1000 meters(Please consult our company for the special circumstances.)
working load		Blower、pump、compressor、forming machine、banbury mixer、Stirring mill, etc.

2.5 Specifications and dimensions

The following technical indicators contain all information on electrical model selection and cabinet dimensions of ME800 series high voltage inverter, which can be as an important reference for your selection. If the information has been updated, you can contact the marketing. If system bypass cabinet has been chose, the width of one-driven-one system bypass cabinet is 800mm and its height and depth are the same as inverter.

Table 2-2 3kV ME800 high-voltage inverter specifications and dimensions table

Rated current [A]	Inverter capacity [kVA]	Adaptive motor [kW]	Product type	Overall dimensions (W×D×H)[mm]
58	300	250	ME800-0250-T03-PA	2600×1500×2667
77	400	315	ME800-0315-T03-PA	
87	450	355	ME800-0355-T03-PA	
96	500	400	ME800-0400-T03-PA	
108	560	450	ME800-0450-T03-PA	
121	630	500	ME800-0500-T03-PA	
135	700	560	ME800-0560-T03-PA	
154	800	630	ME800-0630-T03-PA	2600×1500×2707
173	900	710	ME800-0710-T03-PA	
192	1000	800	ME800-0800-T03-PA	3500×1500×2895
216	1120	900	ME800-0900-T03-PA	4300×1500×2895 (Including the start cabinet size)
241	1250	1000	ME800-1000-T03-PA	
269	1400	1120	ME800-1120-T03-PA	
308	1600	1250	ME800-1250-T03-PA	
335	1800	1400	ME800-1400-T03-PA	5520×1500×2895 (Including the start cabinet size)
385	2000	1600	ME800-1600-T03-PA	
481	2500	2000	ME800-2000-T03-PA	
600	3150	2500	ME800-2500-T03-PA	

Note： Configure startup cabinet if the power is greater than 900kW. Please contact with Shanghai Sigriner STEP Motor Co., Ltd about the selection of load, if the power is greater than 2500kW.

Table 2-3 6kV ME800 high-voltage inverter specifications and dimensions table

Rated current [A]	Inverter capacity [kVA]	Adaptive motor [kW]	Product type	Overall dimensions (W×D×H)[mm]
34	350	280	ME800-0280-T06-PA	2900×1500×2667
43	450	355	ME800-0355-T06-PA	
48	500	400	ME800-0400-T06-PA	
61	630	500	ME800-0500-T06-PA	
67	700	560	ME800-0560-T06-PA	
77	800	630	ME800-0630-T06-PA	2900×1500×2707
87	900	710	ME800-0710-T06-PA	
96	1000	800	ME800-0800-T06-PA	
108	1120	900	ME800-0900-T06-PA	3300×1500×2707
120	1250	1000	ME800-1000-T06-PA	
135	1400	1120	ME800-1120-T06-PA	
154	1600	1250	ME800-1250-T06-PA	
173	1800	1400	ME800-1400-T06-PA	
192	2000	1600	ME800-1600-T06-PA	4405×1500×2895
217	2250	1800	ME800-1800-T06-PA	5205×1500×2895 (Including the start cabinet size)
241	2500	2000	ME800-2000-T06-PA	
269	2800	2240	ME800-2240-T06-PA	
315	3150	2500	ME800-2500-T06-PA	
337	3500	2800	ME800-2800-T06-PA	7420×1600×2895 (Including the start cabinet size)
385	4000	3150	ME800-3150-T06-PA	
433	4500	3550	ME800-3550-T06-PA	
481	5000	4000	ME800-4000-T06-PA	
558	5800	4500	ME800-4500-T06-PA	7520×1700×2895 (Including the start cabinet size)
600	6300	5000	ME800-5000-T06-PA	

Note： Configure startup cabinet if the power is greater than 1800kW. Please contact with Shanghai Sigriner STEP Motor Co., Ltd about the selection of load, if the power is greater than 5000kW.

Table 2-4 10kV ME800 high-voltage inverter specifications and dimensions table

Rated current [A]	Inverter capacity [kVA]	Adaptive motor [kW]	Product type	Overall dimensions (W×D×H)[mm]
22	375	300	ME800-0300-T10-PA	3800×1500×2667
29	500	400	ME800-0400-T10-PA	
32	560	450	ME800-0450-T10-PA	
36	630	500	ME800-0500-T10-PA	
40	700	560	ME800-0560-T10-PA	
46	800	630	ME800-0630-T10-PA	
52	900	710	ME800-0710-T10-PA	
58	1000	800	ME800-0800-T10-PA	4200×1500×2667
65	1120	900	ME800-0900-T10-PA	
72	1250	1000	ME800-1000-T10-PA	
81	1400	1120	ME800-1120-T10-PA	
92	1600	1250	ME800-1250-T10-PA	4200×1500×2707
104	1800	1400	ME800-1400-T10-PA	
115	2000	1600	ME800-1600-T10-PA	4400×1600×2707
130	2250	1800	ME800-1800-T10-PA	
144	2500	2000	ME800-2000-T10-PA	
162	2800	2240	ME800-2240-T10-PA	
182	3150	2500	ME800-2500-T10-PA	6900×1500×2895 (Including the start cabinet size)
202	3500	2800	ME800-2800-T10-PA	7200×1600×2895 (Including the start
231	4000	3150	ME800-3150-T10-PA	

254	4500	3550	ME800-3550-T10-PA	cabinet size)
289	5000	4000	ME800-4000-T10-PA	
335	5800	4500	ME800-4500-T10-PA	
364	6300	5000	ME800-5000-T10-PA	10920×1700×2895 (Including the start cabinet size)
404	7000	5600	ME800-5600-T10-PA	
462	8000	6300	ME800-6300-T10-PA	11120×1700×2895 (Including the start cabinet size)
520	9000	7100	ME800-7100-T10-PA	
600	10000	8000	ME800-8000-T10-PA	

Note： Configure startup cabinet if the power is greater than 2500kW. Please contact with Shanghai Sigriner STEP Motor Co., Ltd about the selection of load, if the power is greater than 8000kW.

Chapter Ⅲ Installation and Wiring

3.1 Acceptance check

The correct acceptance check procedure is formed by:

- Check the shipping list and confirm the equipment to be complete;
- Check the possible damage during transportation;
- Make a claim to the transportation company if there is damage.

Note: According to the unit size, structure and unit may be supported by wood, which will be removed during the installation process.

3.2 Handling

Estimate the inverter weight correctly before carrying. Since ME800 inverter system will change with the specific application of users, its exact weight will be different due to the different rating value and options of the inverter. System dimensions and weight are marked outside factory packaging and in the first page of random drawing.

For handing convenience, forklift hole is designed on the bottom of cabinet body. There are two handing modes: a. crane or chain block for hoisting; b. forklift.

DANGER

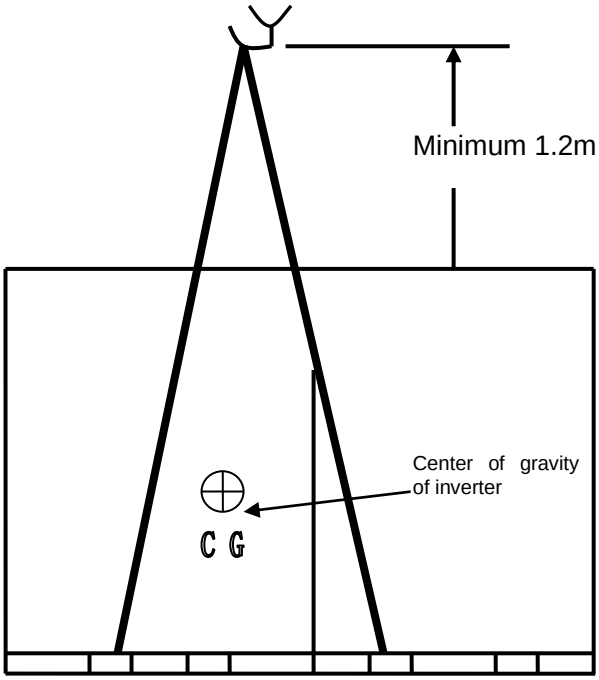
Danger!! Don't try to support the transformer cabinet only relying on the upper cabinet body or don't lift any cabinet using eye bolt.

Crane or chain block hoist for hoisting **–**The best way is that the rope passes through the bottom hole and hoists the cabinet with crane, shown in Figure 3-1. The key is length and strength of the rope. The rope must be long enough, to guarantee a minimum distance of 1.2m between the lifting hook and top of cabinet, avoiding deformation of the cabinet body. If it is inadequate, strengthening rib must be adopted. Rope strength must be able to support the weight marked in drawing.

NOTICE

Rope must passes through the proper forklift hole when it is used for hoisting. Center of hoisting and center of gravity of the inverter will be identical as far as possible.

Center of gravity of the integrated STEP HV inverter is close to the transformer cabinet's, other than geometric center.



Front view during hoisting

Fig.3-1 Center of gravity of inverter must be noted when steel wire is used for hoisting

Forklift – The forklift must be able to bear the relevant weight and the forklift shovel teeth must be at least longer than the width of the cabinet. When the cabinet body is too long, two forklifts will be employed.

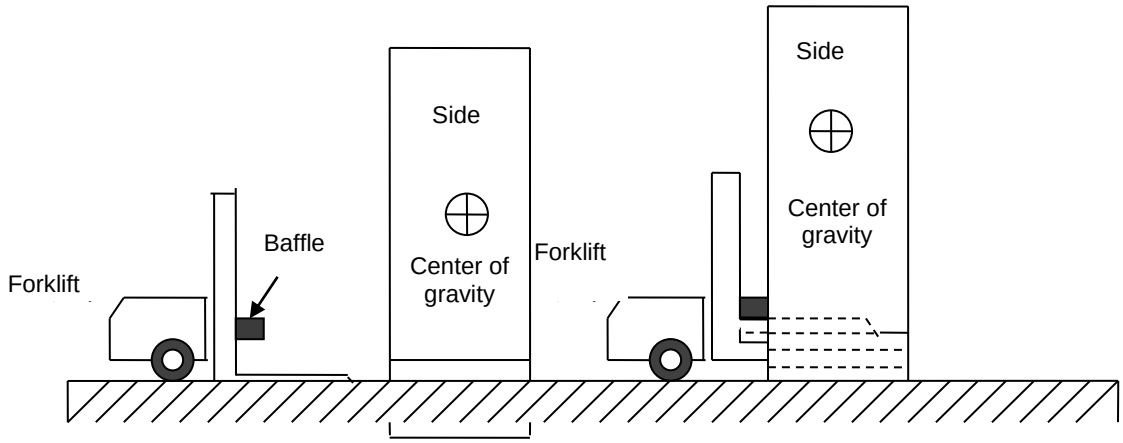


Fig.3-2 Correct way to use the forklift

Be careful that the cabinet surface won't be damaged by forklift and it is better to use a wood baffle at corner of the relieved teeth, shown in Fig.3-2. Center of gravity of the STEP inverter cabinet is close to the middle of front and rear panel.

3.3 Installation

3.3.1 Requirements of operating environment

Efficiency of ME800 series HV inverter is more than 96% and 4% loss is basically transformed into heat energy, so the heat dissipation of HV inverter must be considered. Ambient temperature must be controlled below 40 degrees centigrade in normal operation.

3.3.2 Requirement of cabinet space

Refer to the related drawings in engineering data for cabinet dimension, boundary dimension and baseplate installation diagram of the inverter. All cabinet must be installed according to installation drawing, with enough space distance outside, so as to guarantee the space required by ventilation, maximum door swing and maintenance. Passage (corridor space, etc) accessing to installation base and space to transport the auxiliary equipment of inverter will be provided. Minimum width of the accesses around HV inverter is shown in Table 3-1.

Table 3-1 width of the accesses around HV inverter

	The front door space	Back door away from the wall
Space distance	2.0m	1.5m

In order to guarantee enough heat dissipation, distance between the top of the inverter and roof

space must meet the national requirement. On purpose of reducing the ambient temperature further, the user can install the centralized ventilation air duct to lead hot air outdoor directly via the air duct after it passes the centrifugal fan.

3.3.3 Installation of cooling fan

The fan will be installed after the cabinet body is positioned. Number of fans possibly equipped for each inverter will be different according to different power. Refer to the random drawing for details. Each fan is provided with a bunch (with plug), which is connected to connector socket cabinet inside. During the process of installation, firstly connect the plug well, then tighten the fan power lines with cable ties, and finally tighten the screws of the fan.

The air used to cool unit cabinet and transformer cabinet is brought by the centrifugal fan installed in the top of cabinet, which is drawn from the front door of the cabinet and flowed into the inverter. Outlet is in the top of the inverter cabinet. Installation space must be taken air circulation into account.

The correct rotation direction can be judged in accordance with the following conditions:

- Look from outside of the inverter cabinet, if the fan blade turn right, then rotation direction is correct.
- Look up inside the inverter cabinet, if the fan turn clockwise rotation, then the rotation direction is correct.
- If the green light of phase sequence relay is lighting, then rotation direction is correct.

3.4 Wiring

All user power terminals are connected the transformer cabinet inside, while the control wiring is connected the control cabinet inside. The Fig.3-3 is the typical diagram of system external interface, and the specific terminal will be slightly different due to different model or user requirements.

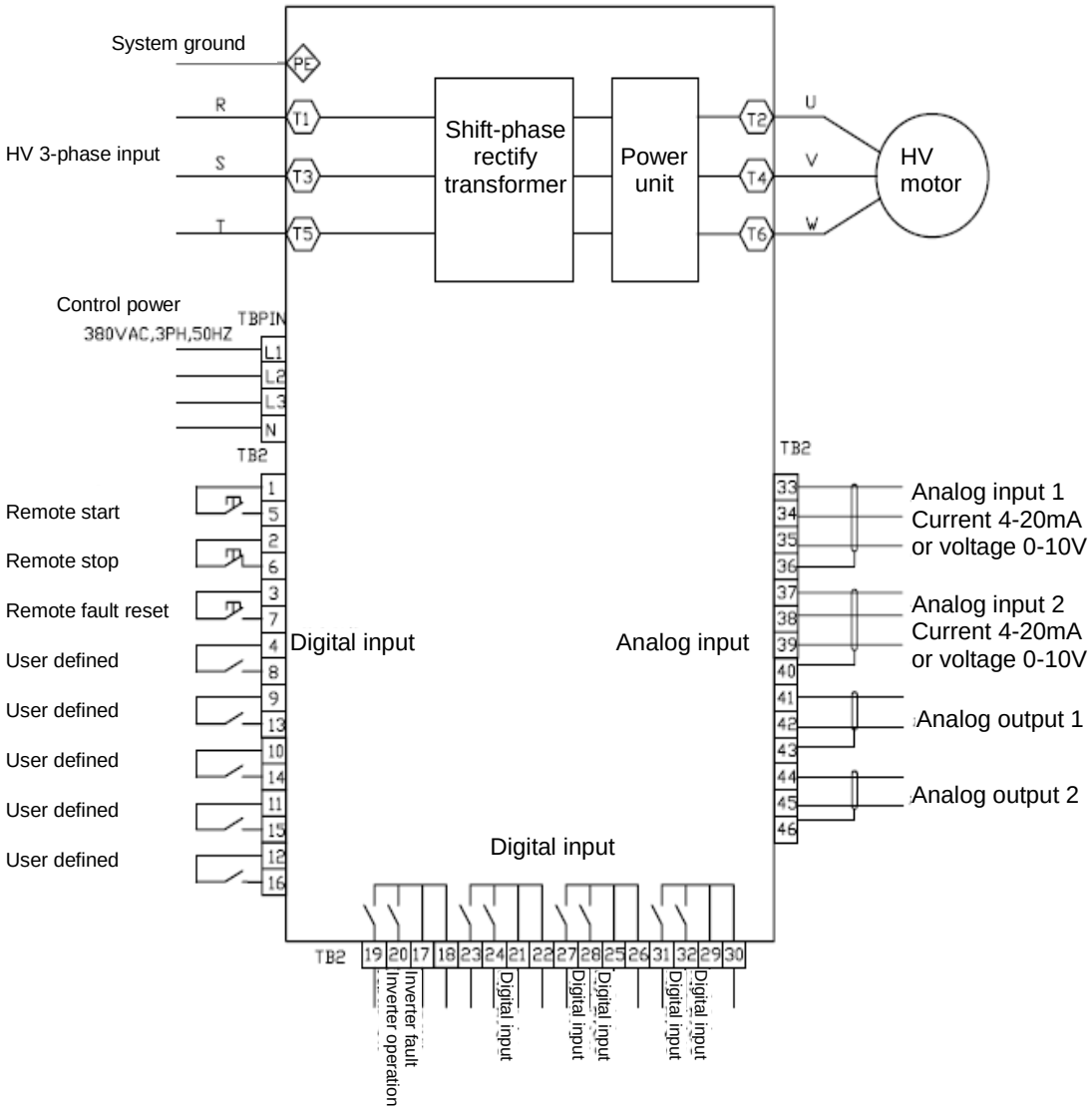


Fig.3-3 Typical system external interface diagram

Table 3-2 Power cable wiring table (inside the transformer cabinet)

Terminal no.	Wiring definition	Remarks
T1	HV input phase 1 R	All cables can enter the cabinet from its top or bottom and only need to remove the cover plate of relevant part.
T3	HV input phase 2 S	
T5	HV input phase 3 T	
T2	HV output put phase 1 U	
T4	HV output put phase 2 V	
T6	HV output put phase 3 W	
PE	System ground	
L1	Control power phase A	Control power is 3-phase 380VAC,

L2	Control power phase B	which should connect to the terminal block TBPIN.
L3	Control power phase C	
N	Control power zero line	

There are 3 groups of ±５％ voltage taps on the left of the transformer to compensate for power voltage, but ＋0％ tap should be connected when leaving factory.

Table 3-3 Controlling cable wiring table

Terminal no.	Wiring definition	Remarks
TB:2:1	Common terminal	DC24V
TB:2:4	Remote start	
TB:2:5	Remote stop	
TB:2:6	Remote system reset	
TB:2:12	User defined	
TB:2:13	User defined	
TB:2:14	User defined	
TB:2:18, TB:2:20	Inverter operation	Relay output, normally open contact, contact capacity 3A, 250VAC
TB:2:19, TB:2:21	Inverter alarm	
TB:2:22, TB:2:24	Inverter fault	
TB:2:23, TB:2:25	User defined	
TB:2:26, TB:2:28	User defined	
TB:2:33, TB:2:34/TB:2:35	Analog input	4~20mA/0~10V
TB:2:37, TB:2:38/TB:2:39	Analog input	4~20mA/0~10V
TB:2:41, TB:2:42	Analog output	0~10V
TB:2:44, TB:2:45	Analog output	0~10V
TB:2:47, TB:2:48	Analog output	4~20mA
TB:2:50, TB:2:51	Analog output	4~20mA

Chapter Ⅳ Touch Screen

4.1 Introduction of touch screen

Touch screen of ME800 series high voltage inverter is the operation interface between the inverter and the user. It can monitor the run status and unit status; adjust parameters; refer the fault record and event record. The operation interface is very simple and direct.

4.2 Operation of touch screen

After the touch screen is powered on, firstly popup the main interface. The user may click the related buttons to have different operations. Some operations will be switched to their corresponding sub-interfaces after clicking, which will return to the main interface if you click the “Exit”.

4.2.1 Main interface of touch screen

The main interface of touch screen is used to monitor running status of the inverter and control its operation. There are software version of the main control board, RTC clock and the current status of the inverter on the left top of the interface. The operation status of the inverter is in the middle of the interface and includes operation data, control mode and the current operation status. Control command buttons are on the right of the interface, which can deliver control command after successful login password. There are trigger buttons of the sub interfaces on the bottom and the corresponding interface will be displayed by clicking them. There are two colors about the main interface and it will change the color every one hour to protect the screen. Reference the Fig.4-1 and Fig.4-2.

Fig.4-1 Main interface1 of touch screen

Fig.4-2 Main interface2 of touch screen

【Main interface】See Table 4-1 for the key functions.

Table 4-1 Key functions of inverter main interface

Key	Name	Functions
	Given frequency	Move the slider to change the command freq, and the step size is 1. Move left to decrease and right to add. The max value is 100.
	Accelerating	Increase speed value, it will change 0.5Hz every time.
	Decelerating	Decrease speed value, it will change 0.5Hz every time.
	Speed set key	Confirm the speed after the speed has been set.
	Start key	Give a command to start inverter.
	Stop key	Give a command to stop inverter.
	Direction key	Change the running direction of inverter. “Foreward” indicates the inverter is in a reverse status, while “Reverse” indicates a foreward status.
	Fault reset key	Give a command to reset inverter fault
	Login password	Enter sub interface of password login.
	Power unit/ IO	Enter sub interface of power unit, IO status and system status.
	Information record	Enter sub interface of fault record and event record.
	Parameter setting	Enter sub interface of parameters and backup parameters.
	SOP setting	Enter sub interface of local setting and SOP.

Instruction

- Communication light: Its color is lime when communication is normal between the touch screen and the inverter, red to abnormal.

- Inspect light: Its color is lime when the system is inspecting, white to other status.
- Normal light: Its color is lime when the system is normal, white to other status.
- Fault light: Its color is yellow when the system is on alarm status, red to fault status, white to other status.
- Bypass light: Its color is yellow when unit bypass, red to system bypass, white to other status.

4.2.2 Password login interface of touch screen

There are two types of operation right for password login:

Operator: they can only browse system information and give running command to the system.

Administrator: They can set and operate the system.

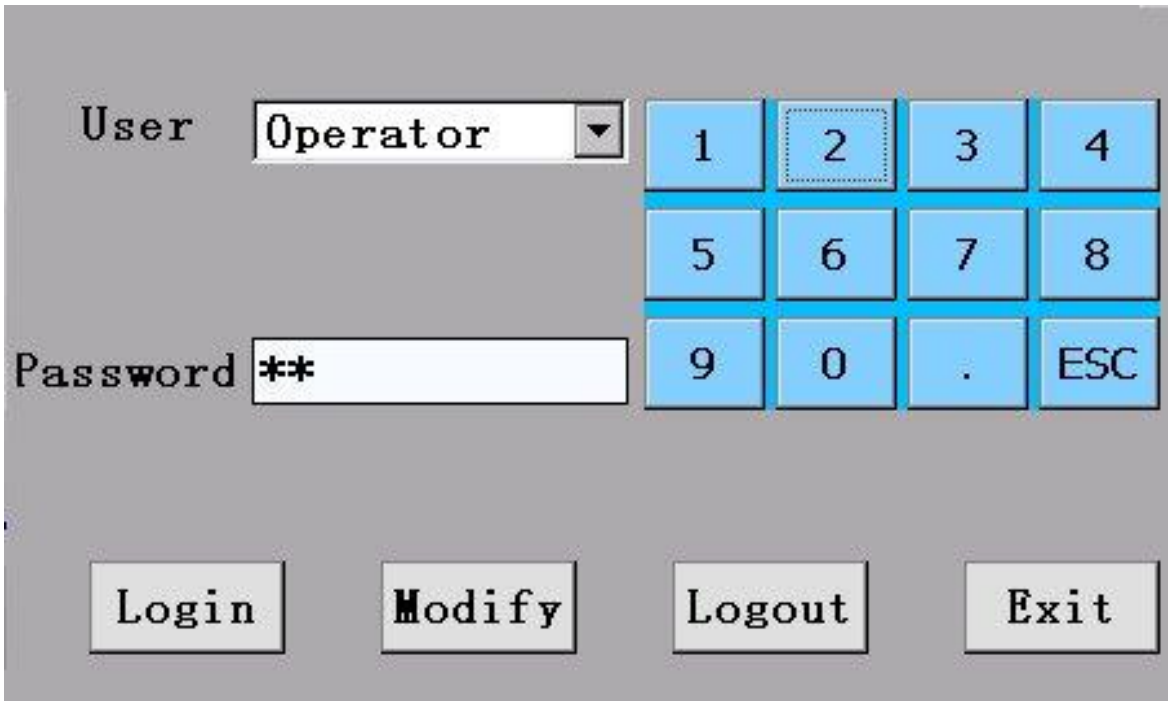


Fig. 4-3 Password login interface of touch screen

【password login】See Table 4-2 for key functions.

Table 4-2 Functions of password login keys of inverter

Key	Name	Functions
Logout	Logout key	Cancel the current password, the current limits of authority should not be lower than the selected user.
Login	Login key	Confirm password input and deliver a login command.

Modify	Modification key	Enter the password change interface. Password can only be modified after correct login.
Exit	Exit key	Exit from the current interface and return to the main interface.

4.2.3 Password modify interface of touch screen

Password modification interface is used to modify the password, which will be valid after successful password login and stopping the inverter.

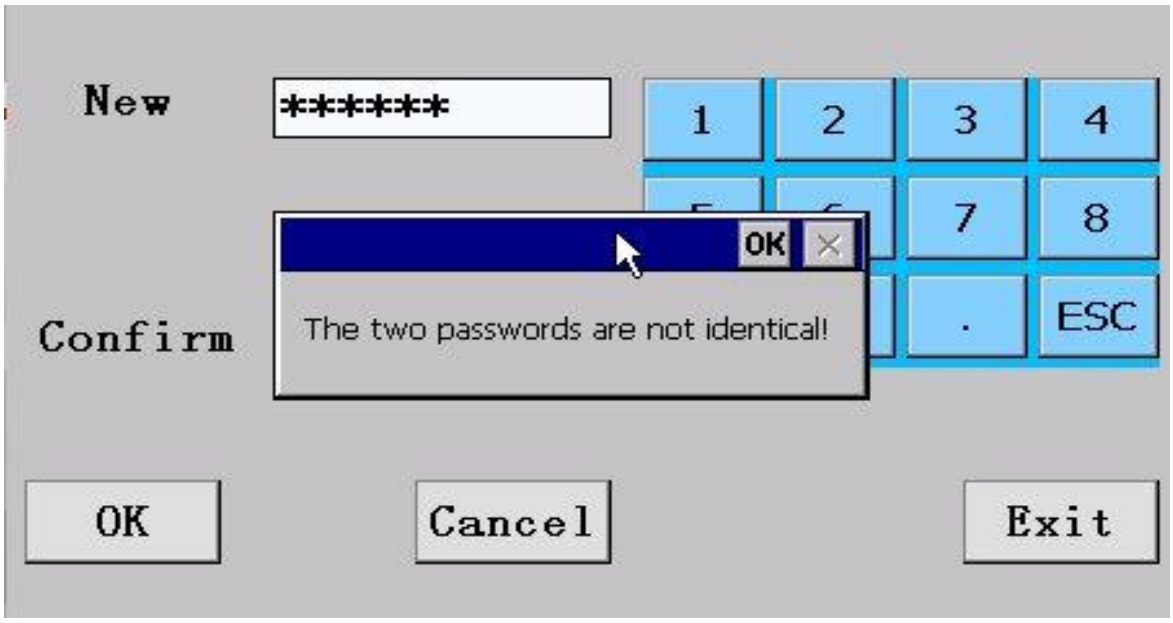


Fig.4-4 Password modify interface of touch screen

【password modify】See Table 4-3 for key functions.

Table 4-3 Functions of password change keys of inverter

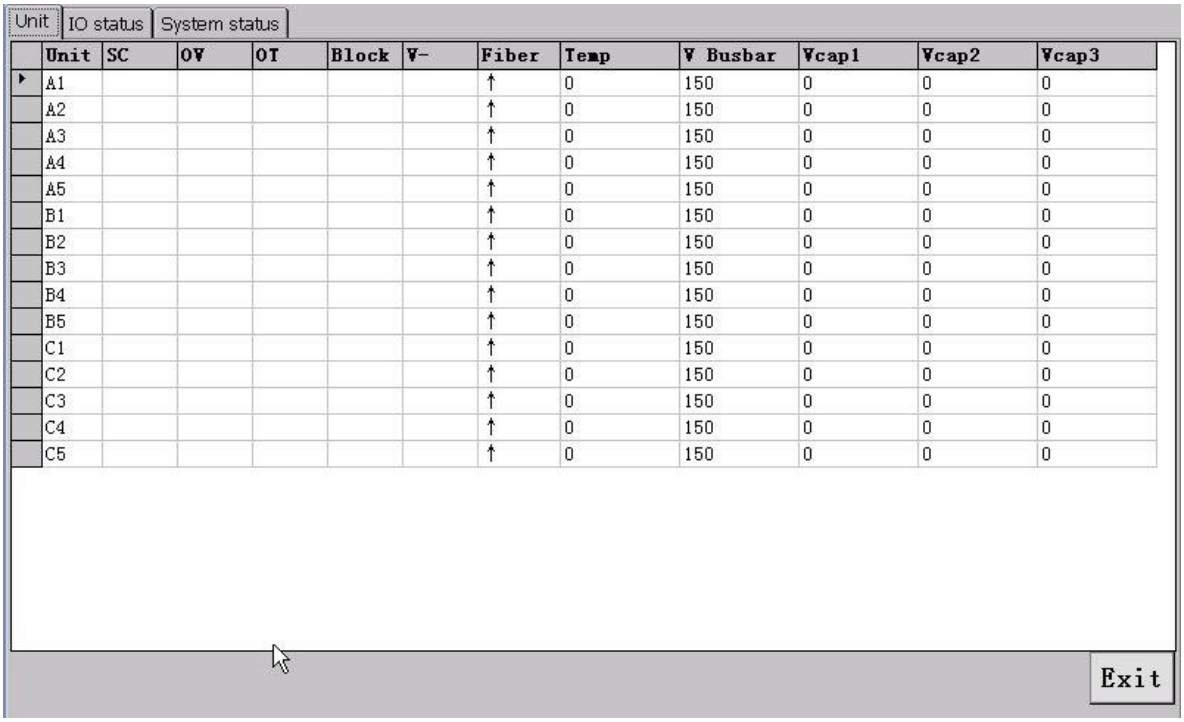
Key	Name	Functions
OK	Confirm key	Confirm the new password input and give a command of password change. Return to the main interface after successful change.
Cancel	Cancel key	Cancel password change operation.
Exit	Exit key	Exit from the current interface and return to security code login interface.

4.2.4 Power unit/IO status interface of touch screen

Power unit I/O interface includes power unit state, IO status and system status of inverter.

➢ Power unit

Power unit interface monitors the bus voltage, temperature, capacitor voltage and fault status of the power unit. It will appear different sign according to fault status. It will sign ‘ * ’ under the corresponding fault type when the status is alarm, and sign ‘★’ when the status is fault. For example, the unit A1 has overvoltage alarm, it will sing ‘ * ’ at the A1 row and the overvoltage column. When the unit is bypass, it will sign ‘●’ after the unit name. ‘↑’ indicates upward optical fiber fault, and ‘↓’ indicates downward optical fiber fault.



Unit	SC	OV	OT	Block	V-	Fiber	Temp	V Busbar	Vcap1	Vcap2	Vcap3
A1						↑	0	150	0	0	0
A2						↑	0	150	0	0	0
A3						↑	0	150	0	0	0
A4						↑	0	150	0	0	0
A5						↑	0	150	0	0	0
B1						↑	0	150	0	0	0
B2						↑	0	150	0	0	0
B3						↑	0	150	0	0	0
B4						↑	0	150	0	0	0
B5						↑	0	150	0	0	0
C1						↑	0	150	0	0	0
C2						↑	0	150	0	0	0
C3						↑	0	150	0	0	0
C4						↑	0	150	0	0	0
C5						↑	0	150	0	0	0

Fig.4-5 Power unit interface of touch screen

【Power unit】See Table 4-4 for key functions.

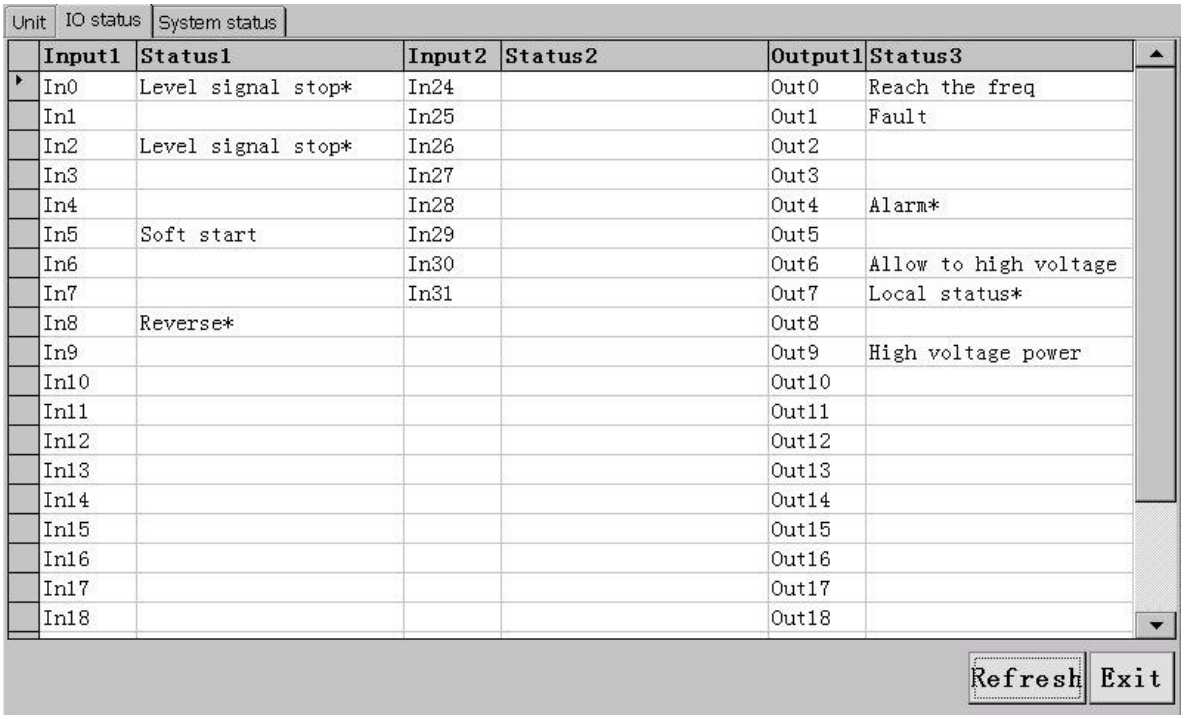
Table 4-4 Functions of power unit keys of inverter

Key	Name	Functions
Exit	Exit key	Exit from the current interface and return to the main interface.

➢ IO status interface

IO status displays the state of digital input and output having been defined presently, which may be defined in “digital input/digital output”. If ‘*’ is displayed in the related column of IO port, indicating that the state of the present IO port is the defined state. For example, the digital

output1 is defined “Fault”, while the current status is not fault status, then there is no ‘*’ after the definition. See the Fig.4-6.



Input1	Status1	Input2	Status2	Output1	Status3
In0	Level signal stop*	In24		Out0	Reach the freq
In1		In25		Out1	Fault
In2	Level signal stop*	In26		Out2	
In3		In27		Out3	
In4		In28		Out4	Alarm*
In5	Soft start	In29		Out5	
In6		In30		Out6	Allow to high voltage
In7		In31		Out7	Local status*
In8	Reverse*			Out8	
In9				Out9	High voltage power
In10				Out10	
In11				Out11	
In12				Out12	
In13				Out13	
In14				Out14	
In15				Out15	
In16				Out16	
In17				Out17	
In18				Out18	

Fig.4-6 IO status interface of touch screen

【IO status】See Table 4-5 for key functions.

Table 4-5 Functions of IO status keys of inverter

Key	Name	Functions
Refresh	Refresh key	Refresh the current IO status.
Exit	Exit key	Exit from the current interface and return to the main interface.

- System status

System status interface indicates temperature, sample board version, IO expansion board version, touch screen version, RTC clock, running times, energy consumption, running time, inverter running time and power frequency running time. Refer the Fig.4-7.

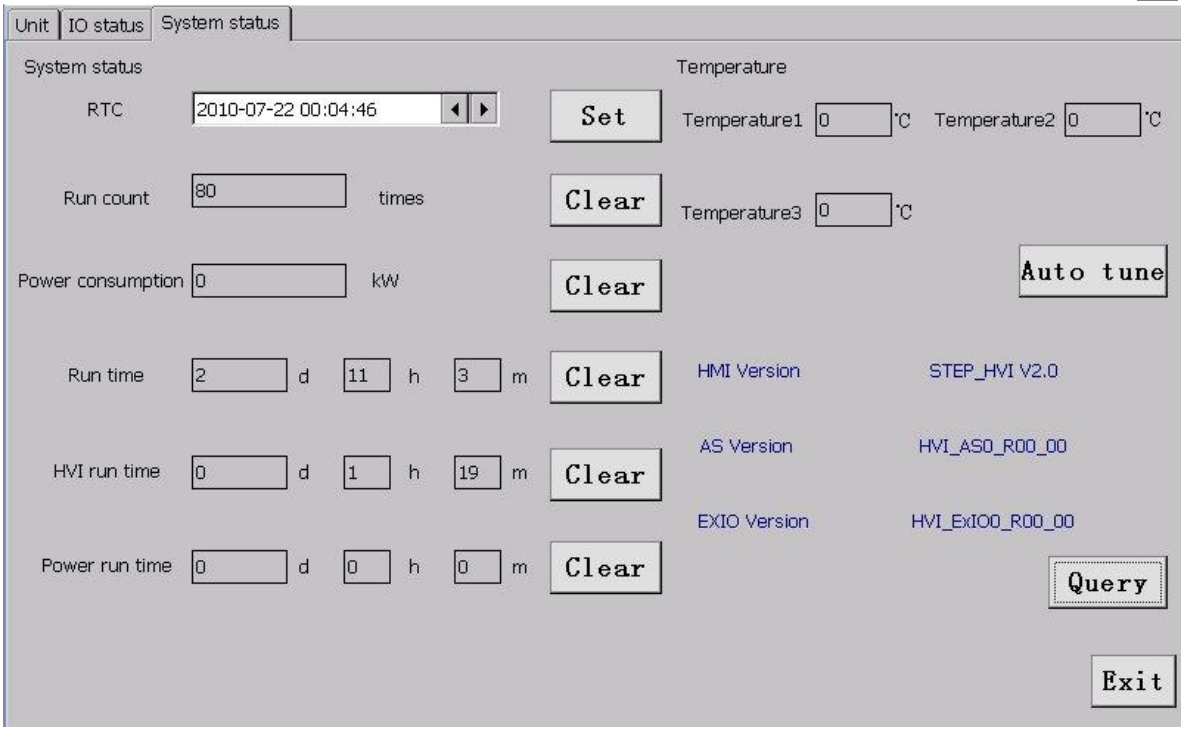


Fig.4-7 System status interface of touch screen

【system status】See Table 4-6 for key functions.

Table 4-6 Functions of system status keys of inverter

Key	Name	Functions
Set	Set key	Set the system RTC.
Clear	Clear key	Reset the related system value.
Auto tune	Auto tune key	Calculate zero AD value of temperature.
Query	Query	Auto tune Ir, Is, reading sample board and IO expansion board software version.
Exit	Exit key	Exit from the current interface and return to the main interface.

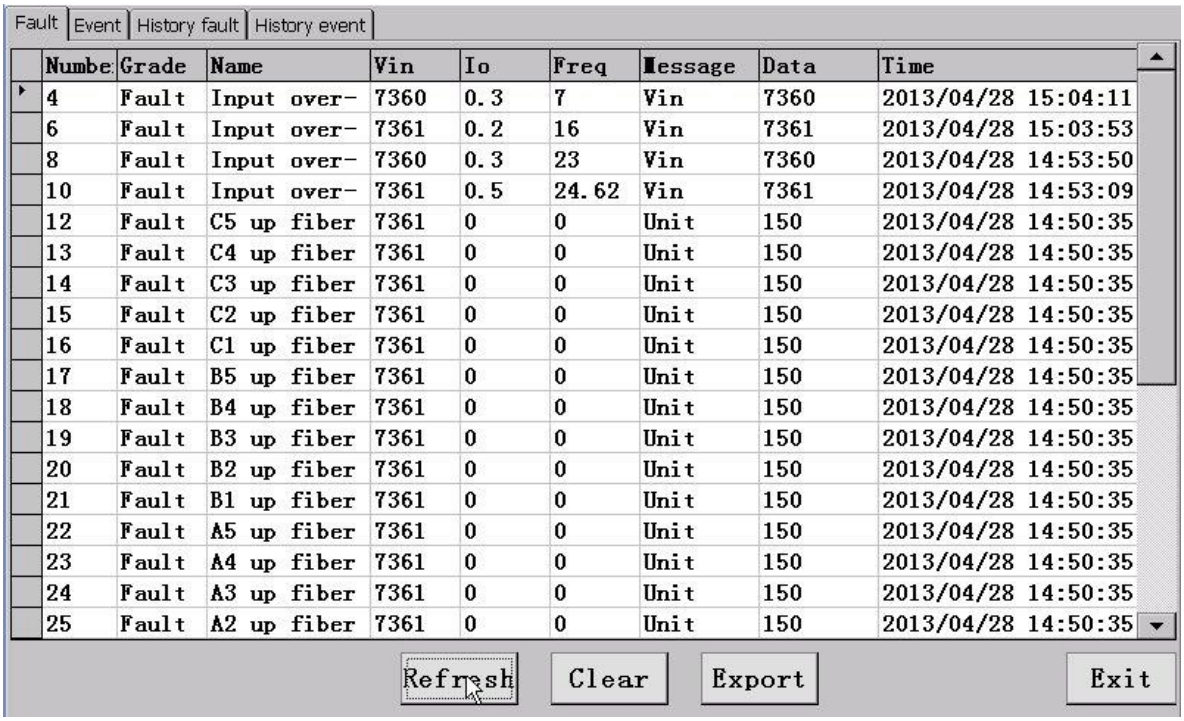
Instructions for RTC clock setting: system clock is divided into such 6 sections as year, month, date, hour, minute and second. Move the cursor to the setting section and modify it by pressing UP and DOWN key on the right. Press SET to confirm to the complete operation.

4.2.5 Record interface

It contains fault record, event record, history fault record and history event record.

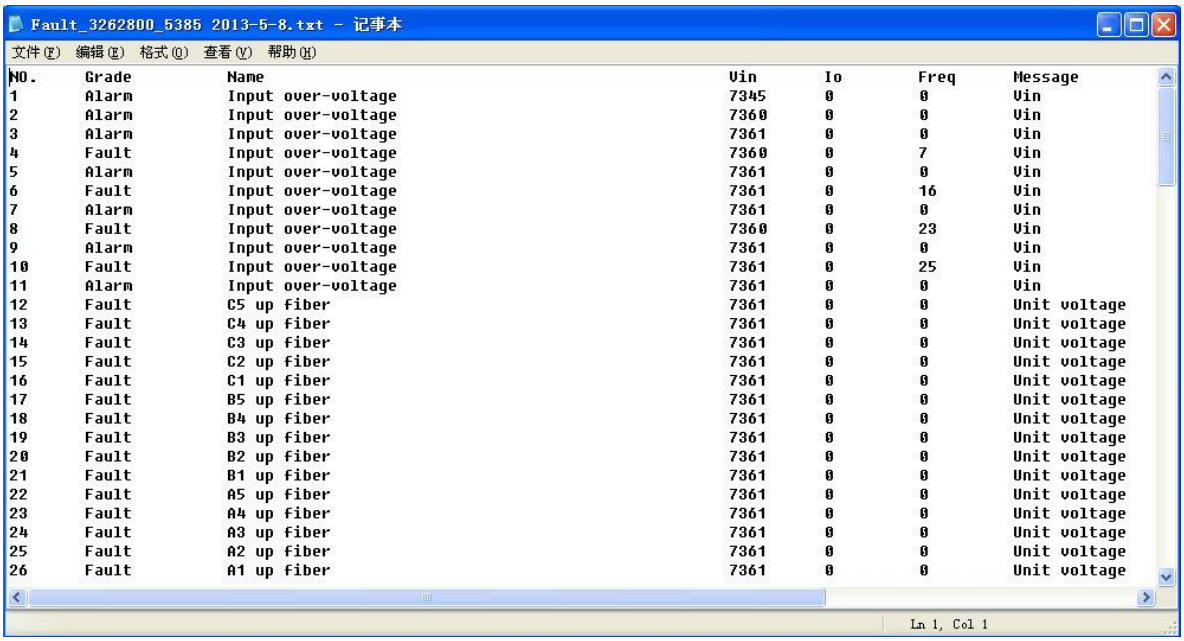
➢ Fault record interface

The fault record interface will display the latest fault information of system which is up to 254. Each fault record contains these messages: fault number, fault grade, fault name, input voltage, output current, current frequency, user defined information and its data, fault time. The interface only displays the fault records, if you want to view the alarm records, you should go to history fault interface, refer the Fig.4-8. By clicking the “export” key, you can export the fault records as “.txt” format and refer the Fig.4-9.



Numbe	Grade	Name	Vin	Io	Freq	Message	Data	Time
4	Fault	Input over-	7360	0.3	7	Vin	7360	2013/04/28 15:04:11
6	Fault	Input over-	7361	0.2	16	Vin	7361	2013/04/28 15:03:53
8	Fault	Input over-	7360	0.3	23	Vin	7360	2013/04/28 14:53:50
10	Fault	Input over-	7361	0.5	24.62	Vin	7361	2013/04/28 14:53:09
12	Fault	C5 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
13	Fault	C4 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
14	Fault	C3 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
15	Fault	C2 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
16	Fault	C1 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
17	Fault	B5 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
18	Fault	B4 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
19	Fault	B3 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
20	Fault	B2 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
21	Fault	B1 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
22	Fault	A5 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
23	Fault	A4 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
24	Fault	A3 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35
25	Fault	A2 up fiber	7361	0	0	Unit	150	2013/04/28 14:50:35

Fig.4-8 Fault record interface of touch screen



Fault_3262800_5385 2013-5-8.txt - 记事本

文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

NO.	Grade	Name	Vin	Io	Freq	Message
1	Alarm	Input over-voltage	7345	0	0	Vin
2	Alarm	Input over-voltage	7360	0	0	Vin
3	Alarm	Input over-voltage	7361	0	0	Vin
4	Fault	Input over-voltage	7360	0	7	Vin
5	Alarm	Input over-voltage	7361	0	0	Vin
6	Fault	Input over-voltage	7361	0	16	Vin
7	Alarm	Input over-voltage	7361	0	0	Vin
8	Fault	Input over-voltage	7360	0	23	Vin
9	Alarm	Input over-voltage	7361	0	0	Vin
10	Fault	Input over-voltage	7361	0	25	Vin
11	Alarm	Input over-voltage	7361	0	0	Vin
12	Fault	C5 up fiber	7361	0	0	Unit voltage
13	Fault	C4 up fiber	7361	0	0	Unit voltage
14	Fault	C3 up fiber	7361	0	0	Unit voltage
15	Fault	C2 up fiber	7361	0	0	Unit voltage
16	Fault	C1 up fiber	7361	0	0	Unit voltage
17	Fault	B5 up fiber	7361	0	0	Unit voltage
18	Fault	B4 up fiber	7361	0	0	Unit voltage
19	Fault	B3 up fiber	7361	0	0	Unit voltage
20	Fault	B2 up fiber	7361	0	0	Unit voltage
21	Fault	B1 up fiber	7361	0	0	Unit voltage
22	Fault	A5 up fiber	7361	0	0	Unit voltage
23	Fault	A4 up fiber	7361	0	0	Unit voltage
24	Fault	A3 up fiber	7361	0	0	Unit voltage
25	Fault	A2 up fiber	7361	0	0	Unit voltage
26	Fault	A1 up fiber	7361	0	0	Unit voltage

Ln 1, Col 1

Fig.4-9 Export fault records

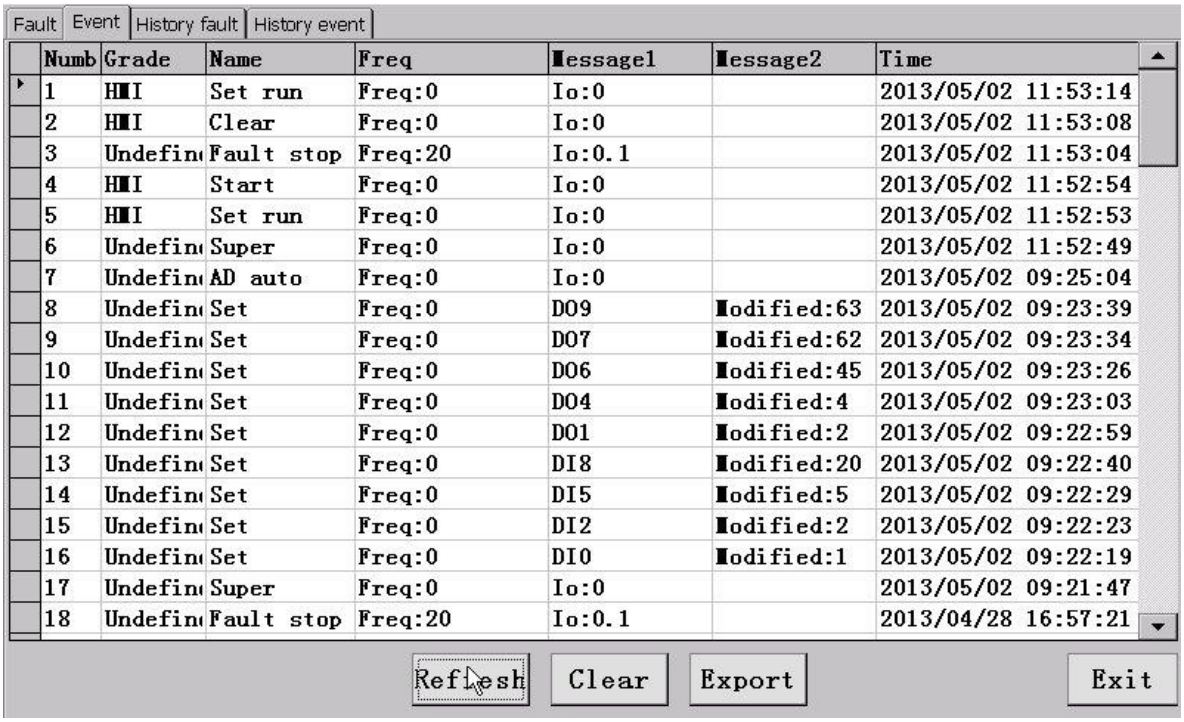
【fault record】See Table 4-7 for key functions.

Table 4-7 Functions of fault record keys of inverter

Key	Name	Functions
Refresh	Refresh key	Refresh the fault records.
Clear	Clear key	Clear the current fault records, but the information can be recorded in historical event database before resetting.
Export	Export key	Export information as “.txt” format and the default name is “Fault+Number+Data”.
Exit	Exit key	Exit from the current interface and return to the main interface.

➢ Event record interface

The event record interface will display the latest events of system, the maximum is 100. Every event record contains these messages: event number, event grade, event name, frequency or torque, information1, information2 and event time, please refer the Fig.4-10. By clicking the “export” key, you can export the event records as “.txt” format and refer the Fig.4-9.



Numb	Grade	Name	Freq	Message1	Message2	Time
1	HMI	Set run	Freq:0	Io:0		2013/05/02 11:53:14
2	HMI	Clear	Freq:0	Io:0		2013/05/02 11:53:08
3	Undefin	Fault stop	Freq:20	Io:0.1		2013/05/02 11:53:04
4	HMI	Start	Freq:0	Io:0		2013/05/02 11:52:54
5	HMI	Set run	Freq:0	Io:0		2013/05/02 11:52:53
6	Undefin	Super	Freq:0	Io:0		2013/05/02 11:52:49
7	Undefin	AD auto	Freq:0	Io:0		2013/05/02 09:25:04
8	Undefin	Set	Freq:0	DO9	Modified:63	2013/05/02 09:23:39
9	Undefin	Set	Freq:0	DO7	Modified:62	2013/05/02 09:23:34
10	Undefin	Set	Freq:0	DO6	Modified:45	2013/05/02 09:23:26
11	Undefin	Set	Freq:0	DO4	Modified:4	2013/05/02 09:23:03
12	Undefin	Set	Freq:0	DO1	Modified:2	2013/05/02 09:22:59
13	Undefin	Set	Freq:0	DI8	Modified:20	2013/05/02 09:22:40
14	Undefin	Set	Freq:0	DI5	Modified:5	2013/05/02 09:22:29
15	Undefin	Set	Freq:0	DI2	Modified:2	2013/05/02 09:22:23
16	Undefin	Set	Freq:0	DI0	Modified:1	2013/05/02 09:22:19
17	Undefin	Super	Freq:0	Io:0		2013/05/02 09:21:47
18	Undefin	Fault stop	Freq:20	Io:0.1		2013/04/28 16:57:21

Fig.4-10 Event record interface of touch screen

【event record】See Table 4-8 for key functions.

Table 4-8 Functions of event record functions of inverter

Key	Name	Functions
Refresh	Refresh key	Refresh event records.
Clear	Clear key	Clear the current fault records, but the information can be recorded in historical event database before resetting.
Export	Export key	Export information as ".txt" format and the default name is "Event+Number+Data".
Exit	Exit key	Exit from the current interface and return to the main interface.

- History fault record interface

The history fault record can save the happened faults, and it will save all the different fault records every 20 hours or after clearing, the maximum is 10000. All the fault records divide into few pages, and each page will display 200 records. The records can display in order and the latest record will display in front.

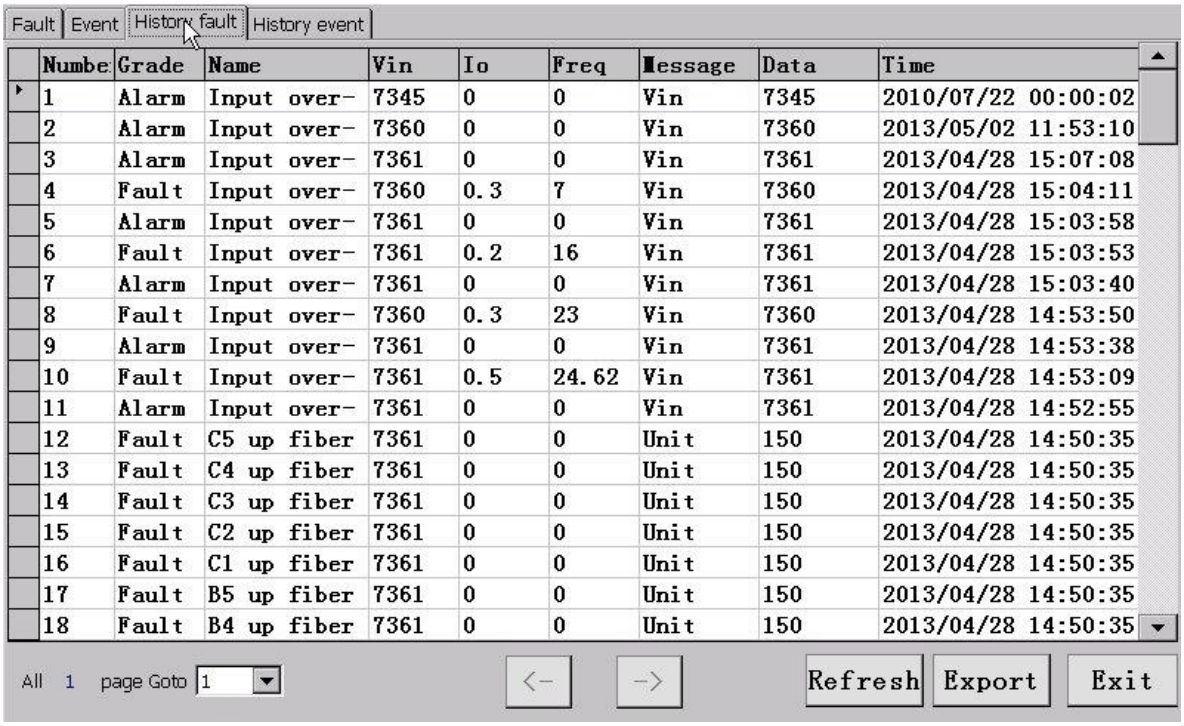


Fig.4-11 History fault record interface of touch screen

【history fault record】See Table 4-9 for key functions.

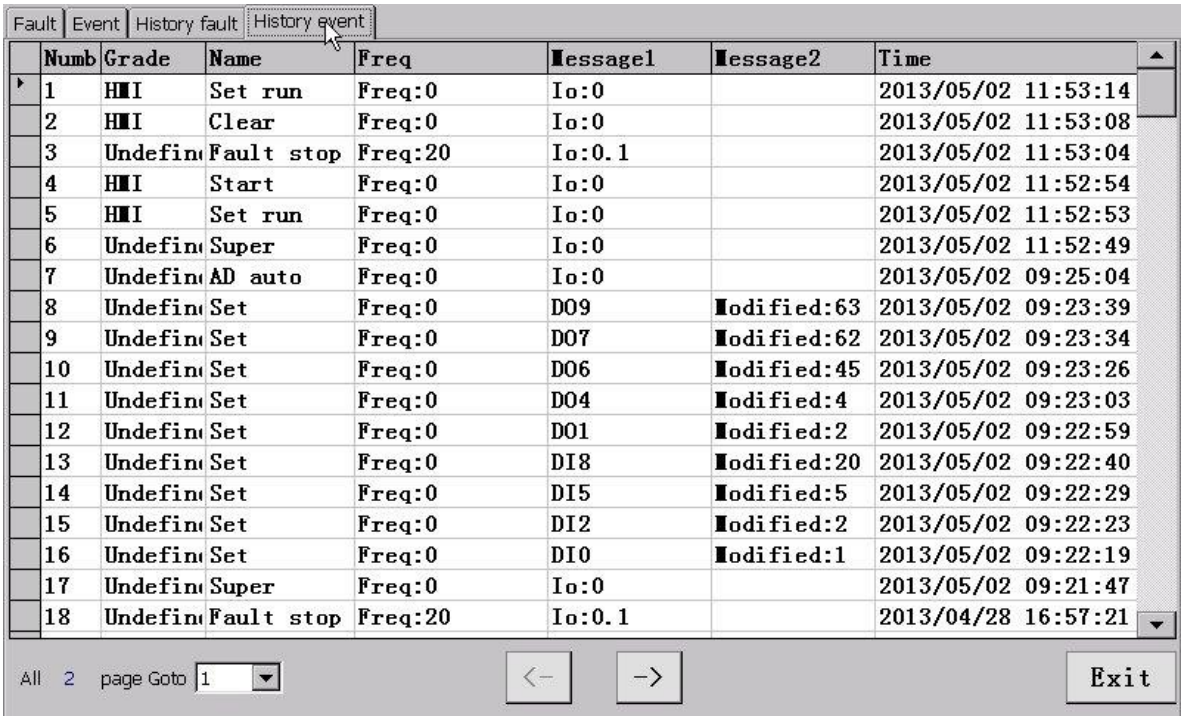
Table 4-9 Functions of history fault record functions of inverter

Key	Name	Functions
<-	Previous page	Go to the previous fault record page.
->	Next page	Go to the next fault record page.
Goto	Goto page	Select the page you want to view.
Refresh	Refresh key	Refresh fault records in this page.
Export	Export key	Export all the history fault records and event records as database format.
Exit	Exit key	Exit from the current interface and return to the main interface.

- History event record interface

The history event record save the happened events, it will save all the different event records

every 20 hours or after clearing, the maximum is 10000. All the event records can divide into few pages, and each page will display 200 records. The records can display in order and the latest record will display in front.



Numb	Grade	Name	Freq	Message1	Message2	Time
1	HMI	Set run	Freq:0	Io:0		2013/05/02 11:53:14
2	HMI	Clear	Freq:0	Io:0		2013/05/02 11:53:08
3	Undefin	Fault stop	Freq:20	Io:0.1		2013/05/02 11:53:04
4	HMI	Start	Freq:0	Io:0		2013/05/02 11:52:54
5	HMI	Set run	Freq:0	Io:0		2013/05/02 11:52:53
6	Undefin	Super	Freq:0	Io:0		2013/05/02 11:52:49
7	Undefin	AD auto	Freq:0	Io:0		2013/05/02 09:25:04
8	Undefin	Set	Freq:0	DO9	Modified:63	2013/05/02 09:23:39
9	Undefin	Set	Freq:0	DO7	Modified:62	2013/05/02 09:23:34
10	Undefin	Set	Freq:0	DO6	Modified:45	2013/05/02 09:23:26
11	Undefin	Set	Freq:0	DO4	Modified:4	2013/05/02 09:23:03
12	Undefin	Set	Freq:0	DO1	Modified:2	2013/05/02 09:22:59
13	Undefin	Set	Freq:0	DI8	Modified:20	2013/05/02 09:22:40
14	Undefin	Set	Freq:0	DI5	Modified:5	2013/05/02 09:22:29
15	Undefin	Set	Freq:0	DI2	Modified:2	2013/05/02 09:22:23
16	Undefin	Set	Freq:0	DI0	Modified:1	2013/05/02 09:22:19
17	Undefin	Super	Freq:0	Io:0		2013/05/02 09:21:47
18	Undefin	Fault stop	Freq:20	Io:0.1		2013/04/28 16:57:21

Fig.4-12 History fault record interface of touch screen

【history event record】See Table 4-10 for key functions.

Table 4-10 Functions of history event record functions of inverter

Key	Name	Functions
<-	Previous page	Goto the previous event record page.
->	Next page	Goto the next event record page.
Goto	Goto page	Select the page which you want to view.
Exit	Exit key	Exit from the current interface and return to the main interface.

4.2.6 Parameter setting interface of touch screen

Parameter setting interface is used to browse and set the inverter parameters, and it also can

view the backup parameters.

- System parameter browse interface

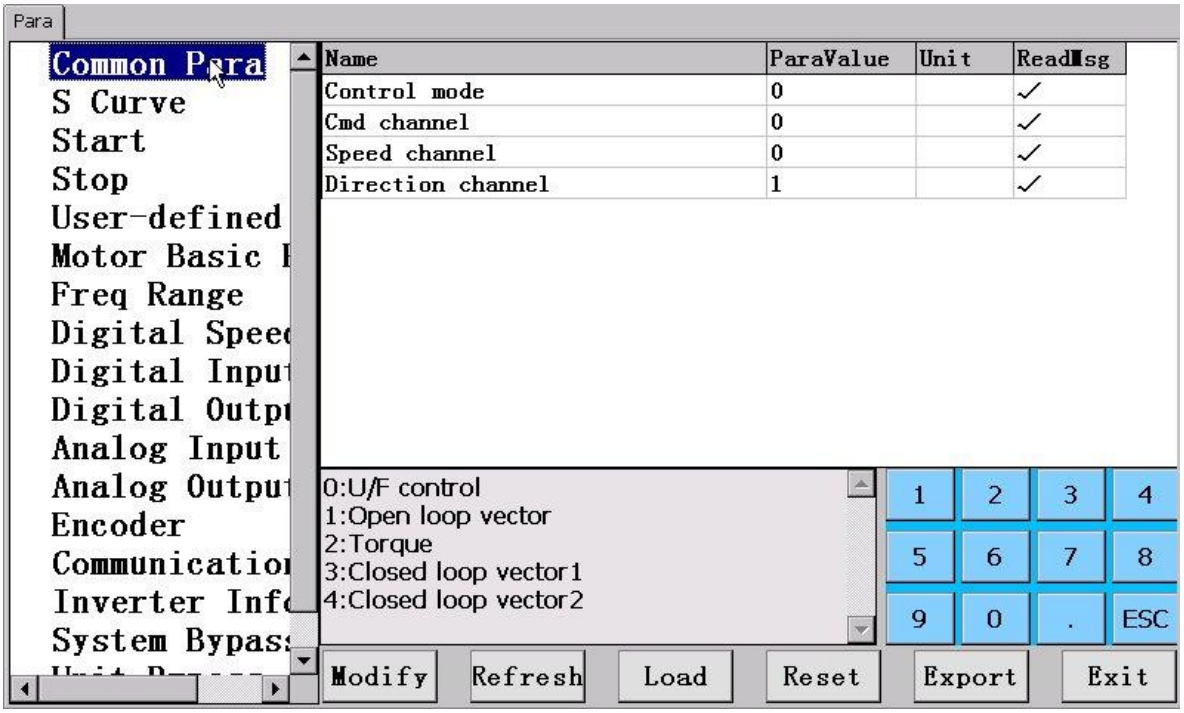


Fig.4-13 Parameter browse interface of touch screen

- System parameter setting interface

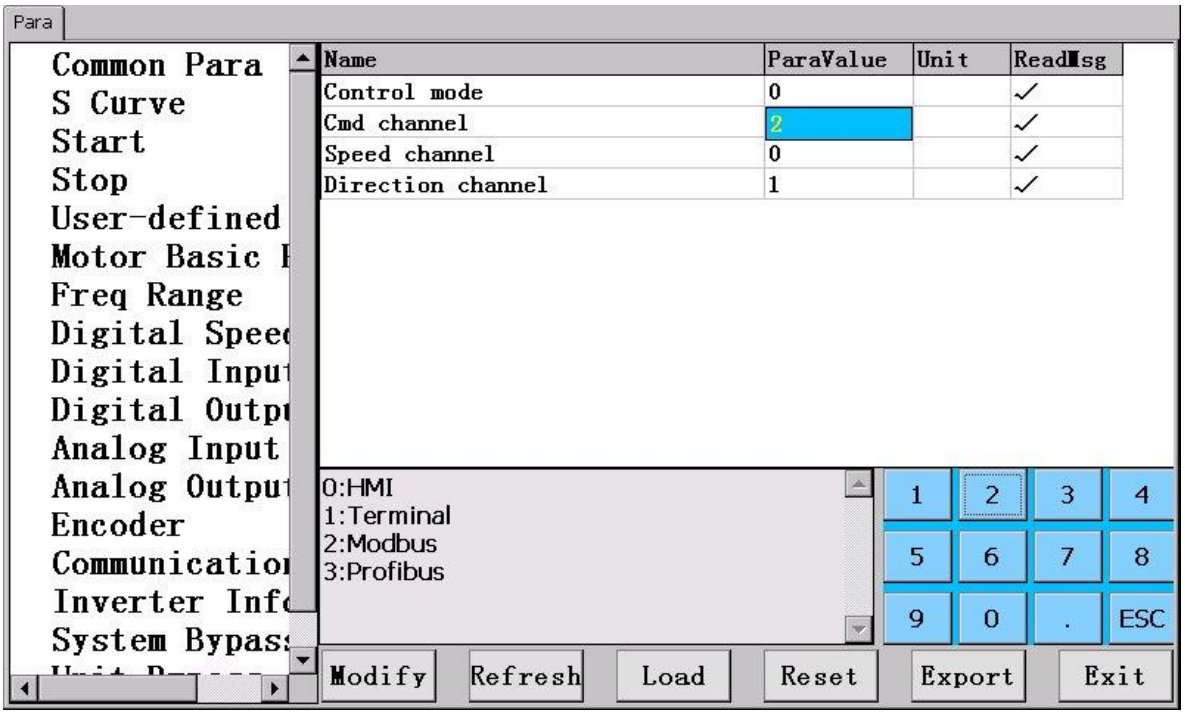


Fig.4-14 Parameter setting interface of touch screen

【system parameters】See Table 4-11 for key functions.

Table 4-11 Functions of system parameter keys of inverter

Key	Name	Functions
Modify	Modification key	Confirm parameter modification. Parameter modification is valid only in stop state.
Refresh	Refresh key	Read this kind of parameters which are read unsuccessfully before.
Load	Load key	Reread this kind of parameters.
Reset	Reset key	Reset the parameter to the default, which is valid only in stop state. Administrator password is required.
Export	Export key	Export all the parameters as ".txt" format, and it will prompt "export success" after exporting success.
Exit	Exit key	Exit from the current interface and return the main interface.

Descriptions for parameter modification: Click the parameter to be modified under the system stop state. Input the expected parameter value on the keyboard according to the lower range and instructions, and then click "Modify" button to confirm the operation.

- Backup parameter interface

Check the backup information and send backup command. The default status is hidden the page, if you want to make it visible, you can set the "parameter backup" display in the local setting page.

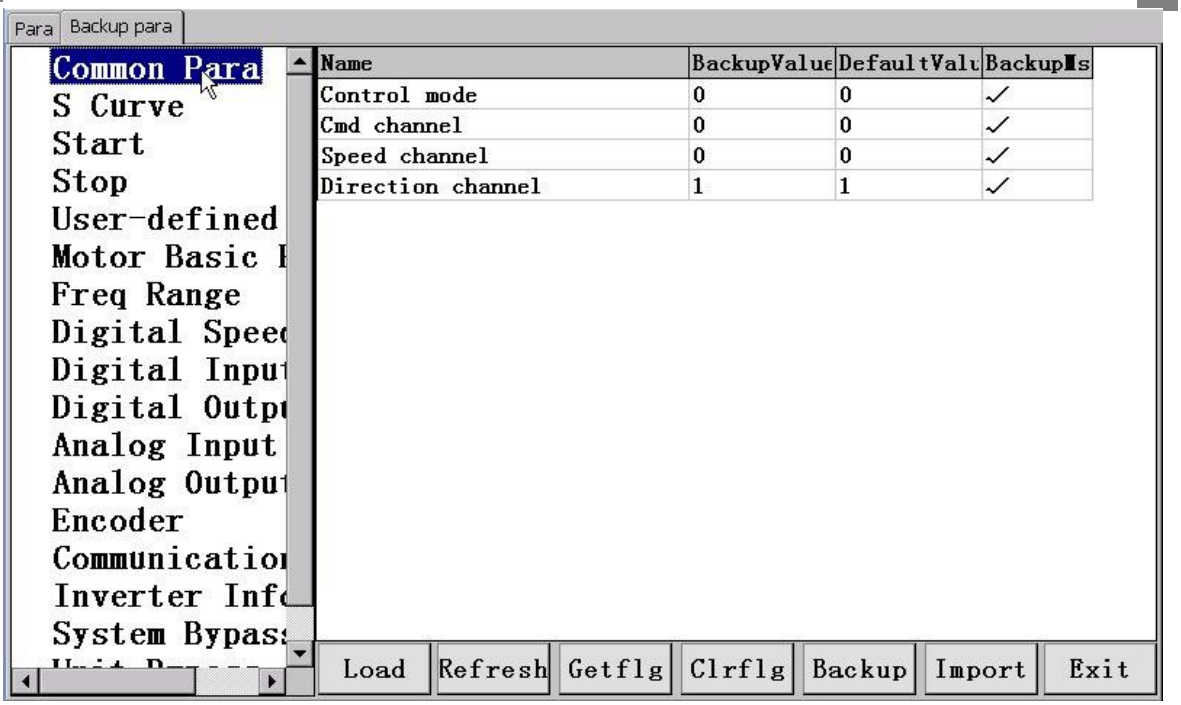


Fig.4-15 Backup parameter interface of touch screen

【backup parameters】See Table 4-12 for key functions.

Table 4-12 Functions of backup parameter keys of inverter

Key	Name	Functions
Load	Load key	Reread this kind of backup parameters which read unsuccessfully before.
Refresh	Refresh key	Reload all this kind of parameters.
Getflg	Get flag	Check the backup symbol.
Clrflg	Clear flag	Reset the backup flag.
Backup	Backup key	Backup the current parameter value.
Import	Import key	Make the backup parameter value import to the current parameters.
Exit	Exit key	Exit from the current interface and return the main interface.

4.2.7 SOP setting interface

➢ Local setting

In this interface you can set inverter number, unit number, baud rate, voltage direction, backup parameters display, display grade, and they have been set in factory, most of them do not need to use.

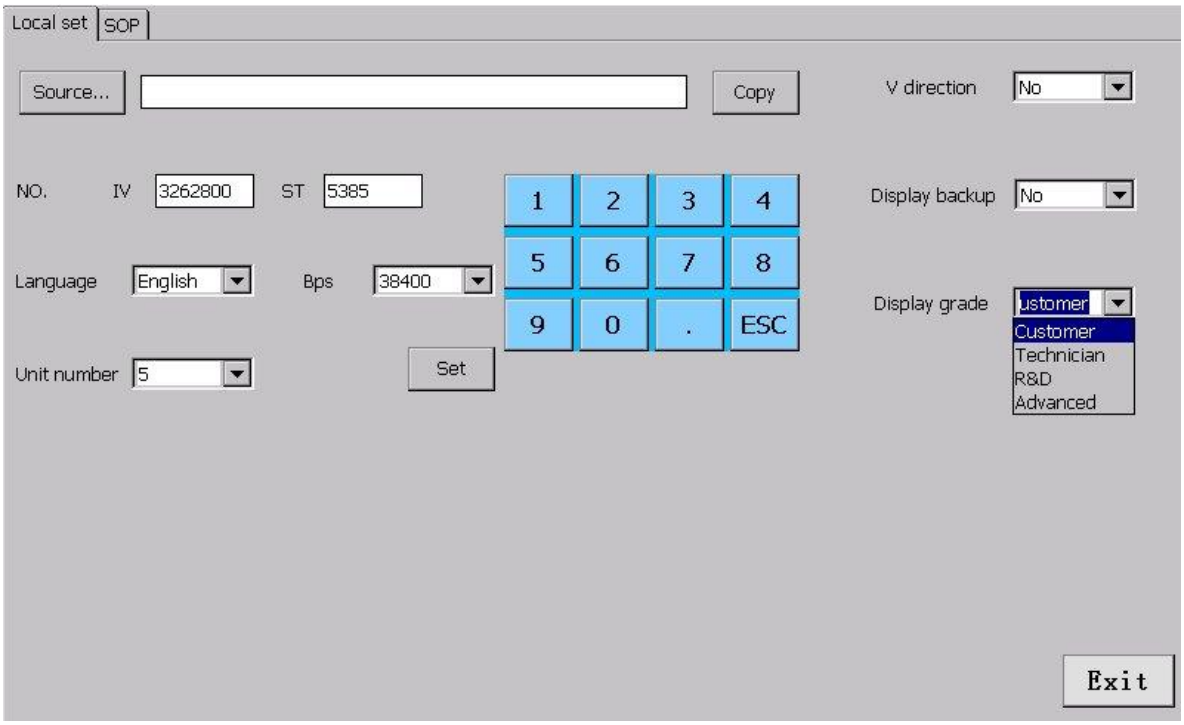


Fig.4-16 Local setting interface of touch screen

【local setting】See Table 4-13 for key functions.

Table 4-13 Functions of local setting keys of inverter

Key	Name	Functions
Source...	Source selection	Click this key to select the source file address when parameter database is updated.
Copy	Copy key	Copy the database file to the local disk.
Set	Set key	Set the number, language, baud rate and so on, after that, restart the system.
Voltage direction	Voltage direction	Choose whether to display the voltage phase sequence or not, the default is no display.

Backup parameter	Hiding the backup parameter	Choose whether to hide the backup parameter page or not, the default is hidden status.
Display grade	Display grade selection	Select the display grade of parameters and backup parameters. Parameters can display different contents according to the different grades, and the default grade is customer.
Exit	Exit key	Exit from the current interface and return the main interface.

➢ SOP setting

SOP setting interface displays shielding conditions of all faults of the inverter. “Undefinition” means this fault is shielded; “Alarm” indicates that the inverter sends an alarm when this fault appears; “Fault” indicates that the inverter has occurred fault when this fault appears; “Alarm & Fault” indicates the inverter will send an alarm within a certain scope when this fault appears, while the inverter will be fault beyond this range. 512 faults are defined, which will be displayed in 32 pages, with 16 ones for each page.

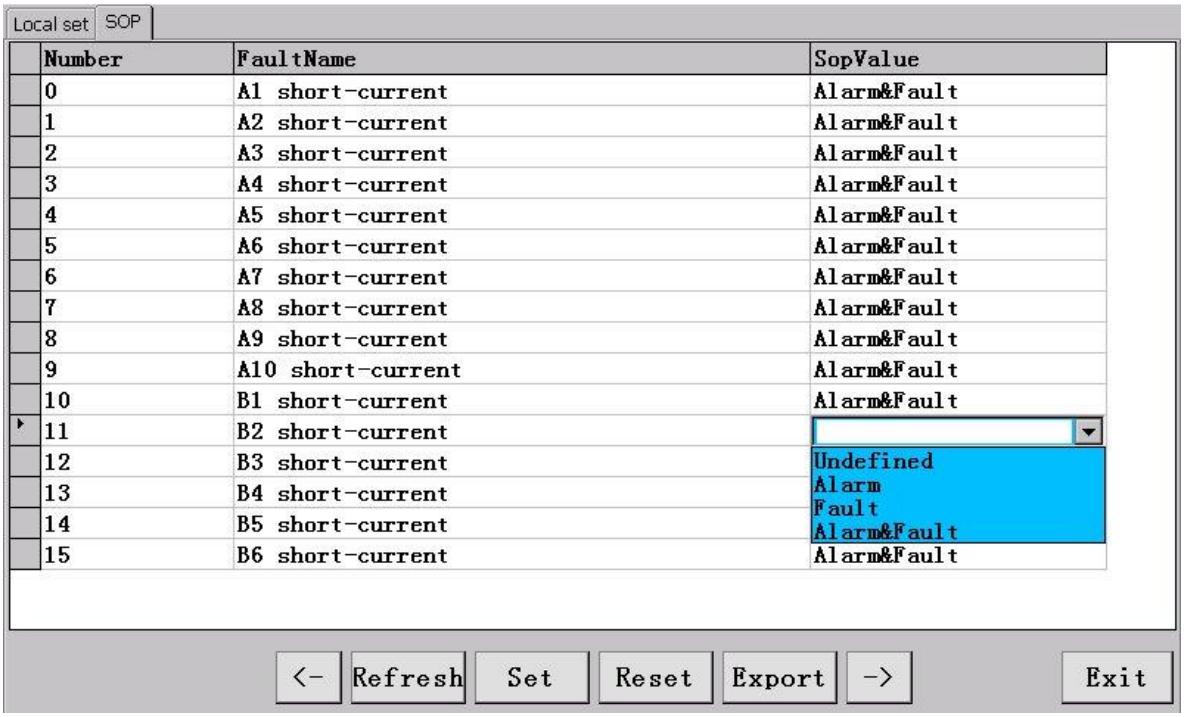


Fig.4-17 SOP setting interface of touch screen

【SOP setting】See Table 4-14 for key functions.

Table 4-14 Functions of SOP setting keys of inverter

Key	Name	Functions
<-	Previous page	Display SOP value of the previous page.
Refresh	Refresh	Refresh SOP value of the current page.
Set	Setting	Set the defined SOP value.
Reset	Reset key	Reset SOP value of the fault to default.
->	Next page	Display SOP value of the next page.
Exit	Exit key	Exit from the current interface and return to the main interface.

Chapter Ⅴ Function Parameter Table

This chapter lists all the parameters and related information about the inverter in detail for reference. If you need to use advanced application, please contact our technical service department.

5.1 Functional group classification

The parameters are classified by group, and Table 6-1 has lists the function group classifications.

Table 5-1 Function Group Classification Table

Function Group	Function Group Description	
	Chinese	English
1	基本参数	Basic parameters
2	调整参数	Adjustment parameters
3	电机参数	Motor parameters
4	频率控制参数	Frequency parameters
5	端子功能参数	IO parameters
6	扩展功能参数	Expand parameters
7	显示参数	Display parameters
8	功率单元相关参数	Power unit parameters

5.2 Function list and description

5.2.1 Basic parameters

The basic parameters include the password parameters and the common parameters.

5.2.1.1 Common parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Control model	0: V/F control 1: Open-loop vector 2: Torque control 3: Closed-loop vector 1 4: Closed-loop vector 2	0~4	×	0	
Command	0: Panel	0~3	×	0	

channel selection	1: Terminal 2: Modbus 3: Profibus				
Speed channel selection	0: Panel target speed reference 1: Digital multi-velocity target speed reference 2: Analog multi-velocity target speed reference 3: Analog1 target speed reference 4: Analog1 current speed reference 5: Analog2 target speed reference 6: Analog2 current speed reference 7: Modbus target speed reference 8: Performance function target speed reference 9: Analog3 target speed reference 10: Analog3 current speed reference 11: Analog4 target speed reference 12: Analog4 current speed reference 13: Analog5 target speed reference 14: Analog5 current speed reference 15: Analog6 target speed reference 16: Analog6 current speed reference 17: Analog7 target speed reference 18: Analog7 current speed reference 19: Analog8 target speed reference 20: Analog8 current speed reference	0~22	×	0	

	21: Profibus reference 22:Inching				
Direction channel selection	0: Panel 1: Terminal 2: Modbus 3: Profibus	0~3	×	1	

5.2.2 Adjustment parameters

5.2.2.1 S Curve parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Acceleration time T0	Set the acceleration time from 0Hz to 50 Hz.	2~655.35	s	12	2dot
Deceleration time T0	Set the deceleration time from 50Hz to 0Hz.	5~655.35	s	18	2dot

5.2.2.2 Start parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Start mode selection	0: Normal start 1: Start after DC braking 2: Speed tracking start	0~2	×	0	

5.2.2.3 Stop parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Stop mode selection	0: Inertia stop 1: Deceleration stop 2: Deceleration + DC braking	0~2	×	0	

5.2.2.4 Custom V/F parameters

Name	Content	Setting range	Unit	Factory setting	Remark
VF modulation ratio	We suggest the VF modulation ratio should be set less than 1.2.	0.1~2	×	1.1	1dot

5.2.3 Motor parameters

5.2.3.1 Motor basic parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Motor rated power	Set the motor rated power	0~6553.5	kW	350	1dot
Motor rated	Set the motor rated current	0~6553.5	A	39	1dot

current					
Motor rated frequency	Set the motor rated frequency	0~60	Hz	50	2dot
Motor rated speed	Set the motor rated speed	0~65535	rpm	1483	0dot
Motor rated voltage	Set the motor rated voltage	0~65535	V	6000	0dot
Number of motor pole-pairs	Set the number of motor pole-pairs	1~8	p	2	0dot
Motor phase sequence	Set the motor phase sequence	0~1	×	0	0dot

5.2.4 Frequency control parameters

5.2.4.1 Frequency limit parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Maximum frequency	Set the maximum inverter operating frequency.	0~60	Hz	50	2dot
Minimum frequency	Set the minimum inverter operating frequency.	0~60	Hz	5	2dot

5.2.4.2 Digital multi-velocity parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Digital multi -speed 0	Set the frequency corresponding to the speed 0.	0~60	Hz	5	2dot
Digital multi -speed 1	Set the frequency corresponding to the speed 1.	0~60	Hz	5	2dot
Digital multi -speed 2	Set the frequency corresponding to the speed 2.	0~60	Hz	10	2dot
Digital multi -speed 3	Set the frequency corresponding to the speed 3.	0~60	Hz	20	2dot
Digital multi -speed 4	Set the frequency corresponding to the speed 4.	0~60	Hz	30	2dot
Digital multi -speed 5	Set the frequency corresponding to the speed 5.	0~60	Hz	40	2dot
Digital multi -speed 6	Set the frequency corresponding to the speed 6.	0~60	Hz	50	2dot
Digital multi	Set the frequency	0~60	Hz	50	2dot

-speed 7	corresponding to the speed 7.				
Digital multi -speed 8	Set the frequency corresponding to the speed 8.	0~60	Hz	5	2dot
Digital multi -speed 9	Set the frequency corresponding to the speed 9.	0~60	Hz	5	2dot
Digital multi -speed 10	Set the frequency corresponding to the speed 10.	0~60	Hz	10	2dot
Digital multi -speed 11	Set the frequency corresponding to the speed 11.	0~60	Hz	15	2dot
Digital multi -speed 12	Set the frequency corresponding to the speed 12.	0~60	Hz	20	2dot
Digital multi -speed 13	Set the frequency corresponding to the speed 13.	0~60	Hz	30	2dot
Digital multi -speed 14	Set the frequency corresponding to the speed 14.	0~60	Hz	40	2dot
Digital multi -speed 15	Set the frequency corresponding to the speed 15.	0~60	Hz	50	2dot

5.2.5 Terminal function parameters

5.2.5.1 Digital input parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Function definition of digital input0	0:No function 1: Start (level signal) for 1 is valid, default is 0. 2: Stop (level signal) for 0 is valid, default is 0. 3: Local system reset for 1 is valid, default is 0. 4: Local Emergency stop for 0 is valid, default is 1. 5: Soft start (pulse signal ↑) 6: Cooling fan operation for 1 is valid, default is 1. 7: Normal UPS power supply for 1 is valid, default is 1. 8: Cabinet door open for 0 is valid, default is 1. 9: Transformer reaching 130℃ is 0,default is 1. 10: Transformer reaching	0~128	×	3	

	150℃ is 0,default is 1. 11: Fan fault is 1, default is 0. 12: Unit fan thermal relay trip is 1, default is 0. 13: External ready signal for 1 is valid, default is 1. 14: External fault signal for 0 is fault, default is 1. 15: External fault signal for 1 is fault, default is 1. 16: High voltage emergency breaking input (total input) for 1 is valid, default is 0. 17: System bypass automatic selection for 0 is manual, automatic is 1. 18:Power frequency switch to inverter (pulse signal ↑) 19: Inverter switch to power frequency (pulse signal↑) 20: Direction for 1 is forward, 0 is reverse. 21: Multi-velocity Terminal1 for 1 is valid, default is 0. 22: Multi-velocity Terminal2 for 1 is valid, default is 0. 23: Multi-velocity Terminal3 for 1 is valid, default is 0. 24: Multi-velocity Terminal4 for 1 is valid, default is 0. 25: Multi-velocity Terminal5 for 1 is valid, default is 0. 26: Multi-velocity Terminal6 for 1 is valid, default is 0. 27: Multi-velocity Terminal7 for 1 is valid, default is 0. 28: Multi-velocity Terminal8 for 1 is valid, default is 0. 29: User input 1 for 1 is valid, default is 0. 30: User input 2 for 1 is valid, default is 0. 31: User input 3 for 1 is valid, default is 0.				

	32: User input 4 for 1 is valid, default is 0. 33: User input 5 for 1 is valid, default is 0. 34: User input 6 for 1 is valid, default is 0. 35: User input 7 for 1 is valid, default is 0. 36: User input 8 for 1 is valid, default is 0. 37: Cut off pump 1 for 1 is valid, default is 0. 38: Cut off pump 2 for 1 is valid, default is 0. 39: Cut off pump 3 for 1 is valid, default is 0. 40: Cut off pump 4 for 1 is valid, default is 0. 41: Pump e-stop for 0 is valid, default is 1. 42: Power frequency start (KM3 closed)(pulse signal ↑) 43: Power frequency stop (KM3 open)(pulse signal ↑) 44: Frequency conversion power frequency mode for 0 is frequency conversion, 1 is power frequency, and default is 0. 45: One trailer two motor selection (0 is KM1~KM3,1 is KM4~KM6, and default is 0) 46: Start the power frequency of the reserve motor (pulse signal is ↑) 47: Stop the power frequency of the reserve motor stop (pulse signal is ↑) 48: Local start (pulse signal is ↑) 49: Local stop (pulse signal is ↑) 50: Remote system reset for 1 is valid, default is 0				

	51: Remote emergency stop for 0 is valid, default is 1. 52: Vacuum contactor K1 feedback for 0 is closed, 1 is open. 53: Vacuum contactor K2 feedback for 0 is closed, 1 is open. 54: Vacuum contactor K3 feedback for 0 is closed, 1 is open. 55: Vacuum contactor K4 feedback for 0 is closed, 1 is open. 56: Vacuum contactor K5 feedback for 0 is closed, 1 is open. 57: Vacuum contactor K6 feedback for 0 is closed, 1 is open. 58: One trailer four first power frequency contactor feedback for 0 is closed, 1 is open. 59: One trailer four second power frequency contactor feedback for 0 is closed, 1 is open. 60: One trailer four third power frequency contactor feedback for 0 is closed, 1 is open. 61: One trailer four fourth power frequency contactor feedback for 0 is closed, 1 is open. 62: Internal mixer special automatic / manual control selection, 1 is automatic. 63: Reserve power supply for 0 is supplying the backup power,1 is supplying the external 380V power. 64: Charging cabinet feedback for 0 indicates charging has completed, 1 is charging.				

	65: Manual knife switch motor1 feedback for 1 is valid, default is 0. 66: Manual knife switch motor2 feedback for 1 is valid, default is 0. 67: Local and remote selection for 1 is remote control, 0 is local control and default is 0. 68: Inching acceleration for 1 is valid, default is 0. 69: Inching deceleration for 1 is valid, default is 0. 70: Remote start (pulse signal is ↑) 71: Remote stop (pulse signal is ↑) 72: Remote reset (pulse signal is ↑) 73: Remote multi-speed0 for 1 is valid, default is 0. 74: Remote multi-speed1 for 1 is valid, default is 0. 75: Remote multi-speed2 for 1 is valid, default is 0. 76: Remote multi-speed3 for 1 is valid, default is 0. 77: Remote multi-speed4 for 1 is valid, default is 0. 78: Remote multi-speed5 for 1 is valid, default is 0. 79: Remote multi-speed6 for 1 is valid, default is 0. 80: Remote multi-speed7 for 1 is valid, default is 0. 81: Local frequency is fine tuning upwards. 82: Local frequency is fine tuning downwards. 83: Remote frequency is fine tuning upwards. 84: Remote frequency is fine tuning downwards. 85: Remote start (level signal)				

	86~128: Reserve				
Function definition of digital input1	The same as digital input0	0~128	×	8	
Function definition of digital input2	The same as digital input0	0~128	×	7	
Function definition of digital input3	The same as digital input0	0~128	×	6	
Function definition of digital input4	The same as digital input0	0~128	×	11	
Function definition of digital input5	The same as digital input0	0~128	×	4	
Function definition of digital input6	The same as digital input0	0~128	×	48	
Function definition of digital input7	The same as digital input0	0~128	×	49	
Function definition of digital input8	The same as digital input0	0~128	×	50	
Function definition of digital input9	The same as digital input0	0~128	×	0	
Function definition of digital input10	The same as digital input0	0~128	×	0	
Function definition of digital input11	The same as digital input0	0~128	×	0	
Function definition of digital input12	The same as digital input0	0~128	×	0	
Function	The same as digital input0	0~128	×	0	

definition of digital input13					
Function definition of digital input14	The same as digital input0	0~128	×	0	
Function definition of digital input15	The same as digital input0	0~128	×	0	
Function definition of digital input16	The same as digital input0	0~128	×	0	
Function definition of digital input17	The same as digital input0	0~128	×	0	
Function definition of digital input18	The same as digital input0	0~128	×	0	
Function definition of digital input19	The same as digital input0	0~128	×	0	
Function definition of digital input20	The same as digital input0	0~128	×	0	
Function definition of digital input21	The same as digital input0	0~128	×	0	
Function definition of digital input22	The same as digital input0	0~128	×	0	
Function definition of digital input23	The same as digital input0	0~128	×	0	

5.2.5.2 Digital output parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Function definition of digital output0	0:Undefined 1: If the system is ready to run, then output 1, else output 0. 2: If the system has occurred fault, then output 1, else output 0. 3: If the system is running, then output 1, else output 0. 4: If the system has occurred alarm, then output 1, else output 0. 5: Cut-in high voltage of the inverter input side, 0 means cutting off the high voltage, 1 means connecting the high voltage. 6: Cut-in power frequency, 1 means connecting power frequency, while 0 means connecting variable frequency. 7: Cut off charging cabinet, 1 means cutting off charging resistance. 8: Connect charging cabinet, 1 means connecting charging resistance. 9: Cut-in motor of the inverter output side, 0 means cutting off the motor, while 1 means connecting motor. 10: Frequency reaching 11: Variable frequency working state 12: Power frequency working state 13: Upper frequency limit reaching 14: Lower frequency limit reaching 15: Unit bypass state 16: High voltage switch	0~128	×	5	

	emergency cut-off 17: Reserve 18: Reserve 19: One trailer four first variable frequency cutting-in, 1 means that the variable frequency has connected. 20: One trailer four first power frequency cutting-in, 1 means that the power frequency has connected. 21: One trailer four second variable frequency cutting-in, 1 means that the variable frequency has connected. 22: One trailer four second power frequency cutting-in, 1 means that the power frequency has connected 23: One trailer four third variable frequency cutting-in, 1 means that the variable frequency has connected. 24: One trailer four third power frequency cutting-in, 1 means that the power frequency has connected 25: One trailer four fourth variable frequency cutting-in, 1 means that the variable frequency has connected. 26: One trailer four fourth power frequency cutting-in, 1 means that the power frequency has connected 27: User-defined output 1, 1 is valid, default is 0. 28: User-defined output 2, 1 is valid, default is 0. 29: User-defined output 3, 1 is valid, default is 0. 30: User-defined output 4, 1 is valid, default is 0. 31: User-defined output 5, 1 is				

	valid, default is 0. 32: User-defined output 6, 1 is valid, default is 0. 33: User-defined output 7, 1 is valid, default is 0. 34: User-defined output 8, 1 is valid, default is 0. 35: Transformer with fan control 1, 1 means start, the default is 0. 36: Transformer with fan control 2, 1 means start, the default is 0. 37: Transformer with fan control 3, 1 means start, the default is 0. 38: Dehumidifier 1,1 means start, default is 0. 39: Dehumidifier 2, 1 means start, default is 0. 40: Dehumidifier 3, 1 means start, default is 0. 41: Inverter input connects net side 2 port. 0 means input cutting-off, 1 means input cutting-in. 42: Inverter output connects motor side 2 port. 0 means cutting-off motor, 1 means cutting-in motor. 43: Power cuts in motor side 2 port. 1 means power frequency cut-in, 0 means variable frequency. 44: Inverter fan control, start is 1, default is 0 45: Permissible power on under high voltage, power on is 1, default is 0. 46: System state detection 1, default is 0. 47: System state detection 2, the default is 0. 48: System state detection 3,				

	default is 0. 49: System state detection 4, default is 0. 50: Cut-in K1 (grid cut-in inverter), pulse signal. 51: Disconnect K1 (grid disconnect inverter), pulse signal. 52: Cut-in K2 (grid cut-in inverter), pulse signal. 53: Disconnect K2 (grid disconnect inverter), pulse signal 54: Cut-in K3 (grid cut-in inverter), pulse signal. 55: Disconnect K3 (grid disconnect inverter), pulse signal. 56: Cut-in K4 (grid cut-in inverter), pulse signal. 57: Disconnect K4 (grid disconnect inverter), pulse signal. 58: Cut-in K5 (grid cut-in inverter), pulse signal. 59: Disconnect K5 (grid disconnect inverter), pulse signal 60: Cut-in K6 (grid cut-in inverter), pulse signal 61: Disconnect K6 (grid disconnect inverter), pulse signal 62: Local and remote selection status, 1 means remote, 0 means local. 63: High voltage power on, 1 means switching on, 0 means opening. 64: Reserve, the default output is 0. 65: Cabinet top fan1, 1 means start, default is 0. 66: Cabinet top fan2, 1 means				

	start, default is 0. 67: Cabinet top fan3, 1 means start, default is 0. 68: Cabinet top fan4, 1 means start, default is 0. 69: Cabinet top fan5, 1 means start, default is 0. 70: Cut-off charging cabinet, 1 means cutting off the charging resistance (Pulse signal is ↑). 71: Cut-in charging cabinet, 1 means cutting in the charging resistance (Pulse signal is ↑). 72~128: Reserve				
Function definition of digital output1	The same as digital input0	0~128	×	9	
Function definition of digital output2	The same as digital input0	0~128	×	6	
Function definition of digital output3	The same as digital input0	0~128	×	35	
Function definition of digital output4	The same as digital input0	0~128	×	0	
Function definition of digital output5	The same as digital input0	0~128	×	0	
Function definition of digital output6	The same as digital input0	0~128	×	0	
Function definition of digital output7	The same as digital input0	0~128	×	0	

Function definition of digital output8	The same as digital input0	0~128	×	0	
Function definition of digital output9	The same as digital input0	0~128	×	0	
Function definition of digital output10	The same as digital input0	0~128	×	0	
Function definition of digital output11	The same as digital input0	0~128	×	0	
Function definition of digital output12	The same as digital input0	0~128	×	0	
Function definition of digital output13	The same as digital input0	0~128	×	0	
Function definition of digital output14	The same as digital input0	0~128	×	0	
Function definition of digital output15	The same as digital input0	0~128	×	0	

5.2.5.3 Analog input parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Type of analog input 1~8	0: 0~10V 1: -10~10V 2: 1~10V (connected to 0~10V) 3: 0~20mA 4: 4~20mA 5:1~10V (connected to -10~10V)	0~5	×	If analog quantity outputs 1 or 2, the default is 4; The default is 0 for others.	

Function definition of analog input 1~8	0: Undefined 1: Target speed input 2: Current speed input 3: Torque input 4: Weighing compensation input	0~4	×	If analog quantity outputs 1, the default is 1; The default is 0 for others.	
Bias of analog input 1~8	The lower limit value of the setting target function	0~65.535	×	10	
Gain of analog input 1~8	The upper limit value of the setting target function	0~6553.5	%	100	

5.2.5.4 Analog output parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Function definition of analog output 1~9	Analog output function: 0: Undefined function 1: U phase instantaneous current 2: V phase instantaneous current 3: W phase instantaneous current 6: Current frequency 7: Current feedback speed(encoder required) 43: Target frequency 49: Full scale output (10V or 20mA) 59: Output current effective value 60:Input voltage 61:Output voltage 62: Input power 63: Output power 68:Ur instantaneous value 69:Us instantaneous value 70:Ut instantaneous value 71:Uu instantaneous value 72:Uv instantaneous value 73:Uw instantaneous value 74: Target torque 75: Output torque	0~79	×	If analog quantity outputs 1, the default is 6; If analog quantity outputs 2, the default is 59; The default is 0 for others.	

	76:Input current				
Offset of analog output 1~9	The lower limit value of the setting target function	0~6553.5	%	0	
Gain of Analog output 1~9 gain	The upper limit value of the setting target function	0~6553.5	%	0	

5.2.6 Expand parameters

5.2.6.1 Encoder parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Encoder pulses	Set the encoder pulses.	0~65535	ppr	1024	

5.2.6.2 Communication parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Native Modbus communication address		1~99	×	1	
Maximum permissible time of Modbus communication fault		0~60	s	30	The alarm value is a quarter of the parameter.
Modbus function enable	0:Disable 1:Enable	0~1	×	0	
Profibus function enable	0:Disable 1:Enable	0~1	×	0	
Native Profibus communication address		1~65535	×	1	
Maximum permissible time of Profibus		0~60	s	30	

communicati on fault					

5.2.7 Display parameters

5.2.7.1 Inverter information parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Inverter rated power	Inverter rated power	0~6553.5	kW	350	
Inverter rated current	Inverter rated current	0~600	A	10	
Inverter rated voltage	Inverter rated voltage	0~65535	V	10000	

5.2.8 Power unit parameters

5.2.8.1 System bypass parameters

Name	Content	Setting range	Unit	Factory setting	Remark
System bypass enable	0: Disable 1: Enable	0~1	×	0	
System bypass contactor time		2000~60000	ms	5000	Switch to power frequency time

5.2.8.2 Unit bypass parameters

Name	Content	Setting range	Unit	Factory setting	Remark
Unit bypass enable	0: Disable 1: Enable	0~1	×	0	

Chapter Ⅵ Debugging Procedures

6.1 Introduction

This chapter outlines the necessary steps that are required to successfully startup the **ME800** series inverter from a pre-power visual inspection to a complete high voltage motor test. These checks are discussed individually within the separate sections of this procedure. Following any introductory text and precautions, each section contains a series of individual steps. Tables may be included in some sections. Some tables are used to record parameter settings, test point data, and any errors or deviations from expectations. **In this chapter, we assume that the inverter has been correctly installed.**

Debugging procedures of **ME800** series high voltage inverter must be executed under the guide of our professionals or refer to the debug file from our company. Functional testing, debugging and parameter setting must be strictly based on the related regulations and HV inverter user manual of our company. During the debugging process, the user must provide two professional electrical technicians at least, who will be served as the necessary debugging operators and must satisfy the following:

- Know the high voltage electrical equipment and related safety code well.
- Know the user's load transmission process well.
- Be authorized to operate high voltage equipment (power breaker and other HV drive switch, etc).
- Be authorized to operate the transmission equipment.

NOTICE

Warning!! Considering heat dissipation, power supply of the fan must be kept normal when high voltage is energized to the inverter.

Note: Never disconnect control power while high voltage is energized. This will disable the cooling system and potentially cause severe overheating of the system and possibly cause damage to the units.

Note: Proper inverter setup will require the use of a DC voltmeter, an AC voltmeter and a dual trace oscilloscope for testing purpose. In addition, a 3-phase voltage regulator is required.

DANGER

Electrical hazard! The steps outlined in the following procedure could cause serious injury or death if the inverter has not been properly installed and checked. Before proceeding, be sure to remove power from the inverter and follow proper lock out and tag out procedures.

Electrical hazard! Hazardous voltages may still exist within the ME800 cabinets even when the high voltage disconnect switch is open and the control power switch is shut off (for example, internally stored energy found in units)

6.2 Pre-power visual inspection

Before power is applied to the inverter, pre-power visual inspection must be conducted. Verify the system specifications as detailed below.

Table 6-1 Pre-power visual inspection

Step	Description
1	Verify the source voltage to the inverter matches the drive specification. Inverter parameters can refer to the inverter nameplate.
2	The inverter's rated output voltage as stated on the inverter nameplate should match the motor's rated voltage as stated on the motor nameplate.
3	Control voltage (low voltage) must be four-wire three-phase 380V power source.
4	Rated power on motor nameplate must match the inverter's rated power.
5	Verify that the two tap cables for the high voltage input are securely connected to the three transformer taps. These connections should be made to the 0% taps on each of the three coils of the transformer.
6	Verify that all wiring between the transformer and unit cabinet shipping splits has been properly securely re-connected.
7	Inspect all connections and wiring ensuring that they are connected appropriately and securely. Verify all torque markings are properly aligned on all electrical connections including power connections.
8	Ensure that all electrical connections are tight and that all torque markings are intact. Verify that no sheet metal damage or excessive coating damage has occurred. If found, verify the integrity of the components, cables or other materials behind or below the damage.
9	Check all the cabling for splitting and/or cracking. Verify that no conductors are exposed due to chafing or other shipping abuse.
10	Verify the presence of markings or labels on all terminal strips, mounted components, units and other

	sub-assemblies. Notify the factory of any discrepancies.
11	Verify the installation of the fan hood. Verify that the fan rotates freely while mounted.
12	Ensure that the control and main power are installed and connected properly and in accordance with the local regulations.
13	Verify all customer connections for tightness and accuracy.
14	Standard safety precautions and local codes must be followed during installation of external wiring. Protective separation must be kept between low voltage wiring and high voltage wiring.
15	To maintain EMC compliance, weak current signal wiring such as analog signal and encoder signal, be sure to use shielded cables as described on the drawings shipped with the ME800 system.

Note: If any of the previous checks yield inconsistent or unusual results, cancel the debugging procedure and notify the factory.

6.3 Insulation resistance inspection

Inspection of insulation resistance must be the last step before power on, to ensure that there is no obvious time interval after insulation test. Insulation resistance of the related circuit must be measured, and the result shall satisfy the requirements in Table 6-2.

Table 6-2 Requirements of Insulation Testing

Rated circuit voltage	Megger grade	Insulation resistance (MΩ)
Less than 120VAC	250VDC	≥0.25
Less than 500VAC	500VDC	≥0.5
Less than 1000VAC	1000VDC	≥1.0
3000VAC and above	2500VDC	≥3.0

The bigger the insulation value actually measured, the better it will be. For example, insulation resistance reaches 500 MΩ for low voltage and 2500 MΩ for high voltage. If insulation value is smaller, moist weather or the rain will be taken into account. At this time, heater will be applied to heat cabinet body (2h), and insulation test will be conducted again after completing the heating.

During insulation testing, some relative insulation may be zero, which is caused by some work grounding line. For example, control transformer ground secondary. At this time, you need to remove the ground line before testing, and recover it after the testing becomes qualified.

NOTICE

When the user checks the insulation of the input and output HV cable, the inverter must

be disconnected. Insulation test will be done without inverter, especially its internal elements may be damaged if the inverter is connected on output side, which isn't allowed.

6.4 Power unit and communication testing

The test can be performed with a 3-phase voltage regulator (0-380V adjustable, capacity of is more than 10 KVA) and a PC/portable computer with optional STEP touch screen. Voltage can be supplied to all units.

Table 6-3 Power unit and communication testing

Step	Description
1	Connect PC portable computer to the master control via RS232 standard socket.
2	Connect 3-phase voltage regulator to the input of unit B1, meanwhile connect the original cable from transformer. DANGER **Electrical Hazard: The transformer cabinet door must be closed before this step starts, because high voltage will be sensed on HV output side.**
3	Connect an AC voltmeter to the input of any unit. Close the control power supply of control cabinet and examine whether the control part is initialized normally or not. **Electrification sequence of control power supply: firstly close all distribution switches on upper of the transformer cabinet, and then close the cabinet door and the door coupling switch outside. Then open UPS (long press ON for 5s), with its start time about 10s. After UPS has normal output, close the rest all one-way switches. At this time, the fan will work and indicators of the switching power will be Lit.**
4	Connect the 3-phase voltage regulator and slowly increase output voltage to 75V. • Measure input voltage of all units, to confirm that they will receive almost the same voltage. • If all voltage is normal, continue to increase the voltage of 3-phase voltage regulator to 200VAC, and confirm that all switching power supply works normally (There are two lights on printed circuit boards). At the same time, unit temperature and actual bus voltage value can

	be viewed on the monitoring picture, the unit of busbar voltage is about 200 * 1.414 = 283 V.
5	Shield optical fiber upload fault, input undervoltage fault and input unbalance fault of the unit though the touch screen by means of SOP setting.
6	Switch the inverter to operation mode and examine modulation of all unit output with oscilloscope. • Confirm that 4 LED indicators (Q1-Q4) on each unit control panel go out.
7	Stop the inverter. Turn off control power supply and power supply of 3-phase voltage regulator, disconnect 3-phase voltage regulator.
8	**Recover optical fiber upload fault, input undervoltage fault and input unbalance fault of the unit by means of SOP setting.** Otherwise the system can't protect these faults and leave safety risk.

6.5 Test on the inverter without motor

The following steps verify operation of the inverter (without motor).

Table 6-4 Test on the inverter without motor

Step	Description
1	Lock all doors to the units and transformer cabinets.
2	Re-energize the AC control power.
3	According to the drawings to control cabinet inside the empty open, open the UPS power supply (long press ON 5 seconds). Verify that the control power and touch screen display are normal.
4	Energize the high voltage power supply. NOTICE **Power on sequence of AC control power supply and high voltage power supply cannot be reversed. Control power supply must be supplied firstly, then high voltage power supply after the control system works normally. Power failure sequence is opposite to it.**
5	In monitoring the main screen displays the input power supply voltage is normal, can be compared with the power supply voltage readings of client, to confirm the power supply is normal and units voltage display normal.

6	Set “control mode parameter (P01.00) as 0 (VF control) and “VF modulation ratio parameter (P15.15) as 1.0. Then input 50Hz speed command and start the inverter. Observe wave form of output voltage with oscilloscope, to confirm that it is normal.

6.6 Test on the inverter with motor

The following steps are used to verify operation conditions of the inverter (output side is connected to motor). During testing, the motor carries no load. Load testing can be started after the motor is able to normally start and stop.

Table 6-5 Test on the inverter with motor

<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>1</td><td>Disconnect high voltage and control power supply, reconnect the motor cable or close the motor contactor.</td></tr>
<tr><td>2</td><td>Reclose control power supply.</td></tr>
<tr><td>3</td><td>1) Set the motor parameters are consistent with the value of motor nameplates;
2) Set the inverter parameters are consistent with the inverter configuration;
3) According to the way of commands given, set "command channel selection parameters";
4) If use the analog input, need depending on the frequency given way , set “Speed channel selection parameters”, and according to the external analog in a given range, set the analog bias and gain parameter.</td></tr>
<tr><td>4</td><td>1) Verify common parameters as the following default values, can be modified according to need:
<table>
<tr><th>Name</th><th>Unit</th><th>Factory setting</th></tr>
<tr><td>Control mode</td><td>×</td><td>0</td></tr>
<tr><td>Command channel selection</td><td>×</td><td>0</td></tr>
<tr><td>Speed channel selection</td><td>×</td><td>0</td></tr>
<tr><td>Direction channel selection</td><td>×</td><td>0</td></tr>
</table>
2) Verify S curve parameter as the following default values, , can be modified according to need:
<table>
<tr><th>Name</th><th>Unit</th><th>Factory setting</th></tr>
<tr><td>Acceleration time T0</td><td>S</td><td>60</td></tr>
<tr><td>Deceleration time T0</td><td>S</td><td>90</td></tr>
</table>
3) Verify start parameter P13 as the following default values, , can be modified according to need:</td></tr>
</table>

Name	Unit	Factory setting
Start mode selection	×	0

4) Verify stop parameter P14 as the following default value, , can be modified according to need:

Name	Unit	Factory setting
Parking mode selection	×	0

5) Verify that general parameters are accordance with the motor nameplate.

6) Modify default values of the frequency limit parameters according to the need.

Name	Unit	Factory setting
Maximum	Hz	50
Minimum	Hz	0

7) Confirm digital quantity input parameter as the following default values, can be modified according to the actual electrical connections :

Name	Unit	Factory setting
Function definition of digital quantity input 0	×	3
Function definition of digital quantity input 1	×	8
Function definition of digital quantity input 2	×	9
Function definition of digital quantity input 3	×	10
Function definition of digital quantity input 4	×	8
Function definition of digital quantity input 5	×	7
Function definition of digital quantity input 6	×	6
Function definition of digital quantity input 7	×	11
Function definition of digital quantity input 8	×	4
Function definition of digital quantity input 9	×	0
Function definition of digital quantity input 10	×	0
Function definition of digital quantity input 11	×	17
Function definition of digital quantity input 12	×	19
Function definition of digital quantity input 13	×	18
Function definition of digital quantity input 14	×	0
Function definition of digital quantity input 15	×	0

8)Confirm digital quantity output parameter P41 as the following default values, can be modified according to the actual electrical connections :

Name	Unit	Factory setting
Function definition of digital quantity output 0	×	5
Function definition of digital quantity output 1	×	9
Function definition of digital quantity Output 2	×	6

	Function definition of digital quantity Output 3 × 3 Function definition of digital quantity Output 4 × 1 Function definition of digital quantity Output 5 × 2 9)Confirm unit bypass parameter as the following default values, can be modified according to the actual electrical connections : Name / Unit / Factory setting Unit bypass enable × 0
5	Motor rotates at a speed of 10Hz. Observe whether the rotation direction is correct. If it is not correct, change the default rotation direction by modifying “motor phase sequence parameter” (P20.09).
6	Normally start the inverter at given 30Hz speed, the motor begins to speed up its rotation after it is driven. After it speeds up to the given speed, observe whether the motor operation is stable or there is any abnormal noise, etc. If no abnormal exists, stop the motor to have on load testing.

6.7 Important parameters setup instructions

6.7.1 Analog calibration

Input analog test

With 0 ~ 20 mA port connected to 4 ~ 20 mA external signals as example, debugging steps are as follows:

Step 1. First the parameter "analog input type" is set to 4, the parameter "analog input function definition" is set to 1, the parameter "analog input bias" is set to 10, the parameter "analog input gain" is set to 100% ;

Step 2. When analog given is 4mA , if the interface given frequency is not 0, then reduce “the analog input bias” parameters; if the interface given frequency is 0, then increase “the analog input bias” parameters, to be sure Just to make the interface of a given frequency shows 0 (slightly larger, target frequency is not zero).

Step 3. When analog given is 20mA，if the interface given frequency is ≥ 50.00Hz, then reduce “the analog input bias” parameters; if the interface given frequency is ＜50.00Hz, then increase “the analog input bias” parameters.

Step 4. When analog given is 10mA (set output gain as 37.5%), Validate parameter is set

correctly (Corresponding to the target frequency of 25 Hz or so).

Analog output debugging

- IO board analog output current frequency

  Setting analog output channel 1 function to 6, offset is set to 50%, gain is set to 50%(the channel is ±10V, only need to output0~10V), need to fine tune.

- Output current

  Setting output channel function to 59, offset is set to 50%, gain is set to 50%.

6.7.2 Frequency hopping function description

When the frequency is set in the range of hopping frequency, the actual running frequency will be at the boundary of hopping frequency.

Make the speed control system of inverter avoid mechanical resonance point of the load though the setting hopping frequency. This speed control system can set three hopping frequency points.

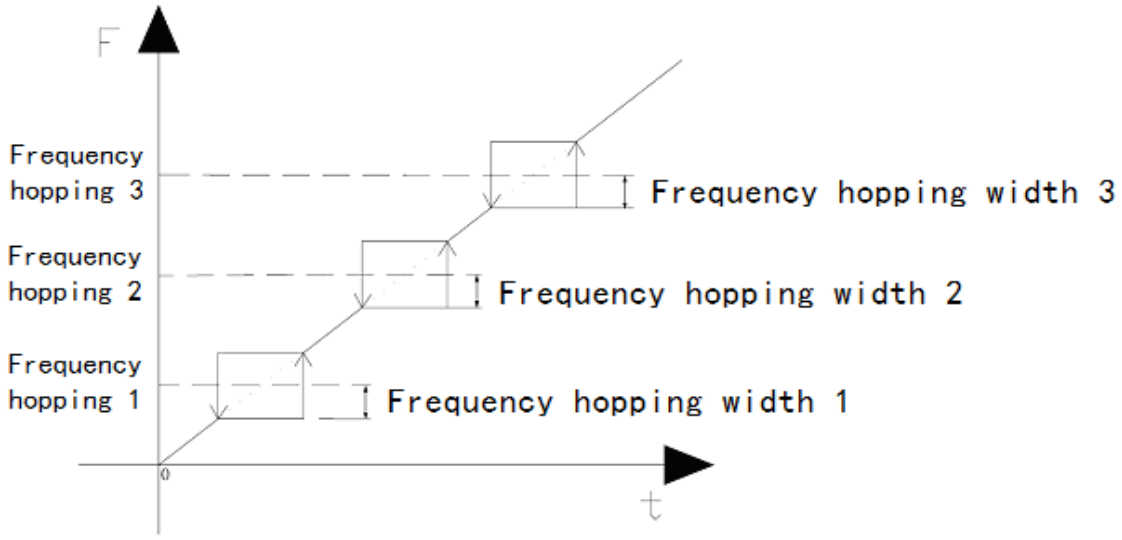


Fig.6-1 Frequency hopping function diagram

Chapter Ⅶ Alarm Information and Fault Processing

ME800 high-voltage inverter has complete alarm and fault protection functions. The faults can be categorized as cell faults, system faults, bypass faults and other faults.

Fault function: The system can clearly indicate the fault and automatically execute the actions of power cell bypass, safety stop and even cutting off the high-voltage input in accordance with the fault level. The fault indicator of the human-machine interface will display in different colors depending on the fault level. And fault condition can be determined quickly according to the displayed fault information.

Alarm function: When faults are not enough to cause destructive exceptions, the system will alarm, but the equipments will not stop and the fault indicator will turn yellow. And alarm condition can be determined quickly according to the display alarm information.

7.1 Fault name

Please refer to Appendix A which summarizes the fault names, and it is facilitated to refer and use for the users.

7.2 Fault and solutions

Please consult the Table 7-1 to Table7-4 to troubleshoot problems.

7.2.1 System fault and solutions

Table 7-1 System fault and solutions

Fault name	type	Possible reasons	Solutions
Over speed	Alarm/Fault	1. The motor speed exceeds the setting over speed value.	1. Verify the encoder setting is correct. 2. It's necessary to adjust inertia when the exceeding adjustment is too large. 3. Adjust the overspeed protection parameters (P50.03).
Overload	No	1. Grid voltage is too low. 2. Motor rated current is set wrongly.	1. Check the grid voltage. 2. Reset the motor rated current. 3. Check the load and adjust the torque

		3. Motor stall or the sudden load changes too large. 4. Inverter does not match the motor power.	increase capacity. 4. Select the matching motor.
Input side overcurrent	No	1. The valid value of input current exceeds protection limiting value. 2. Acceleration is too fast.	1. Check the "Motor rated current parameter (P20.02)". 2. Check the "Maximum current parameter of input current sensor parameter". 3. Adjust up the "acceleration time T0 parameter".
Input side phase loss	Alarm/Fault	1. Wrong input side wiring connection 2. Input resistance has damaged. 3. Input power supply phase loss	1. Check the input wiring. 2. Check the input resistance. 3Kv high voltage corresponding 2.1MΩ, 6Kv high voltage corresponding 4.2MΩ, 10Kv high voltage corresponding 7MΩ 3. Check the phase of the power supply.
Input phase imbalance	Alarm/Fault	1. The output side wiring is abnormal, missing or broken. 2. Collection board input voltage sampling circuit has damaged.	1. Check the input three-phase voltage. 2. Replace the collection board.
Input side under-voltage	Alarm/Fault	1. Grid voltage is too low (<70% rated) 2. The parameter setting is wrong. 3. The input voltage sampling circuit of collection board has damaged.	1. Check the grid input power supply. 2. Check the "Motor rated voltage parameter (P20.05)" and the "Maximum value of the inverter input voltage sensor voltage parameter". 3. Replace the collection board.
Input side overvoltage	Alarm/Fault	1. Grid voltage is too high (>110% rated voltage) 2. Input side higher voltage exceeds the protection limiting value. 3. The input voltage sampling circuit of collection board has damaged.	1. Check the grid input power supply. 2. Check the input overvoltage protection parameter and sensor parameter set. 3. Replace the collection board.
Output side	Alarm/Fault	1. Acceleration is too quick.	1. Increase the acceleration time.

overcurrent		2. Load inertia torque is large. 3. The parameter is set wrongly. 4. The output current detection line has problems.	2. The VF low frequency compensation is set as 110%. 3. Check the “Motor rated current parameter”, "Inverter rated current parameter”, and the “maximum current value of inverter rated current sensor current parameter ”. 4. Check the correctness of the wiring.
Output side phase loss	No	1. Inverter output line has broken. 2. Output terminal is loose. 3. The output three-phase load is serious asymmetry.	1. Check the output matching wire. 2. The output terminal is loose.
Output grounding fault	No	1. External output cable or motor single phase ground	1. Check the external cable and the motor for grounding. 2. Disconnect the inverter and motor connection, and use the ammeter to detect the motor and motor cable for insulation.
Output open circuit	No	Inverter output line has broken.	1. Check all the connections to motor for fastening. 2. Seek the technical service.
Output instantaneous overcurrent	Fault	1. Acceleration is too quick. 2. Load inertia torque is large. 3. Parameter is set wrongly. 4. Load is too light during startup process.	1. Increase the acceleration time. 2. Set the VF low frequency for 110%. 3. Check the ”Motor rated current parameter (P20.02)”, ”Inverter rated current (P20.02)” and the ”maximum current value of inverter rated current sensor parameter (P73.06)” 4. Set the VF low frequency compensation for 110%.
Output phase imbalance	No	1. Abnormal inverter output side wiring, missing wiring or broken line	2. Check the inverter output wiring and exclude the missing wiring and broken line. 3. Seek the technical service.
Output side overvoltage	No	1. Motor parameter and inverter parameter set value inconsistent with the motor rated value	1. Check for the proper motor parameter and inverter parameter set. 2. Seek the technical service.

CAN communication fault	Alarm/Fault	1. Communication interface is loose. 2. Communication wiring is not standard.	1. Check the communication interface. 2. Use the twisted pair and connect the CANH. CANL. and GND.
communication fault	No	1. Baud rate is set wrong. 2. Communication interface is loose 3. Communication wiring has damaged	1. Set a proper baud rate. 2. Check the communication interface. 3. Replace the communication wiring.
Optical fiber communication fault	No	1. Optical fiber is loose. 2. Optical fiber has damaged.	1. Plug and connect again. 2. Replace the optical fiber.
HMI communication fault	No	1. Wrong baud rate set 2. Communication interface is loose 3. Communication wiring has damaged.	1. Set a proper baud rate. 2. Plug and connect again the communication interface. 3. Replace the communication wiring.
Bypass board upstream communication fault	Alarm	1. Optical fiber is loose. 2. Optical fiber has damaged. 3. Bypass board is not work.	1. Plug and connect again the optical fiber head. 2. Replace the optical fiber. 3. Seek the technical service.
Bypass board downstream communication fault	No	1. Optical fiber is loose 2. Optical fiber has damaged	1. Plug and connect again the optical fiber head. 2. Replace the optical fiber.
Cabinet door open	Alarm	1. Cabinet door is not closed. 2. The travel switch on the door has damaged. 3. The electric circuit has disconnected.	1. Check whether the cabinet door is closed. 2. Replace the travel switch. 3. Check the fault of electric circuit according to the corresponding drawing.
Transformer overheating	Alarm/Fault	1. Environment temperature is too high. 2. Transformer load is too heavy 3. Wrong control cable shield ground. 4. Transformer overheating	1. Check the external signal loop circuit and the cable shield for correct grounding. 2. Check whether the installation conditions meet the requirements (for good air ventilation and exposure to

		signal wire connects the IO board wrongly.	sunlight and so on). 3. Check the control cable shield for correct grounding. 4. Seek the technical service.
Transformer fan thermal relay trip	Alarm	Fan overheating causing fan thermal relay trip	1. Check whether the fan is reverse or is locked-rotor. 2. Check whether thermal relay is normal. 3. Check whether the filter screen is locked-rotor.
		Transformer built-in fan stalling	1. Check whether the fan is damaged. 2. According to the drawing fan circuit testing whether it is normal.
		Transformer fan relay trip signal wire connects the IO board wrongly.	Check whether the connections are normal in accordance with the electrical drawing.
Unit fan 1 thermal relay trip	Alarm	Fan overheating causing fan thermal relay trip	1. Check whether the fan is reverse or is locked-rotor. 2. Check whether the filter screen is locked-rotor. 3. Check whether the thermal relay is normal.
		Wrong unit fan 2 thermal relay trip signal wire cut-in IO board	In accordance with the electrical drawing fan circuit detection
UPS fault, that is medium voltage power failure	Alarm	1. UPS electric circuit is damaged. 2. UPS is damaged.	1. Check whether the UPS wiring is normal. 2. Replace UPS
Fan not power on	Alarm	The power disconnects the fan.	Check and ensure correct motor wiring.
		The electric circuit of the fan is abnormal.	Check whether the UPS connections are abnormal in accordance with the electrical drawing.
User external fault	Fault	Outdoor fault signal wire connects the IO board wrongly.	Check whether the electric circuit is abnormal in accordance with the electrical drawing.

Environment overheating	Alarm/Fault	Environment temperature is too high	Open the refrigeration equipment.
		Cooling circuit fault	Check the cooling circuit.
		Electric detection circuit is abnormal.	Check whether the circuit is abnormal according to the electric drawing.
Humidity is too large	Alarm/Fault	Environment humidity is too high	Using air conditioning or other device to remove moisture.
		Detection circuit is abnormal.	Check whether this circuit is abnormal in accordance with the electric drawing.
		The shield of control cable is grounding wrongly.	Check whether the control cable shield is grounding correctly.
RTC fault	Alarm	RTC cannot work normally.	Check whether the battery is charged.
Modbus communication fault	Alarm/Fault	Communication interface is loose	Check the communication interface.
		The set ID address is wrong.	Set the communication address parameters.
Analog disconnection fault	Alarm	Analog given wire is dropping.	Connect the analog given wiring.
		Input AD channel is damage.	Change an analog input channel.
Profibus communication fault	Fault	Communication interface is loose	Check the communication interface.
		The set ID address is wrong.	Set the card address of Anybus.
Vacuum contactor K1~K6 fault	Fault	The feedback state of the vacuum contactor is inconsistent with the reference	1. Whether the command of the IO board has been given or not. 2. Check the electrical wiring of the vacuum contactor.

External 380V power fault	Alarm	Loss of the external 380 power	Verify that the external 380 power lose.
		380V power supply fault signal wire dropping	Check the signal wiring.
Power frequency phase sequence inconsistent (judge only >10Hz)	Alarm/Fault	Power frequency sequence is inconsistent with variable frequency phase sequence.	Verify the phase sequence consistency between power frequency and variable frequency.
		Input and output sampling circuit has crossing situation (output A. B. C not corresponding to sampling triangle resistance).	Check the crossing situation between input and output sampling circuit.
Vacuum contactor simultaneous action	Fault	The feedback contact of vacuum contactor is error.	Check the feedback contact.
IO expansion board CAN communication fault	Alarm/Fault	Communication interface loose	Check the communication interface.
		Communication wiring nonstandard	Use the twisted pair and connect the CANH. CANL. and GND.
Collection board CAN communication fault	Alarm/Fault	Communication interface is loose.	Check the communication interface.
		Communication wiring is not connected standard.	Use the twisted pair and connect the CANH. CANL. and GND.

Action after system fault

- The system will save the fault information after the system fault occurs, and displays if on the human-computer interface, meanwhile, the fault indicator displays yellow when the fault is alarmed, and the indicator displays red when the fault occurs;
- The system will not stop when it alarms;
- Block PWM immediately after the fault occurs and stops freely. For the serious system fault, such as the phase-shifting transformer temperature exceeding the fault threshold value, the system will cut off the high voltage input on the basis of stop.

7.2.2 Unit fault and solutions

Table 7-2 Unit fault and solutions

Fault name	Type	Possible reasons	Solutions
Unit short circuit fault	Fault	Unit output short circuit	Check the unit and replace the damaged unit.
		Unit drive is damaged.	Replace the unit drive
		The output motor wire is short circuit	Check whether the output cable is short circuit.
Unit overvoltage fault	Fault /Alarm	Deceleration is too quick	Set a longer deceleration time.
		Grid voltage is too high.	Reduce the input voltage.
Unit overheating fault	Fault /Alarm	Filter blockage	Clean the dust filter.
		Cooling fan does not work.	Check whether the fan is normal.
		The direction of cooling fan is backward.	Change the phase sequence of the control source.
		Poor cooling channel	Check whether the external channel has blocked.
		Poor cabinet sealing	Check the closeness of the cabinet door.
		Environment temperature is too high.	Install a bigger air-conditioning.
Unit voltage sharing fault	Fault /Alarm	The wiring of voltage sharing resistance is loose	Fasten the loose wiring.
		Voltage sharing resistance is damaged.	Replace the damaged voltage sharing resistance.
		DC-LINK capacitance is damaged.	Replace the damage DC-LINK capacitance.

Upward optical fiber fault (Unit sent it to the master control)	Fault /Alarm	Optical fiber connector is loose.	Replace the optical if the light is abnormal compared with the others.
		Unit fault	Replace the drive board or unit.
		Unit does not power on (power on high voltage alarm disappear).	Check whether the output undervoltage fault is shield.
Downward optical fiber fault (Master control sent it to the unit)	Fault /Alarm	Optical fiber connector is loose	Replace the optical if the light is abnormal compared with the others.
		Optical fiber non-luminance	Replace the master control board.
PWM block (that is block during operation) fault	Fault	Unit FPGA crystal oscillator does not vibrate.	Replace the drive board.
		Unit cannot receive PWM of the master control optical fiber.	Refer to the optical fiber communication fault.
PWM blockade fault	Fault /Alarm	Poor optical fiber communication	Refer to the optical fiber communication fault.
		Unit does not power on.	Check whether the SOP has shielded the input undervoltage fault.
Unit phase loss fault	Fault /Alarm	Unit incoming line phase loss	Check whether the unit incoming line and the transformer secondary side fall off.
		High voltage phase loss	Check whether the inverter power is loss phase.
		Transformer has damaged	Seek the technical service.

Action after unit fault

- When unit alarms, the system runs continuously, but the fault indicator will turn yellow.

- If the unit bypass is disabled, the system will block PWM and report the fault information, meanwhile, the system stops when unit has occurred fault.
- If unit bypass is enabled, the system will bypass this unit and run in dated capacity.

7.2.3 Bypass fault and solutions

Table 7-3 Bypass fault and solutions

Fault name	Type	Possible reasons	Solutions
A~C phase bypass fault	Fault	The number of the unit bypass exceeds the setting maximum value.	Determine that the unit bypass number exceeds the set maximum value.
		The feedback of bypass board is inconsistent with the bypass command.	Check the communication of bypass board.

Action after bypass fault

When the system bypass is enabled, if the bypass fault information is reported, block PWM, and the system will stop.

7.2.4 Other faults and solutions

Table 7-4 Other faults and solutions

Fault name	Type	Possible reasons	Solutions
Watchdog reset fault	Fault	Program fleet	Replace the main board.
		The motherboard ARM crystal oscillator does not work.	Replace the main board.

Action after other faults

When the watchdog resets fault, fault information should be saved, meanwhile, PWM should be blocked and the system stops free.

Chapter Ⅷ Communication Protocol

8.1 Function and address of Modbus

8.1.1 Explanation

Note: Please Write 0 to the unused bits or registers;

Do not write any value to the reserved bits or registers.

- If WORD is took as unit and 0 is the start address, the way of calculating register address is as follows:

  Register address of Modbus = register address

  Bit address of Modbus = register address * 16 + bit number (n) (n=0, …,15)

- If BYTE is took as unit and 0 is the start address, the way of calculating register address is as follows:

  Register address of Modbus = register address *2, register address * 2 + 1 (big endian)

  Bit address of Modbus = register address * 16 + bit number (n) (n=0, …,15)

- If WORD is took as unit and 1 is the start address, the way of calculating register address is as follows:

  Register address of Modbus = register address + 1

  Bit address of Modbus = register address * 16 + bit number (n) + 1 (n=0, …,15)

- If BYTE is took as unit and 1 is the start address, the way of calculating register address is as follows:

  Register address of Modbus = register address *2 + 1, register address * 2 + 2 (big endian)

  Bit address of Modbus = register address * 16 + bit number (n) + 1 (n=0, …,15)

8.1.2 Modbus protocol

8.1.2.1 Explanation of protocol

Function Code：

- Function code “3”: Read holding register (read command word register)
- Function code “6”: Write holding register (write command word register)
- Function code “1”: Read coils state (read command bit register)

- Function code “5”:Write coil state (write command bit register)
- Function code “2”:Read Input state (read state bit register)
- Function code “4”:Read Input register (read state word register)

8.1.2.2 Communication protocol

Master send

Slave address	Function code	Upper eight bits of address	Lower eight bits of address	Upper eight bits of quantity	Lower eight bits of quantity	Upper eight bits of CRC	Lower eight bits of CRC
1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte	1Byte

Slave return

Slave address	Function code	Data length (byte)	Data ……	Upper eight bits of CRC	Lower eight bits of CRC
1Byte	1Byte	1Byte	2n Byte	1Byte	1Byte

8.1.2.3 Command data【Register3、6】【Bit1、5】

Register address	Content
0000H	Running Control bit0 1：Foreward 0：Invalid bit1 1：Reverse 0：Invalid bit2 1：Run 0：Stop bit3 1：Emergency Stop 0：Invalid bit4 1：Power Frequency to Inverter Frequency 0：Invalid bit5 1：Inverter Frequency to Power Frequency 0：Invalid bit6 1：Pump Emergency Stop bit7 1：Stop Power Frequency 0：Invalid bit8 1：Start Power Frequency 0：Invalid bit9 Reserved bit10 1：Soft Run 0：Invalid bit11 1：Stop 0：Invalid bit15~12 Reserved*
0001H	Target Frequency 0~10000：0.00~100.00Hz
0002H	Reserved
0003H	Multi-speed 0~15
0004H	Reset Command bit0 Reserved

	bit1 1：Self-check Reset 0：Invalid bit2 1：Reset Fault 0：Invalid bit3 Reserved bit4 Reserved bit5 Reserved Bit6 1：Reset Units 0：Invalid Bit7 1：Rest Bypass Board 0：Invalid bit15~8 Reserved
0005H	Multi-function Output Ports# (For User) bit0 1：DO0 ON 0：OFF bit1 1：DO1 ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 ON 0：OFF bit5 1：DO5 ON 0：OFF bit6 1：DO6 ON 0：OFF bit7 1：DO7 ON 0：OFF bit15~8 Reserved ***Actual value of output port = Modbus setting value | Output value of inverter**
0006H~0205H	Reserved
0206H	Multi-function Input Ports[1] bit0 1：DI0 ON 0：OFF bit1 1：DI1 ON 0：OFF bit2 1：DI2 ON 0：OFF bit3 1：DI3 ON 0：OFF bit4 1：DI4 ON 0：OFF bit5 1：DI5 ON 0：OFF bit6 1：DI6 ON 0：OFF bit7 1：DI7 ON 0：OFF bit8 1：DI8 ON 0：OFF bit9 1：DI9 ON 0：OFF bit10 1：DI10 ON 0：OFF bit11 1：DI11 ON 0：OFF bit12 1：DI12 ON 0：OFF bit13 1：DI13 ON 0：OFF bit14 1：DI14 ON 0：OFF bit15 1：DI15 ON 0：OFF
0207H	Pump Command bit0 1：Enable the first pump ON 0：OFF bit1 1：Enable the second pump ON 0：OFF bit2 1：Enable the third pump ON 0：OFF bit3 1：Enable the forth pump ON 0：OFF

[1] It means the input I/O of Modbus Master which can be seen as the expanding I/O of Modbus Slave.

	bit4~bit15 Reserved
0208H	Target Torque (0.1%, based on the rated torque of motor), signed number.

8.1.2.4 State data【Register 4】【Bit2】

Read only.

Register address	Content
0000H	Inverter state bit0 1：Self-check bit1 1：Alarm bit2 1：Fault bit3 1：Unit bypass bit4 1：System bypass bit5 1：Remote control 0：Local control bit6 1：Closed loop control 0：Open loop control bit7 1：EEPROM Initialization bit8 1：Foreward 0：Reverse bit9 1：Soft start bit10 1：Positive (Grid phase sequence) 0：Negative (Grid phase sequence) bit11 1：Positive (Motor phase sequence) 0：Negative (Motor phase sequence) bit12~15 Reserved
0001H	Running state 0：Idle 1：Foreward start 2：Foreward 3：Foreward stop 4：Reverse start 5：Reverse 6：Reverse stop 7：Foreward -> Reverse 8：Reverse -> Foreward bit15~9 Reserved
0002H	Current feedback revolving speed (0.1rpm，with encoder)
0003H	Current feedback frequency (0.01Hz，with encoder)
0004H	RMS of output voltage (V)
0005H	RMS of output current (0.1A)
0006H	RMS of input voltage (V)
0007H	RMS of input current (0.1A)
0008H	Active power of output (0.1KW)
0009H	Active power of input (0.1KW)
000AH	Total power of output (0.1KW)
000BH	Total power of input (0.1KW)

000CH	Power factor
000DH~004CH	Reserved
004DH~004EH	State of input port (32) bit0 1：DI0 ON 0：OFF bit1 1：DI1 ON 0：OFF bit2 1：DI2 ON 0：OFF bit3 1：DI3 ON 0：OFF bit4 1：DI4 ON 0：OFF bit5 1：DI5 ON 0：OFF bit6 1：DI6 ON 0：OFF bit7 1：DI7 ON 0：OFF … Bit31 1：DI31 ON 0：OFF
004FH~0050H	State of output port (24) bit0 1：DO0 (Relay A) ON 0：OFF bit1 1：DO1 (Relay B) ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 (OC) ON 0：OFF bit5 1：DO5 (OC) ON 0：OFF … Bit23 1：DO5 (OC) ON 0：OFF Bit24~Bit31 Reserved
0051H	PLC output port bit0 1：DO0 ON 0：OFF bit1 1：DO1 ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 ON 0：OFF bit5 1：DO5 ON 0：OFF bit6 1：DO6 ON 0：OFF bit7 1：DO7 ON 0：OFF bit8 1：DO8 ON 0：OFF bit9 1：DO9 ON 0：OFF bit10 1：DO10 ON 0：OFF bit11 1：DO11 ON 0：OFF bit12 1：DO12 ON 0：OFF bit13 1：DO13 ON 0：OFF bit14 1：DO14 ON 0：OFF bit15 1：DO15 ON 0：OFF
0052H	Current frequency (0.01Hz)
0053H	Closed loop frequency (0.01Hz)
0054H	Bypass board state of phase A

	Bit 0 indicates the state of unit A1, 1 means A1 in unit bypass state, while 0 means A1 in normal state; Bit n indicates the state of unit An, 1 means An in unit bypass state, while 0 means An in normal state;
0055H	Bypass board state of phase B The same as phase A
0056H	Bypass board state of phase C The same as phase A
0057H	State of System Bypass Bit 0 indicates the type of system bypass (1 means auto, 0 means manual) Bit 1 indicates system bypass in enable or disable state (1 means enable, 0 means disable) Bit 2 indicates the state of power frequency (1 means start, 0 means stop) Bit 3~bit5: reserved Bit 6 indicates the mode of system bypass (1 means test mode, 0 means work mode) Bit 7 indicates the emergency stop state of system (1 means emergency stop state) Bit 8~bit15: reserved
0058H	Target Torque (0.1%, based on the rated torque of motor), signed number
0059H	Output Torque (0.1%, based on the rated torque of motor), signed number

8.2 Profibus protocol

8.2.1 Control word

WORD	Content
WORD1	Running control bit0 1：Foreword 0：Invalid bit1 1：Reverse 0：Invalid bit2 1：Run 0：Stop bit3 1：Emergency stop 0：Invalid bit4 1：Power frequency to variable frequency 0：Invalid bit5 1：Variable frequency to power frequency 0：Invalid bit6 1：Pump emergency stop 0：Invalid bit7 1：Power frequency start 0：Power frequency stop bit8~15 Reserved
WORD 2	Reserved
WORD 3	Reserved
WORD 4	Profibus frequency setting (0.01Hz)：0~6000
WORD 5	Reset command bit0 Reserved bit1 1：Self-check Reset 0：Invalid bit2 1：Fault Reset 0：Invalid

	bit3 Reserved bit4 Reserved bit5 Reserved bit6 1： Reset Unit 0： Invalid bit7 1： Reset Bypass Boar 0： Invalid bit8~15 Reserved
WORD 6	Multi-function Output Ports# (For User) bit0 1：DO0 ON 0：OFF bit1 1：DO1 ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 ON 0：OFF bit5 1：DO5 ON 0：OFF bit6 1：DO6 ON 0：OFF bit7 1：DO7 ON 0：OFF bit15~8 Reserved ***Actual value of output port = Profibus setting value | Output value of inverter**
WORD 7	Multi-function Input Ports [2]() bit0 1： DI0 ON 0：OFF bit1 1： DI1 ON 0：OFF bit2 1： DI2 ON 0：OFF bit3 1： DI3 ON 0：OFF bit4 1： DI4 ON 0：OFF bit5 1： DI5 ON 0：OFF bit6 1： DI6 ON 0：OFF bit7 1： DI7 ON 0：OFF bit8 1： DI8 ON 0：OFF bit9 1： DI9 ON 0：OFF bit10 1： DI10 ON 0：OFF bit11 1： DI11 ON 0：OFF bit12 1： DI12 ON 0：OFF bit13 1： DI13 ON 0：OFF bit14 1： DI14 ON 0：OFF bit15 1： DI15 ON 0：OFF
WORD 8	Pump Command bit0 1：Enable the first pump ON 0：OFF bit1 1：Enable the second pump ON 0：OFF bit2 1：Enable the third pump ON 0：OFF bit3 1：Enable the forth pump ON 0：OFF bit4~bit15 Reserved
WORD9	Target Torque(0.1%, based on the rated torque of motor)，signed number

[2] It means the input I/O of Profibus Master which can be seen as the expanding I/O of Profibus Slave.

8.2.2 State word

WORD	Contents
WORD 1	Inverter state bit0 1：Self-check bit1 1：Alarm bit2 1：Fault bit3 1：Unit bypass bit4 1：System bypass bit5 1：Remote control 0：Local control bit6 1：Closed loop control 0：Open loop control bit7 1：EEPROM Initialization bit8~15 Reserved
WORD 2	Running state bit0 1：Idle bit1 1：Foreward start bit2 1：Foreward bit3 1：Foreward stop bit4 1：Reverse start bit5 1：Reverse bit6 1：Reverse stop bit7 1：Foreward -> Reverse bit8 1：Reverse -> Foreward bit9~15 Reserved
WORD3	Target frequency
WORD4	Current frequency
WORD 5	Current feedback revolving speed
WORD 6	Current feedback frequency
WORD7	Closed loop speed
WORD 8	RMS of output voltage
WORD 9	RMS of output current
WORD 10	RMS of input voltage
WORD 11	RMS of input current
WORD 12	Active power of output
WORD 13	Active power of input
WORD 14	Total power of output
WORD 15	Total power of input
WORD 16	Power factor
WORD 17 WORD 18	State of input port (32, WORD 17 corresponding 31~16 bit, WORD 18 corresponding 15~0 bit) bit0 1： DI0 ON 0：OFF bit1 1： DI1 ON 0：OFF

	bit2 1：DI2 ON 0：OFF bit3 1：DI3 ON 0：OFF bit4 1：DI4 ON 0：OFF bit5 1：DI5 ON 0：OFF bit6 1：DI6 ON 0：OFF bit7 1：DI7 ON 0：OFF bit8 1：DI8 ON 0：OFF bit9 1：DI9 ON 0：OFF bit10 1：DI10 ON 0：OFF bit11 1：DI11 ON 0：OFF bit12 1：DI12 ON 0：OFF bit13 1：DI13 ON 0：OFF bit14 1：DI14 ON 0：OFF bit15 1：DI15 ON 0：OFF bit16 1：DI16 ON 0：OFF bit17 1：DI17 ON 0：OFF bit18 1：DI1 8ON 0：OFF bit19 1：DI1 9ON 0：OFF bit20 1：DI20 ON 0：OFF bit21 1：DI21 ON 0：OFF bit22 1：DI22 ON 0：OFF bit23 1：DI23 ON 0：OFF bit24 1：DI24 ON 0：OFF bit25 1：DI25 ON 0：OFF bit26 1：DI26 ON 0：OFF bit27 1：DI27 ON 0：OFF bit28 1：DI28 ON 0：OFF bit29 1：DI29 ON 0：OFF bit30 1：DI30 ON 0：OFF bit31 1：DI31 ON 0：OFF
WORD 19 WORD 20	State of output ports (24) bit0 1：DO0 ON 0：OFF bit1 1：DO1 ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 ON 0：OFF bit5 1：DO5 ON 0：OFF bit6 1：DO6 ON 0：OFF bit7 1：DO7 ON 0：OFF bit8 1：DO8 ON 0：OFF bit9 1：DO9 ON 0：OFF bit10 1：DO10 ON 0：OFF bit11 1：DO11 ON 0：OFF bit12 1：DO12 ON 0：OFF

	bit13 1：DO13 ON 0：OFF bit14 1：DO14 ON 0：OFF bit15 1：DO15 ON 0：OFF bit16 1：DO16 ON 0：OFF bit17 1：DO17 ON 0：OFF bit18 1：DO18 ON 0：OFF bit19 1：DO19 ON 0：OFF bit20 1：DO20 ON 0：OFF bit21 1：DO21 ON 0：OFF bit22 1：DO22 ON 0：OFF bit23 1：DO23 ON 0：OFF bit24~31 Reserved
WORD 21	Multi-function output ports bit0 1：DO0 ON 0：OFF bit1 1：DO1 ON 0：OFF bit2 1：DO2 ON 0：OFF bit3 1：DO3 ON 0：OFF bit4 1：DO4 ON 0：OFF bit5 1：DO5 ON 0：OFF bit6 1：DO6 ON 0：OFF bit7 1：DO7 ON 0：OFF bit8 1：DO8 ON 0：OFF bit9 1：DO9 ON 0：OFF bit10 1：DO10 ON 0：OFF bit11 1：DO11 ON 0：OFF bit12 1：DO12 ON 0：OFF bit13 1：DO13 ON 0：OFF bit14 1：DO14 ON 0：OFF bit15 1：DO15 ON 0：OFF
WORD 22	Bypass board state of phase A Bit 0 indicates the state of unit A1, 1 means A1 in unit bypass state, while 0 means A1 in normal state; Bit n indicates the state of unit An, 1 means An in unit bypass state, while 0 means An in normal state;
WORD 23	Bypass board state of phase B The same as phase A
WORD 24	Bypass board state of phase C The same as phase A
WORD 25	State of system bypass Bit 0 indicates the model of system bypass (1 means auto, 0 means manual) Bit 1 indicates system bypass in enable or disable state (1 means enable, 0 means disable) Bit 2 indicates the state of power frequency (1 means start, 0 means stop) Bit3~bit5 Reserved

	Bit 6 indicates the mode of system bypass (1 means test mode, 0 means work mode) Bit 7 indicates the emergency stop state of system (1 means emergency stop state) Bit8~bit15 reserved
WORD 26	Target torque (0.1%, based on the rated torque of motor), signed number
WORD 27	Output torque (0.1%, based on the rated torque of motor), signed number

Appendix A Fault List

Fault Code	Fault Type	Fault Code	Fault Type
0	A1 Short circuit fault	25	C6 Short circuit fault
1	A2 Short circuit fault	26	C7 Short circuit fault
2	A3 Short circuit fault	27	C8 Short circuit fault
3	A4 Short circuit fault	28	C9 Short circuit fault
4	A5 Short circuit fault	29	C10 Short circuit fault
5	A6 Short circuit fault	30	A1 Overvoltage fault
6	A7 Short circuit fault	31	A2 Overvoltage fault
7	A8 Short circuit fault	32	A3 Overvoltage fault
8	A9 Short circuit fault	33	A4 Overvoltage fault
9	A10 Short circuit fault	34	A5 Overvoltage fault
10	B1 Short circuit fault	35	A6 Overvoltage fault
11	B2 Short circuit fault	36	A7 Overvoltage fault
12	B3 Short circuit fault	37	A8 Overvoltage fault
13	B4 Short circuit fault	38	A9 Overvoltage fault
14	B5 Short circuit fault	39	A10 Overvoltage fault
15	B6 Short circuit fault	40	B1 Overvoltage fault
16	B7 Short circuit fault	41	B2 Overvoltage fault
17	B8 Short circuit fault	42	B3 Overvoltage fault
18	B9 Short circuit fault	43	B4 Overvoltage fault
19	B10 Short circuit fault	44	B5 Overvoltage fault
20	C1 Short circuit fault	45	B6 Overvoltage fault
21	C2 Short circuit fault	46	B7 Overvoltage fault
22	C3 Short circuit fault	47	B8 Overvoltage fault
23	C4 Short circuit fault	48	B9 Overvoltage fault
24	C5 Short circuit fault	49	B10 Overvoltage fault

50	C1 Overvoltage fault	79	B10 Overheating fault
51	C2 Overvoltage fault	80	C1 Overheating fault
52	C3 Overvoltage fault	81	C2 Overheating fault
53	C4 Overvoltage fault	82	C3 Overheating fault
54	C5 Overvoltage fault	83	C4 Overheating fault
55	C6 Overvoltage fault	84	C5 Overheating fault
56	C7 Overvoltage fault	85	C6 Overheating fault
57	C8 Overvoltage fault	86	C7 Overheating fault
58	C9 Overvoltage fault	87	C8 Overheating fault
59	C10 Overvoltage fault	88	C9 Overheating fault
60	A1 Overheating fault	89	C10 Overheating fault
61	A2 Overheating fault	90	A1 Voltage sharing fault
62	A3 Overheating fault	91	A2 Voltage sharing fault
63	A4 Overheating fault	92	A3 Voltage sharing fault
64	A5 Overheating fault	93	A4 Voltage sharing fault
65	A6 Overheating fault	94	A5 Voltage sharing fault
66	A7 Overheating fault	95	A6 Voltage sharing fault
67	A8 Overheating fault	96	A7 Voltage sharing fault
68	A9 Overheating fault	97	A8 Voltage sharing fault
69	A10 Overheating fault	98	A9 Voltage sharing fault
70	B1 Overheating fault	99	A10 Voltage sharing fault
71	B2 Overheating fault	100	B1 Voltage sharing fault
72	B3 Overheating fault	101	B2 Voltage sharing fault
73	B4 Overheating fault	102	B3 Voltage sharing fault
74	B5 Overheating fault	103	B4 Voltage sharing fault
75	B6 Overheating fault	104	B5 Voltage sharing fault
76	B7 Overheating fault	105	B6 Voltage sharing fault
77	B8 Overheating fault	106	B7 Voltage sharing fault
78	B9 Overheating fault	107	B8 Voltage sharing fault

108	B9 Voltage sharing fault	137	B8 Upstream optical fiber fault
109	B10 Voltage sharing fault	138	B9 Upstream optical fiber fault
110	C1 Voltage sharing fault	139	B10 Upstream optical fiber fault
111	C2 Voltage sharing fault	140	C1 Upstream optical fiber fault
112	C3 Voltage sharing fault	141	C2 Upstream optical fiber fault
113	C4 Voltage sharing fault	142	C3 Upstream optical fiber fault
114	C5 Voltage sharing fault	143	C4 Upstream optical fiber fault
115	C6 Voltage sharing fault	144	C5 Upstream optical fiber fault
116	C7 Voltage sharing fault	145	C6 Upstream optical fiber fault
117	C8 Voltage sharing fault	146	C7 Upstream optical fiber fault
118	C9 Voltage sharing fault	147	C8 Upstream optical fiber fault
119	C10 Voltage sharing fault	148	C9 Upstream optical fiber fault
120	A1 Upstream optical fiber fault	149	C10 Upstream optical fiber fault
121	A2 Upstream optical fiber fault	150	A1 Downstream optical fiber fault
122	A3 Upstream optical fiber fault	151	A2 Downstream optical fiber fault
123	A4 Upstream optical fiber fault	152	A3 Downstream optical fiber fault
124	A5 Upstream optical fiber fault	153	A4 Downstream optical fiber fault
125	A6 Upstream optical fiber fault	154	A5 Downstream optical fiber fault
126	A7 Upstream optical fiber fault	155	A6 Downstream optical fiber fault
127	A8 Upstream optical fiber fault	156	A7 Downstream optical fiber fault
128	A9 Upstream optical fiber fault	157	A8 Downstream optical fiber fault
129	A10 Upstream optical fiber fault	158	A9 Downstream optical fiber fault
130	B1 Upstream optical fiber fault	159	A10 Downstream optical fiber fault
131	B2 Upstream optical fiber fault	160	B1 Downstream optical fiber fault
132	B3 Upstream optical fiber fault	161	B2 Downstream optical fiber fault
133	B4 Upstream optical fiber fault	162	B3 Downstream optical fiber fault
134	B5 Upstream optical fiber fault	163	B4 Downstream optical fiber fault
135	B6 Upstream optical fiber fault	164	B5 Downstream optical fiber fault
136	B7 Upstream optical fiber fault	165	B6 Downstream optical fiber fault

166	B7 Downstream optical fiber fault	195	Output phase imbalance
167	B8 Downstream optical fiber fault	196	Output over voltage
168	B9 Downstream optical fiber fault	197	CAN Communication fault
169	B10 Downstream optical fiber fault	198	Manual operation communication fault
170	C1 Downstream optical fiber fault	199	Optical fiber communication failure
171	C2 Downstream optical fiber fault	200	HMI Communication failure
172	C3 Downstream optical fiber fault	201	Bypass board upstream communication failure
173	C4 Downstream optical fiber fault	202	Bypass board downstream communication failure
174	C5 Downstream optical fiber fault	203	Watchdog reset fault
175	C6 Downstream optical fiber fault	204	Cabinet door open
176	C7 Downstream optical fiber fault	205	Transformer overheating
177	C8 Downstream optical fiber fault	206	Transformer fan 1 thermal relay trip
178	C9 Downstream optical fiber fault	207	Transformer fan 2 thermal relay trip
179	C10 Downstream optical fiber fault	208	Unit fan 1 thermal relay trip
180	Overspeed	209	Unit fan 2 thermal relay trip
181	Overload	210	Unit fan 3 thermal relay trip
182	Underload	211	UPS fault, that is medium voltage turned off
183	Motor overheating	212	A phase bypass fault
184	Input overcurrent	213	B phase bypass fault
185	Input phase loss	214	C phase bypass fault
186	Input ground fault	215	Fan unpowered
187	Input phase imbalance	216	User external fault 0, low level fault
188	Input under voltage	217	User external fault 1,high level fault
189	Output over voltage	218	Transformer overheating (sensor detection)

190	Output over current	219	Environment overheating
191	Output phase loss	220	Humidity too large
192	Output ground fault	221	RTC fault
193	Output open circuit	222	Modbus communication fault
194	Output instantaneous over current	223	Analog disconnection fault
224	Profibus communication fault	253	B4PWM Blockade fault
225	Input power failure	254	B5PWM Blockade fault
226	Vacuum contactor K1 fault	255	B6PWM Blockade fault
227	Vacuum contactor K2 fault	256	B7PWM Blockade fault
228	Vacuum contactor K3 fault	257	B8PWM Blockade fault
229	Vacuum contactor K4 fault (backup)	258	B9PWM Blockade fault
230	Vacuum contactor K5 fault (backup)	259	B10PWM Blockade fault
231	Vacuum contactor K6 fault (backup)	260	C1PWM Blockade fault
232	One trailer four first power frequency access failure	261	C2PWM Blockade fault
233	One trailer four second power frequency access failure	262	C3PWM Blockade fault
234	One trailer four third power frequency access failure	263	C4PWM Blockade fault
235	One trailer four fourth power frequency access failure	264	C5PWM Blockade fault
236	External 380V power failure	265	C6PWM Blockade fault
237	Power frequency and frequency conversion inconformity	266	C7PWM Blockade fault
238	Vacuum contactor simultaneous motion	267	C8PWM Blockade fault
239	IO expansion board CAN communication fault	268	C9PWM Blockade fault
240	A1PWM Blockade fault	269	C10PWM Blockade fault

241	A2PWM Blockade fault	270	A1PWM Open fault
242	A3PWM Blockade fault	271	A2PWM Open fault
243	A4PWM Blockade fault	272	A3PWM Open fault
244	A5PWM Blockade fault	273	A4PWM Open fault
245	A6PWM Blockade fault	274	A5PWM Open fault
246	A7PWM Blockade fault	275	A6PWM Open fault
247	A8PWM Blockade fault	276	A7PWM Open fault
248	A9PWM Blockade fault	277	A8PWM Open fault
249	A10PWM Blockade fault	278	A9PWM Open fault
250	B1PWM Blockade fault	279	A10PWM Open fault
251	B2PWM Blockade fault	280	B1PWM Open fault
252	B3PWM Blockade fault	281	B2PWM Open fault
282	B3PWM Open fault	311	B1 Phase loss fault
283	B4PWM Open fault	312	B2 Phase loss fault
284	B5PWM Open fault	313	B3 Phase loss fault
285	B6PWM Open fault	314	B4 Phase loss fault
286	B7PWM Open fault	315	B5 Phase loss fault
287	B8PWM Open fault	316	B6 Phase loss fault
288	B9PWM Open fault	317	B7 Phase loss fault
289	B10PWM Open fault	318	B8 Open phase
290	C1PWM Open fault	319	B9 Phase loss fault
291	C2PWM Open fault	320	B10 Phase loss fault
292	C3PWM Open fault	321	C1 Phase loss fault
293	C4PWM Open fault	322	C2 Phase loss fault
294	C5PWM Open fault	323	C3 Phase loss fault
295	C6PWM Open fault	324	C4 Phase loss fault
296	C7PWM Open fault	325	C5 Phase loss fault
297	C8PWM Open fault	326	C6 Phase loss fault
298	C9PWM Open fault	327	C7 Phase loss fault

299	C10PWM Open fault	328	C8 Phase loss fault
300	Acquisition board CAN communication fault	329	C9 Phase loss fault
301	A1 Phase loss fault	330	C10 Phase loss fault
302	A2 Phase loss fault		
303	A3 Phase loss fault		
304	A4 Phase loss fault		
305	A5 Phase loss fault		
306	A6 Phase loss fault		
307	A7 Phase loss fault		
308	A8 Phase loss fault		
309	A9 Phase loss fault		
310	A10 Phase loss fault		

Appendix B Customer Compliant

Customer Name：	
Phone:	Fax:
Compliant Type: □Sell □Propaganda □ Service □Quality □Business □Product □ Other	
Content of Compliant:	
Complainant (signature): Compliant Unit (official seal): Date: Day Month Year	

Appendix C Product Warranty Card

Customer Name :	
Phone :	Fax :
Compliant Type : □Sell □ Propaganda □Service □Quality □Business □Product □Other	
Content of Compliant :	
Complainant (signature): Compliant Unit (official seal): Date: Day Month Year	

Warranty agreement

1. The warranty period of this product is 18 months since leaving the factory or 12 months after debug the equipment, which will be subject to the first come. If there is any product fault or damage under normal use according to the operation instruction during the warranty period, our company is responsible for the free maintenance.
2. If there is any damage due to the following reasons in the warranty period, a certain maintenance fee will be charged:

   A. Machine damage is due to errors in use, own unauthorized repair and alteration;

   B. Machine damage is caused by fire, flood, abnormal voltage, other natural disasters, and the secondary disasters;

   C. Hardware damage is due to artificially drop and transport after purchase;

   D. Machine damage is due to out of accordance with the operation instruction provided by our company;

   E. Failure and damage due to obstacles except for the machine (external equipment factors, for instance)
3. Please fill all contents in the 《Product Warranty Card》 in detail, when there are product faults or damage,.
4. The maintenance costs are referred to the latest 《Maintenance Price List》 adjusted by our company.
5. The warranty card will not be reissued, so please be sure to keep this card and show it to the maintenance staff during the warranty process.
6. If you have any questions in the service process, please contact to our company agent or our company.
7. The interpretation of this agreement is subject to the Shanghai Sigriner STEP Electric Co., Ltd.

Shanghai Sigriner STEP Electric Co., Ltd.

(Customer Service Centre) Service Hotline: 400-820-7921 800-820-7921

Address: No.1560 Siyi Road Jiading District, Shanghai

Zip: 201801

Phone: 021-69926000

Fax: 021-69926000

Website: www.stepelectric.com

Appendix D Notice to Customer

Dear customers:

RoHS is the abbreviation for *the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment* which was implemented by EU on July 1st, 2006. It stipulates that in the newly developed electrical and electronic equipment, the following six hazardous substances are restricted: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE.

In China, *the Electronic Information Products Pollution Control Management Measures* was issued on February 28th, 2006 jointly by the Ministry of Information Industry, State Development and Reform Commission, Ministry of Commerce, General State Administration for Industry and Commerce, Administration of Customs of the P.R.C, General Administration of Quality Supervision, Inspection and Quarantine and State Bureau of Environmental Protection, became a RoHS direction of Chinese Version and was enforced. On February 1st, 2008, *Electronic Waste Environmental Pollution Prevention and Control Management Measures* issued by the State Bureau of Environmental Protection of the P.R.C began to be executed, clearly specifying that the users of electronic and electrical products shall provide or entrust the electronic waste to be disassembled and disposed by the qualified company (including small individual businesses) with corresponding business scope listed in directory (or temporary directory).

All electronic components, PCB filters, wire straps, structural parts used in our products are selected and purchased by following *the Electronic Information Products Pollution Control Management Measures* and RoHS directive. The six hazardous substances (lead, mercury, cadmium, hexavalent chrome, PBB and PBDE), are strictly controlled. During manufacturing PCB components are welded on a XinChi lead free welding production line with a lead free welding technology.

Hazardous substances may be contained in the following assemblies:

Type of assembly	Electronic components	PCB Board	Metal sheet	Radiator	Plastic piece	Conductor

Possible hazardous substances	Six hazardous substances: lead, mercury, cadmium, hexavalent chrome, PBB and PBDE

- Environment analysis

Our electronic products will produce some heat in operation, which may lead the spread of little amount of hazardous substances. It will not cause any serious consequence for ambient environment. Once the life cycle of those electronic products is end and the product is discarded, the heavy metal and chemical hazardous substances contained in the products may seriously contaminate the soil and water resource.

- Life cycle of electronic products and devices

Any electronic products and devices has its life cycle and will be discarded, replaced and upgraded by a new product, even it is still functional. The life cycle of our company electronic products is generally not more than 20 years.

- Electronic products discard treatment

If the discarded electronic products aren't treated properly, it may contaminate the environment. Our customers are required to follow up the related national regulation and set up a reclaiming system. It can't be discarded as a regular household refuse or solid industrial wastes. The discarded products shall be stored in an environment-friendly way, or reclaimed by qualified company, and should be strictly complied with the *electronic waste environmental pollution prevention and control management measures* issued by the State Bureau of Environmental Protection of the P.R.C. Any unqualified individual or company is prohibited in disassembling, utilizing, disposing of electronic wastes.

Please don't throw away the electronic waste together with your ordinary domestic waste. Please call local waste disposing agencies or environment protection agencies for the advice of proper electronic waste handling.

Shanghai STEP Electric Corporation