Preface

First of all, thank you for purchasing ACH200 series high voltage AC drive from Veichi!

ACH200 series high-voltage AC drive is power unit cascade type structure, adopting high-performance vector control technology, the highest output voltage level of 11kV, with excellent control performance, high reliability and other advantages. It can meet the demand of modern industry for energy saving of large and medium-sized fans, pumps and general machinery as well as process speed regulation, and is widely used in electric power, metallurgy, mining, building materials, oil and gas, petrochemical, municipal and other industries.

This manual describes in detail the functional characteristics of the ACH200 series high-voltage AC drive and the use of methods, including product selection, installation, parameter setting, operation and commissioning, maintenance and inspection, etc., before use, please be sure to carefully read this manual, equipment supporting manufacturers, please send this manual along with the equipment to the end-user, to facilitate the subsequent use of reference.

When you find any problems in use, and this manual cannot provide you with answers, please contact the company, our professional and technical staff will be happy to serve you, please put forward your valuable comments and suggestions!

Catalog

Chapter 1 Safety Information and Precaution

High-voltage AC drive units are high-voltage rated products with dangerous voltages of 6kV or 10kV inside the cabinet. Therefore, the user must read and understand the ACH200 High Voltage AC drive Operating Instructions carefully before installing and putting the equipment into operation, and strictly comply with the operating procedures. Failure to operate in accordance with the provisions of this manual may result in injury or death and property damage, for which the offender is responsible.

1.1 Description of Safety Information

Danger: Failure to comply with the relevant safety regulations may result in serious personal accidents or even death.

Warning: Failure to observe the relevant safety instructions may result in personal injury or abnormal functioning or damage to the equipment.

Caution: Matters requiring attention or operating procedures in order for the equipment to function properly.

Trained professional:

This product must be installed, wired, operated and maintained by trained personnel. The term "trained professional" in this manual means that the person working on the equipment must be trained in the installation, wiring, operation and maintenance of the equipment and must be able to respond correctly to any emergencies that may arise during use.

1.2 Warning and Labelling

The following markings used in this manual require critical attention, as failure to do so may result in damage to this product and associated systems, or even in personal safety.

⚠ Dangers

- The AC drive unit and bypass cabinet of this product are in a high-voltage hazardous area, do not open the cabinet door when high voltage is applied.
- Operation of the AC drive unit or bypass cabinet must be in accordance with high voltage operating procedures and the operator must wear insulated shoes and gloves; and the site must be supervised by another operator.
- When the input mains power is switched on, the terminals of the high voltage AC drive unit remain energised even when the universal high voltage AC drive unit is switched off, so do not touch them.
- Maintenance checks on the Universal High Voltage AC drive Unit must be carried out only after the high voltage power supply has been de-energised and it has been confirmed that the power modules have been de-energised for 10 minutes.
- Do not touch any part of the cabinet if you cannot verify the presence of voltage in the cabinet.
- Maintenance checks and component replacement must be carried out by trained professionals.
- A non-compliant ground resistance can be dangerous and needs to be checked regularly (weekly is recommended) for a ground resistance of less than 4Ω.
- When the system is shut down and maintenance is required for loads such as high-voltage motors or fans and pumps, ensure that the circuit breakers in the front-level switchgear of the high-voltage frequency-controlled device have obvious mechanical breakpoints and that all isolation cutters in the bypass cabinet are in the disconnected position. When the system is in continuous operation and maintenance is required for the standby motor or load, safety measures should be taken on the standby motor side.
- Verify that the input power supply meets the requirements of the product specifications.
- Input and output cables to meet requirements for insulation, capacity, etc.

⚠ Warning

- When moving, transporting and placing the equipment, it is important that the equipment is placed horizontally and level.
- When lifting the AC drive, it is strictly forbidden to use the top ring of the cabinet, and to ensure that the lifting force of the equipment is sufficient and that the lifting and lowering process is gentle.
- Do not drop (leave) foreign objects such as wires, paper, metal shavings or tools in the cabinet.
- Do not put into installation and operation if the components of the high voltage AC drive unit

are damaged.

- Install protective barriers (marked with a high voltage hazard symbol) at the necessary locations and do not remove them while the equipment is in operation.
- Do not disconnect the power to the cooling unit while it is in operation as this can lead to overheating and damage to the system equipment.
- Do not control the operation/stopping of the high voltage AC drive by switching the input power on/off.
- The order of power up and down should follow: when starting, turn on the control power first and then turn on the high voltage power. When stopping, stop the stable motor first, then disconnect the high voltage power supply, then disconnect the control power supply.
- During operation, the user should monitor the load operation at all times and stop the machine in case of irregularities.
- It should be ensured that the ambient room temperature where the system is installed is within the range of 0°C to 40°C.
- After a period of operation, mechanical vibrations may cause loosening of the electrical contact parts, resulting in poor contact and, in serious cases, damage to the components and the whole machine. It is recommended that regular maintenance and cleaning checks be carried out as required to avoid damage.
- A system for recording the operating condition of the equipment and applying maintenance systems should be developed.
- Do not place flammable and explosive substances in or near the cabinet of the high voltage AC drive unit.
- The input and output cables should be wired according to the terminal markings, do not connect them incorrectly as this may cause damage to the unit.

1.3 Safe Operation

This series of products is suitable for 3kV~11kV power supply system, the equipment is directly connected to the high voltage grid, please take the following safety precautions when operating:

1) The operator must wear high-voltage insulated shoes before entering the operating position of high-voltage equipment.

2) Insulation mats shall be laid around the equipment.

3) High pressure operation by a single person is strictly forbidden.

1.3.1 Pre-power Check after Initial or Maintenance Overhaul

◆ Make sure the high voltage input and output cable connection terminal screws are tight.

◆ Make sure that the cables between the cabinets, which have been separated due to transport, are properly and tightly connected.

◆ Make sure that all control and signal cables are correctly and tightly connected.

◆ Make sure that the system ground wire between all cabinets separated by transport is reliably connected to the plant ground.

◆ Make sure that the series cables between the units and the neutral cable are correctly and tightly connected.

1.3.2 Pre-routine Power Supply Check

◆ Remove all grounding protection wires before sending power.

◆ Check that the filters do not need replacing.

◆ Check that the AC drive fault message has been processed correctly.

◆ Close and lock the cabinet door of the AC drive.

1.3.3 Power Outage Operation

◆ Notify all relevant work stations to prepare for power failure.

◆ Press the "stop" button of the high-voltage AC drive to stop the operation of the equipment.

◆ Disconnect the circuit breaker of the user switchgear.

1.3.4 Inspection Operation

◆ Take the necessary measures when repairing the line: disconnect the user's switchgear circuit breaker, disconnect the disconnecting switch in question and at the same time hang a warning sign to prevent others from delivering power midway.

◆ Make sure that it is stopped and that the high-voltage live indicator does not display.

◆ After the high and low voltage power failure, the power must be tested before work; for high voltage testing, the corresponding voltage level of the detector should be used and insulating protective equipment must be worn.

◆ After verifying that there is no electricity, ground the three-phase incoming wires of the

construction equipment to ensure the safety of the staff.

- ◆ Grounding wires should be installed in all possible places of the construction equipment, and for two-way power supply units, when servicing a busbar cutter.
- ◆ In the case of disconnect switches or load switches, the two busbar cutters should be disconnected and the two ends of the construction cutter should be grounded.
- ◆ When installing the grounding wire should first be grounded, after hanging the grounding wire, remove the grounding wire in the opposite order, removal, connection should wear insulated protective equipment.
- ◆ The grounding wire should be hung in a place where it is readily visible to staff and a "man at work" warning sign should be placed at the grounding wire.

Chapter 2 Product Information

2.1 Nameplate Information and Naming Rule

Nameplate information:

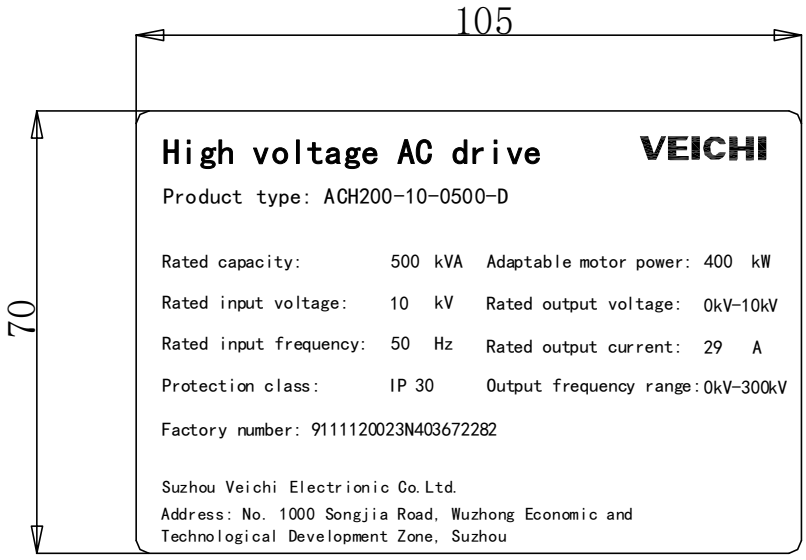


Figure.2-1

Naming rule:

Product model naming rules: product platform - voltage class - rated capacity - product management number

$$\underset{①}{\text{ACH200}} - \underset{②}{10} - \underset{③}{0500} - \underset{④}{D}$$

Table 2-1 ACH200 series high-voltage AC drive model naming rules description

No.	Implication	Detailed description
①	Product platform	ACH200: ACH200 serie high voltage AC drive
②	Voltage rating	03: 3kV 33: 3.3kV 06: 6kV 66: 6.6kV 10: 10kV 11: 11kV
③	Rated capacity	0500: Rated capacity 500kVA
④	Product management No.	D: Two quadrants R: Four quadrants

2.2 Operating Principle and System Component

2.2.1 System Working Principle

The ACH200 series of high voltage AC drive systems are "high-high", voltage-source AC drives. The series H-bridge high voltage AC drive speed control system is based on an output of 6kV with 5 units per phase (for 10kV, 8 units per phase).

The 6kV grid voltage in the diagram feeds the phase shifting transformer directly, which has 15 separate three-phase low-voltage windings on the secondary side. Each three-phase low-voltage winding feeds a low-voltage single-phase AC drive (called an H-bridge or power unit), whose circuit diagram is shown in Figure 2-2. In the example given in Figure 2-2, each of the three phases output to the motor is connected in series by five power units, making a total of 15 power units for the three phases, resulting in a variable voltage, variable frequency power supply with three proportional and adjustable voltages and frequencies. It can directly drive three-phase asynchronous motors up to 6 kV.

If a voltage of 10 kV is required, the number of power units in series per phase can be increased.

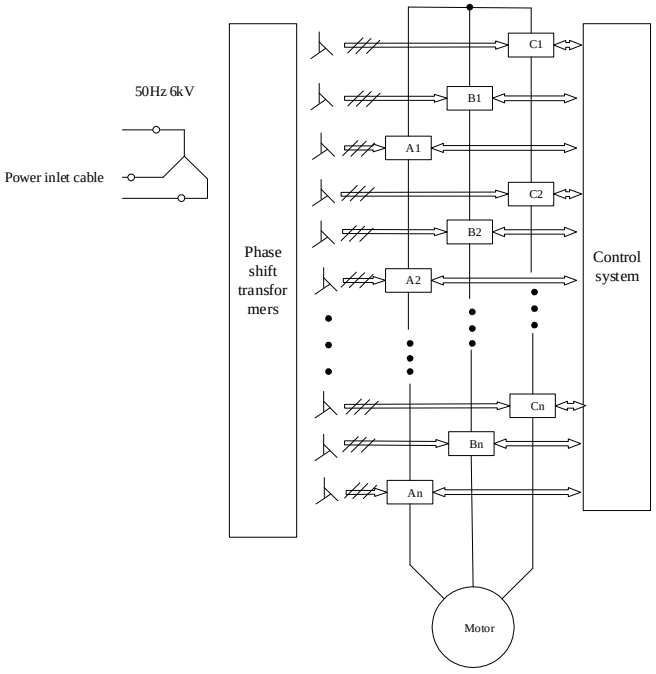


Figure.2-2

The power unit circuit consists mainly of the main circuit and the control circuit. The main circuit consists of protection, rectification, filtering, AC drive and bypass (optional). The schematic diagram is shown in Figure 2-3:

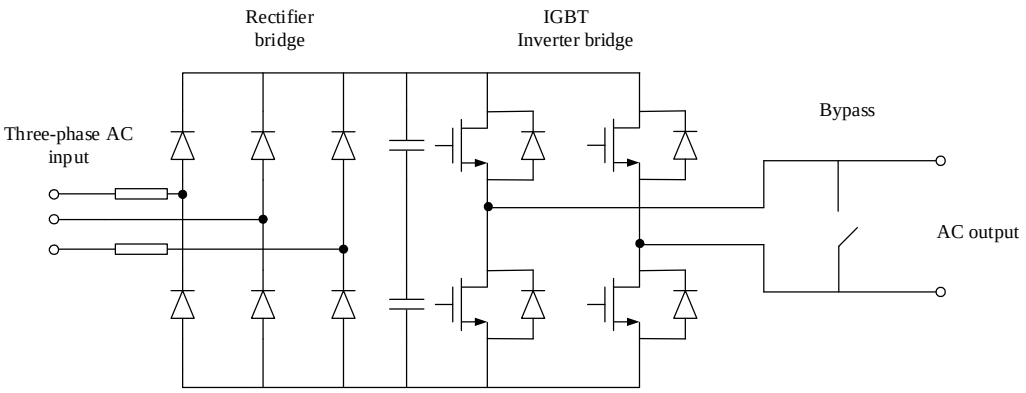


Figure.2-3

The input power supply terminal R/S/T is connected to the three-phase low-voltage output of the transformer secondary coil, which is rectified by a three-phase full bridge to charge the DC bus and then inverted into a single-phase AC output via the H-bridge. The single-phase output of the power unit is: ACI/ACO.

The unit control circuit controls the work of the whole unit by receiving signals from the main control system, while the power unit also transmits its own voltage, fault information and status information back to the main control system via optical fibre to realise the monitoring of the power unit.

The power unit has a unit bypass function, one for IGBT bypass and one for relay bypass (optional). When a unit fails, the power unit can be bypassed automatically to ensure that the frequency control system continues to work normally.

2.2.2 System Component

The components of the ACH200 series high voltage AC drive speed control system include an integrated AC drive cabinet, and a bypass cabinet (optional), as shown in Figure 2-4.

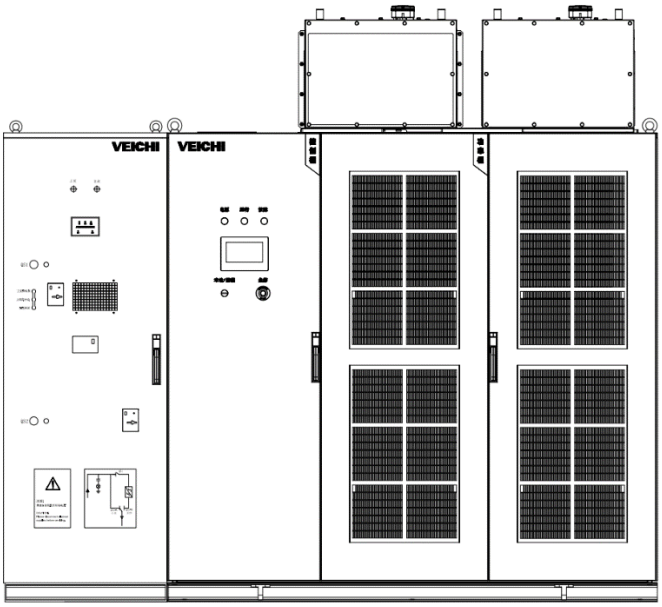


Figure.2-4

1) Transformer cabinet composition:

The transformer cabinet contains mainly high-voltage isolated phase shifting transformers. In the case of a 6kV high voltage frequency conversion system, for example, each phase of the power cabinet consists of five power units. These units are powered by the secondary side of the isolation phase shifting transformer, and the secondary sides differ by a phase difference in turn, allowing for multiplexed series rectification. In the primary side of the phase shifting transformer, the current waveform of each converted secondary side is very close to a sinusoidal waveform after superposition, so that the harmonic interference to the grid is very low and fully meets the requirements of various international and domestic standards including IEEE 519-1992 and GB/T14549-93. At the same time, the power factor of the system is improved.

The transformer cabinet also includes temperature measurement points for the temperature monitoring controller, which monitors the temperature of the windings in a real-time cycle. The transformer temperature monitoring controller will promptly feedback information about transformer over-temperature or transformer faults to the control cabinet, ensuring reliable operation of the transformer.

2) Power cabinet composition:

The power cabinet is the core part of the main circuit of the AC drive power, it consists of several identical power units, the output voltage of each power unit is superimposed in series to form the three-phase voltage output to the motor.

Taking a 6kV high voltage AC drive speed control system as an example, each phase contains 5 power units and the output voltage of each power unit is AC 690V, the phase voltage is 5 x 690V, i.e. 3450V, and accordingly, its line voltage is 6kV.

If the device designed is a 10kV frequency-controlled system, it contains 8 power units in each phase.

By using an optimised PWM (Pulse Width Modulation) control technology with independent intellectual property rights, the voltage waveform output to the motor is very close to a sinusoidal waveform with low harmonic content and small dv/dt. No additional filters are required and the output can be directly to an asynchronous motor or a synchronous motor with no requirement for the length of the cable from the AC drive to the motor. Communication between the power unit and the control cabinet is via high-speed and reliable optical fibre, which effectively avoids electromagnetic interference and increases the reliability of the system.

3) Control cabinet composition:

The control cabinet is the core of the whole high voltage variable frequency speed control system, it decides and controls the action of each power unit according to the user's operation and setting locally or remotely, and collects the voltage and current analogue quantities in the system, and each switching quantity, after logic processing and calculation, to further drive the motor and meet the output requirements.

The control cabinet includes isolation transformers, low voltage devices, the whole control board, IO board, fibre optic board and LCD operating human-machine interface. Of these, all calculations are carried out in the DSP control board. The control core is a professionally designed DSP (Digital Signal Processor) supplemented by FPGA (Field Programmable Gate Array), their use not only allows for high speed calculations and complex control functions, but also greatly simplifies the design of the control circuit and improves the reliability of the control system.

4) Bypass cabinet:

The bypass cabinet is optional. Without the bypass cabinet, the high voltage input and output lines can be connected via terminals in the transformer cabinet.

If bypass cabinets are used, either manual bypass or automatic bypass can be selected and the corresponding bypass cabinets are described as follows:

i. Manual bypass cabinets:

The bypass cabinet in manual bypass mode is mainly composed of isolation knife gate, its main function is to provide high voltage power supply for high voltage motors directly from the grid when the high voltage AC drive is overhauled, without affecting the user's use. When in use, it can be switched between AC drive operation and industrial frequency operation.

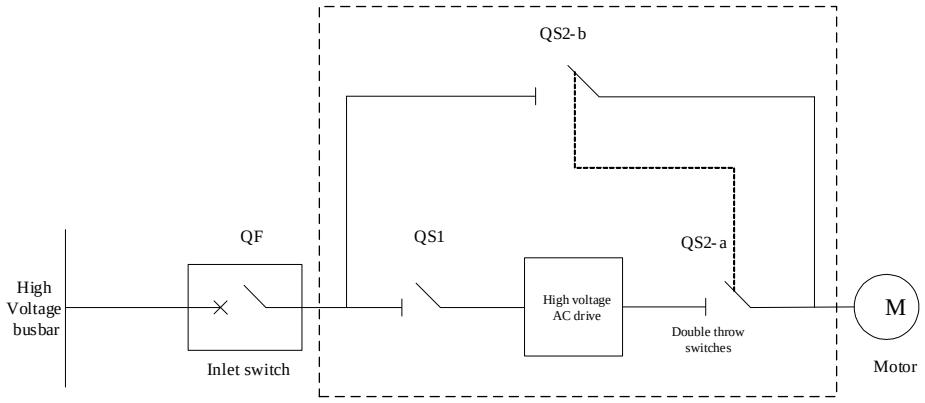


Figure.2-5

In the manual bypass cabinet in the diagram, there are three high-voltage disconnect switches. To ensure that no power is back-fed to the AC drive output, QS2-a and QS2-b use a double-throw disconnect switch to achieve mechanical interlocking. When QS1 and QS2-a are closed and QS2-b is disconnected, the motor runs at variable frequency; when QS1 and QS2-a are disconnected and QS2-b is closed, the motor runs at industrial frequency, at which time the AC drive is isolated from the high voltage for easy access, maintenance and commissioning.

This system consists of high voltage cabinet, manual bypass cabinet, high voltage AC drive and high voltage motor, of which the manual bypass cabinet and high voltage AC drive are provided by Veichi Electric (the high voltage cabinet is already available in the original system).

ii. Automatic bypass cabinets:

The bypass cabinet in the automatic mode mainly includes vacuum contactors, isolation cutters and other equipment, which can be controlled automatically without manual operation through the control system of the control cabinet and, in the event of a system failure, the three-phase output of the AC drive to the motor is automatically removed and switched to direct power supply from the grid, without causing a system shutdown.

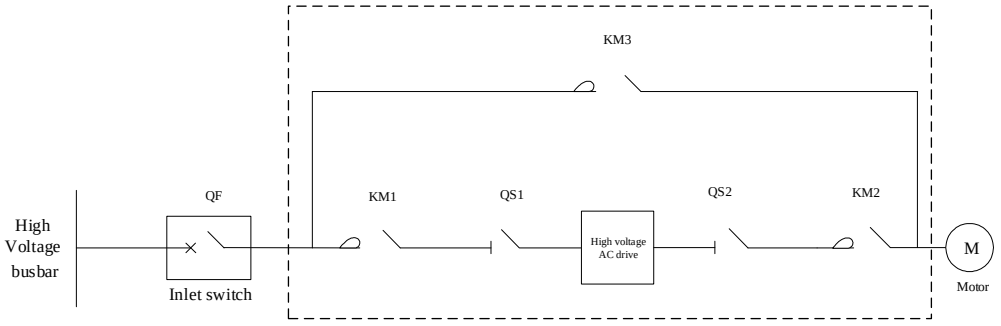


Figure.2-6

The diagram shows an automatic bypass cabinet with three high voltage vacuum contactors KM1 to KM3 and two high voltage disconnect switches QS1 and QS2. It is required that KM1, KM2 cannot be closed at the same time as KM3 to achieve interlocking electrically. When operating

at variable frequency, KM1 and KM2 are closed and KM3 is open; when operating at industrial frequency, KM3 is closed and KM1 and KM2 are open.

The system consists of a high-voltage cabinet, an automatic bypass cabinet, a high-voltage AC drive and a high-voltage motor, of which the automatic bypass cabinet and the high-voltage AC drive are provided by Veichi Electric (the high-voltage cabinet is already available in the original system).

2.3 Technical Parameter

Project		Specification
Input	Voltage rating	3kV/3.3kV/6kV/6.6kV/10kV/11kV
	Voltage fluctuation range	-15%~+10%
	Voltage frequency	50Hz/60Hz ; ±5%
	Power factor	≧0.97(At full capacity)
	System efficiency	≧96%(At full capacity)
	Current harmonics	≦4%
Output	Voltage range	0~ Rated input voltage
	Frequency range	0Hz~120Hz(Customization available)
	Current harmonics	≦4%
Control of power supply	Voltage range	Three phase four wire system 380V,±10%,50Hz/60Hz
	Rated capacity	Not less than 10kVA
Control performance	Control method	V/Fc control ; No PG vector control(SVC) ; With PG vector control (FVC)
	Speed ratio	1:50(VF) ; 1:100(SVC) ; 1:200(VC)
	Speed control accuracy	±1%(VF) ; ±0.4%(SVC) ; ±0.2%(FVC)
	Torque response time	＜200ms(SVC) ; ＜100ms(VC)

	Starting torque	0.5Hz 150% of rated torque(SVC);0Hz 180% of rated torque(VC)
	Overload capacity	120%: 60s
	Acceleration and deceleration times	0s~3600s(Customization available)
User terminal	Switching input	8 digital inputs (expandable, programmable, compatible with 1 high speed pulse input, input range: 0kHz to 50kHz)
	Switching output	8 digital outputs (expandable, programmable, which are compatible to include 1 high speed pulse input, input range: 0kHz to 50kHz)
	Relay output	8 relay outputs (optional, programmable)
	Analogue input	4 way: AI1、AI2、AI3、AI4: -10V~+10V/0mA~20mA
	Analogue output	5 way: AO1、AO2、AO3、AO4、AO5: 0V~+10V/0mA~20mA
Protection functions	System protection	Overcurrent, overvoltage, undervoltage, motor overload, AC drive overload, phase failure, overheating, temperature controller failure, access control failure, communication failure, etc.
	Unit protection	Undervoltage, overvoltage, power supply, overheating, input phase failure, module failure, power supply failure, communication failure, bypass failure, etc.
Other	Human machine interface	Touch screen
	Communication method	Modbus protocol support (standard RS485 interface available), CANopen, Profibus DP, Profinet and Ethernet options available
	Mounting method	Cabinet installation
	Protection level	IP30
	Noise level	≤80dB
	Inlet and outlet method	Lower inlet and lower outlet, other methods optional

	Cooling method	Forced air cooling
	Control of power supply	AC 380V±10%
	MTBF	50000h
	Ambient temperature	-5℃~+40℃, above 40℃ can be used at a reduced rate, maximum operating temperature 50℃; for every 1℃ increase, the capacity will be reduced by 1.5%
	Ambient humidity	5%~95%, no condensation
	Elevation	Up to 1000m, over 1000m requires derating, 1% of capacity for every 100m of elevation
	Storage environment	It should be stored in a place free from dust, direct sunlight, flammable or corrosive gases, oil, water vapour and vibration
	Vibration amplitude	Up to 0.59g

2.4 Product Specification

6kV

AC drive model	Power rating(kW)	Rated capacity(kVA)	Rated current(A)	Size W*D*H(mm)	Weight(kg)
ACH200-06-0400-D	315	400	38	2100*1450*2000	1740
ACH200-06-0450-D	355	450	43	2100*1450*2000	1800
ACH200-06-0500-D	400	500	48	2100*1450*2000	1920
ACH200-06-0560-D	450	560	54	2100*1450*2000	1970
ACH200-06-0630-D	500	630	61	2100*1450*2000	2060
ACH200-06-0710-D	560	710	68	2100*1450*2000	2150

ACH200-06-0800-D	630	800	77	2100*1450*2000	2200
ACH200-06-0900-D	710	900	87	2100*1450*2000	2320
ACH200-06-1000-D	800	1000	96	2100*1450*2000	2410
ACH200-06-1120-D	900	1120	108	2700*1650*2000	2950
ACH200-06-1250-D	1000	1250	120	2700*1650*2000	2100
ACH200-06-1400-D	1120	1400	135	2700*1650*2000	3310

10kV

AC drive model	Power rating(kW)	Rated capacity(kVA)	Rated current(A)	Size W*D*H(mm)	Weight(kg)
ACH200-10-0500-D	400	500	29	2100*1450*2000	2270
ACH200-10-0560-D	450	560	32	2100*1450*2000	2320
ACH200-10-0630-D	500	630	36	2100*1450*2000	2370
ACH200-10-0710-D	560	710	40	2100*1450*2000	2420
ACH200-10-0800-D	630	800	46	2100*1450*2000	2520
ACH200-10-0900-D	710	900	52	2100*1450*2000	2570
ACH200-10-1000-D	800	1000	58	2100*1450*2000	2620
ACH200-10-1120-D	900	1120	65	2100*1450*2000	2770
ACH200-10-1250-D	1000	1250	72	2100*1450*2000	2820

ACH200-10-1400-D	1120	1400	81	2700*1650*2000	3420
ACH200-10-1600-D	1250	1600	92	2700*1650*2000	3620
ACH200-10-1800-D	1400	1800	100	2700*1650*2000	3770
ACH200-10-2000-D	1600	2000	115	2700*1650*2000	3920
ACH200-10-2240-D	1800	2240	129	2700*1650*2000	4170
ACH200-10-2500-D	2000	2500	144	2700*1650*2000	4370

Note: Subject to actual design shipments.

Chapter 3 Mechanical and Electrical Installation

3.1 Requirements for Installation Condition

3.1.1 Environmental Requirement

For the AC drive to operate stably and reliably over time, the installation environment should meet the following conditions:

- The minimum ambient temperature is -20°C and the maximum is not more than 50°C. The change in temperature of the working environment should be less than 5°C per hour. If the environment does not meet the requirements, air conditioning equipment should be installed on site, otherwise the system needs to be used at a reduced rate.
- The relative humidity of the site environment should be less than 90% (at 20 hours) and free from condensation. The change in humidity on site should not exceed 5% per hour when the humidity varies.
- The installation site should be below 1500m above sea level, otherwise additional capacity or customisation is required.
- Do not install the AC drive in places where there is a lot of dust, corrosive, explosive or insulation-damaging gases, and avoid the presence of conductive dust in the air.
- The permissible vibration frequency at the installation site of the equipment is not greater than 150 Hz.

3.1.2 Space Requirements for Installation of Equipment

Please refer to the engineering drawings provided by the manufacturer for AC drive cabinet dimensions and base plate installation drawings. All cabinets should be installed as shown, with sufficient space spacing around the perimeter to ensure air flow and maximum door swing, as well as the space required for maintenance. Provide access to the installation base (aisle spacing etc.) and ensure that space is provided for transporting ancillary equipment for the AC drive.

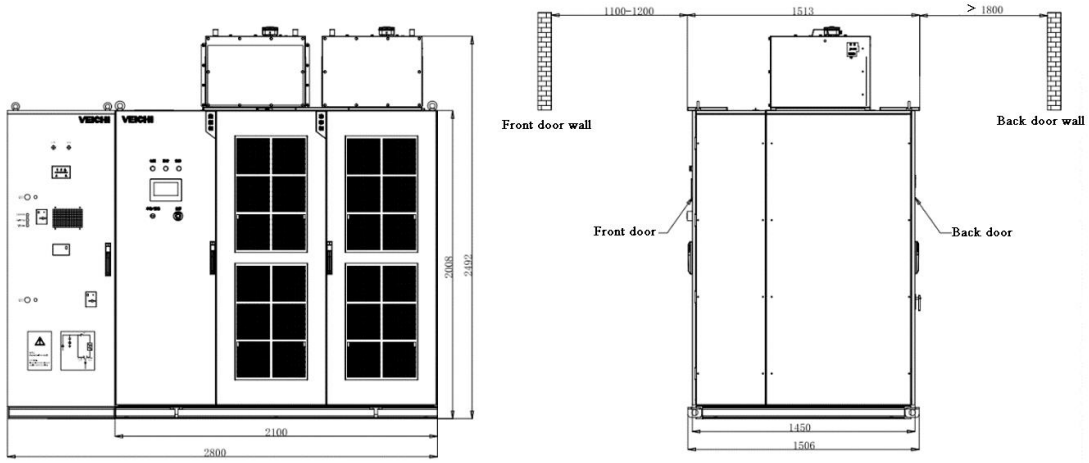


Figure.3-1

The distance between the back of the cabinet and the wall should be greater than 1000mm, the distance between the front of the cabinet and the wall should be greater than 1500mm, the distance between the two sides of the cabinet and the wall should be greater than 500mm and the distance between the top of all series units and the roof should be greater than 1000mm.

3.1.3 Equipment Cooling Guidance

High voltage AC drives are large electronic devices and have strict environmental requirements. According to the operation of many equipments on site, the proportion of equipment failures caused by high ambient temperature on site is large, so our company has proposed three solutions for high voltage AC drive site cooling for users to choose. The three options are: 1. retrofitting air conditioning; 2. retrofitting air ducts; 3. air and water cooling.

Each of the three options has its own scope of application, and the choice of specific solutions should be based on the site environment and the technical solutions given by our company. The following is a brief description of the principles and scope of application of the three options for the user's reference.

1) Retrofitting of air conditioning

a) Cooling capacity of air conditioners

The high-voltage frequency converter is placed in a relatively closed room, and then the air conditioner is installed in the room, and the heat generated by the high-voltage frequency converter is discharged to the outside through the circulation inside the air conditioner. The AC drive heat generation needs to be selected according to the operating conditions, considering a certain margin. The maximum heat generation is 4% of the rated power of the AC drive, and the AC drive heat generation is selected as 3.5% of the actual average output power. If the long-term operating

frequency is lower than 40Hz, the heat generation can be estimated at 2% of the rated power of the AC drive. The air conditioning capacity required for individual space cooling is calculated in accordance with the practical area of the room, and can generally be calculated at 0.15kW per square meter (this can be ignored if the ambient temperature is below 40°C).

$$Q_{Air\ conditioning\ cooling\ capacity}$$
$$= \{Q_{AC\ drive\ heat\ generation}\}$$
$$+ \{Q_{Required\ cooling\ capacity\ of\ the\ space\ (less\ than\ 40°C\ can\ be\ ignored)}\}$$
$$= (W_{Inverter\ output\ power} \times 3.5\%) + (S_{House\ size} \times 0.15)$$

b) Selection of air conditioners

● Selection by number of hp

$$X_{Air\ conditioning\ capacity} = Q_{Air\ conditioning\ cooling\ capacity} \div 2.5$$

● Selection by model

It is customary to use 1 hp equal to 2500 W of cooling capacity (i.e. 25 models) and 1.5 hp approximately equal to 3500 cooling capacity (i.e. 35 models). The rest of the models can be estimated according to the cooling capacity, e.g. two hp for a 50 model.

$$\nabla_{Machine\ type} = Q_{Air\ conditioning\ cooling\ capacity} \div 100$$

● Selection by power consumption of the air conditioner

$$W_{Power} = Q_{Air\ conditioning\ cooling\ capacity} \div \eta_{Energy\ efficiency\ ratio}$$
$$\approx X_{Air\ conditioning\ capacity} \times 735_{(Unit\ is\ watt)}$$

c) Advantages of retrofitting air conditioning

As there is no direct indoor/outdoor air circulation, this method makes it extremely easy to keep the indoor environment clean, growing the life of the AC drive and reducing maintenance rates.

2) Retrofitting of air ducts

a) Design of the air ducts

The conventional design is to install air ducts on top of the cabinet to discharge the heat generated by the AC drive directly to the outside, where the system is cooled by the constant replenishment of cold air from the air inlet of the AC drive room.

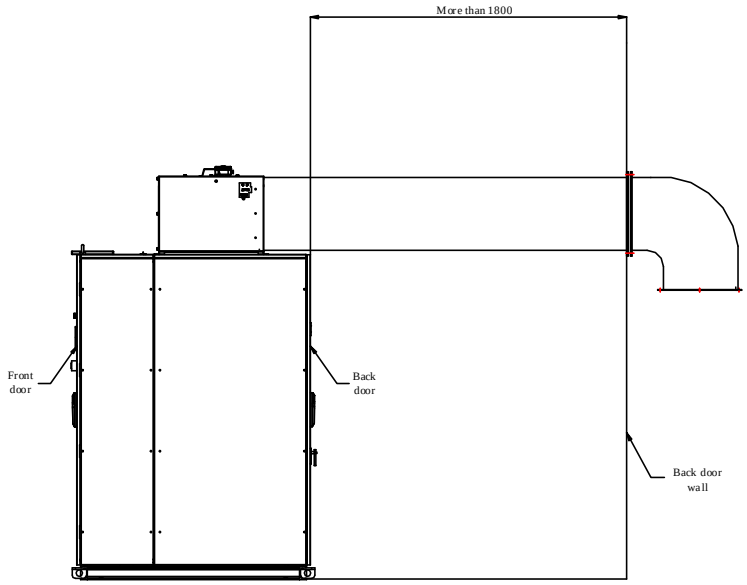


Figure.3-2

b) Advantages of adding air ducts

Low cost, high reliability and good heat dissipation. Suitable for applications where the site environment is relatively clean.

Note:

◆ In the process of use, if the top fan of the AC drive cabinet is closer to the air outlet (less than 10 meters, no turn in the middle), the air outlet cannot be installed with an auxiliary exhaust fan, otherwise it is necessary to install an additional exhaust fan. If the site construction of the air inlet is inconvenient and the air duct needs to have a twist, then you can consider adding a fan to force the air in.

◆ If the duct design is unreasonable, rainwater will back up on rainy days and cause the AC drive to short circuit. The overall ventilation network should be designed to slope downwards at a certain angle and holes should be opened on the lower side of the ventilation network to prevent rainwater from backing up. Ventilation holes with filters to prevent animals from crawling in and to filter dust.

3) Air - water cooling solutions

a) Air - water cooling principle

The hot air of the AC drive is directly exchanged by the air-cooling device through the duct, and the cooling water takes away the heat emitted by the AC drive, and the cooled air is directly discharged back to the room after cooling. The temperature of the cooling water inside the air-cooling unit is lower than 33°C, i.e. it can ensure that the ambient temperature inside the AC drive room is controlled below 40°C after the hot air has passed through the heat sink, which meets the requirements of the AC drive for environmental operation, thus ensuring a good operating

environment inside the AC drive room. The cooling water is completely separated from the circulating air and the water pipeline is clearly separated from the high voltage equipment outside the AC drive room, ensuring that the high voltage equipment room is not subject to safety threats and accidents such as waterproofing and insulation damage. At the same time, because the room is airtight, the AC drive uses the circulating air in the room for equipment cooling, which has the characteristics of low dust level and low maintenance, reducing the adverse impact of the environment on the operational stability of the AC drive power unit cabinet and control cabinet.

b) Air - water cooled conditions

In order to facilitate site selection and application, the following conditions usually need to be met on site:

● The industrial cooling water temperature that can be provided on site is ≤ 33°C and the inlet water pressure that can be provided is between 0.25 MPa and 0.55 MPa, with a return water pressure drop of ≤ 0.1 MPa.

● Able to provide the necessary cooling water, the AC drive air-water cooling system requires a circulating cooling water volume of: heating power (kW): cooling water flow (m^3/h) = 4:1 (single set of air-water cooling system).

● The AC drive needs to be equipped with a separate, airtight house with more than 10 cm of insulation or thermal insulation.

● The house has a clear height of not less than 3.5m and a construction and installation site of not less than 2.0m in width in front or behind the length of the house.

● The site can provide two 380VAC/3PH power supplies with a 6kW power requirement capacity for the AC drive room.

● The cooling water quality requires no suspended matter deposits and a pH value of ≥7.2 on the alkaline side. The cooling water quality requires no suspended matter deposits and a pH value of ≥7.2 on the alkaline side.

c) Selection and configuration principles

For a 4000kW load, for example:

The maximum cooling power of the AC drive is 4,000 x 4% = 160 kW, calculated based on a rated power of 4,000 kW and an operating efficiency of 96%. The air circulation efficiency is close to 99%. Considering the heat generation under the extreme operation condition, as well as the high-water temperature and the system exchange efficiency, the design margin of the air-water cooling device is usually chosen to be 1.15 times to 1.2 times. That is: the heat exchange power of the AC drive air-water cooling device is not less than 184kW/set, and the actual cooling power chosen is 190kW~200kW air-water cooling device.

The formula for calculating the total cooling air volume of each AC drive is: single fan air volume x number of fans. The fan on top of the AC drive cabinet and the fan configured for the air-cooling system are designed as a thermal standby structure. The system uses indoor closed-circulation cooling and the ambient temperature is controlled within 40°C. When the air- and water-cooling device fails or the outdoor ambient temperature is low, the exhaust air of the AC drive can be isolated from the air inlet of the air- and water-cooling device, and the hot air of the AC drive is directly discharged to the outdoors; the temperature of the AC drive room is guaranteed to be below 40°C through external ambient cooling. Thereby, the operating costs of the AC drive are further reduced.

For the cooling water flow rate at the user's site, the empirical estimation is based on a cooling water flow rate of $3m^3/h$~$4m^3/h$ per 10kW of cooling power.

3.1.4 Foundations and Foundation Design

The ACH200 series high voltage AC drive must be installed on a level concrete foundation with a surface unevenness of <5mm; the foundation must be of non-combustible material with a moisture-proof, smooth and non-abrasive surface and able to withstand the weight of the AC drive; the cable ducts must be of non-combustible material with a non-abrasive surface and have measures to prevent moisture, dust and animals from entering. After ordering, the user should carry out construction according to the foundation plan provided by the company.

The design of the foundation should take into account the front and rear access space of the high voltage AC drive and the location of the cooling ducts, as well as the installation and orientation of the high voltage cables for the power supply, the high voltage cables for the drive motor and the system control cables. It is recommended to design the cable trench or cable lead slot underneath the AC drive when designing the foundation (high voltage power, control and signal lines must be separated, otherwise they will affect the use effect), the wiring schematic and wiring requirements are as follows, the specific installation dimensions are detailed in the engineering drawings shipped with the unit.

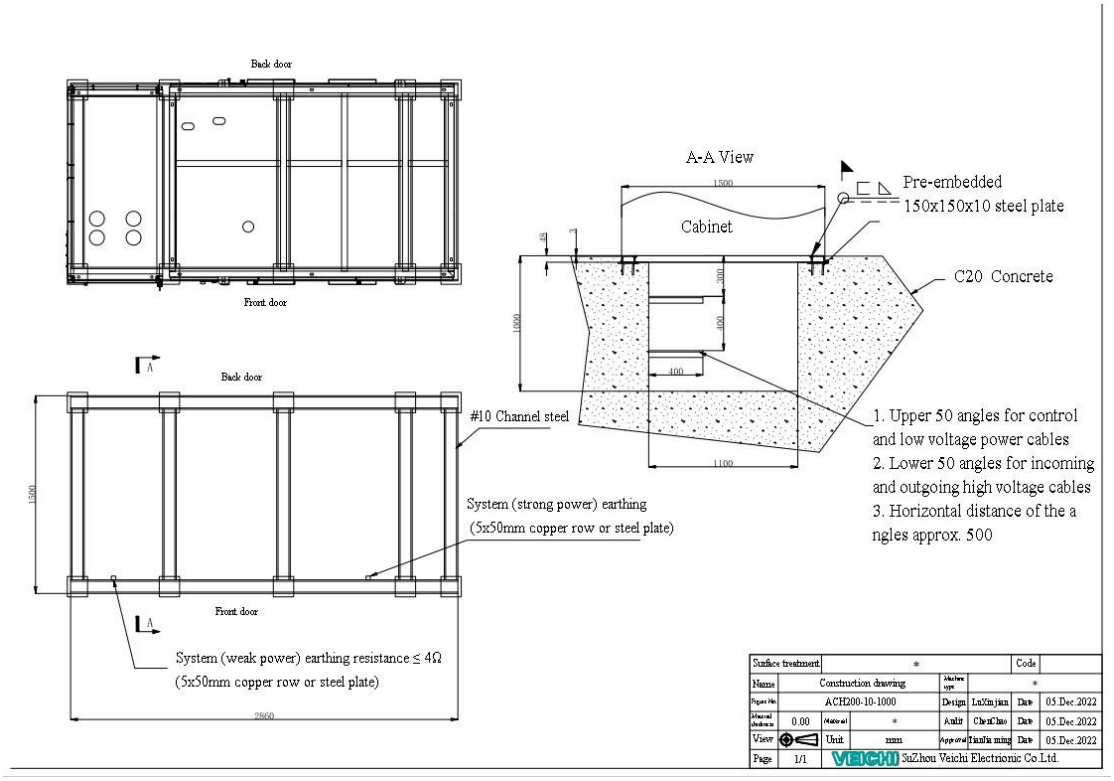


Figure.3-3

Note: High-voltage and low-voltage lines must be strictly separated; cable trenches must be of flame-retardant material, smooth, moisture-proof, dust-proof and protected from small animals.

1) Power cable

- The wiring of the mains and motor cables must comply with local standards and refer to the cable manufacturer's instructions and recommendations.
- For optimum EMC characteristics, individually shielded armoured phase cables are recommended; if single phase cables are used, the three phase cables must be combined to ensure EMC characteristics.
- If the cross-sectional area of the cable shield is less than 50% of the cross-sectional area of one phase, an additional ground wire must be added along the cable to avoid overheating of the cable shield. Please consult your local regulations for details.
- The distance between the layers of cable supports, ladder racks or trays inside the cable trench should meet the requirements for easy laying of cables and their fixing and placement of joints, and for the replacement or addition of any of the cables and their joints in the case of multiple cables placed on the same layer.
- The distance between the layers of cable supports, ladder racks or trays should be greater than 300 mm. the minimum clear distance of the lowermost support from the bottom of the trench should be greater than 100 mm.

● The cables are fixed to the brackets and when installed horizontally, power cables and control cables with an external diameter not greater than 50mm are supported every 0.6m; power cables with an external diameter greater than 50mm are supported every 1.0m. Single-core cables arranged in a square triangle should be tied with ties every 1.0m. For vertical installations, they should be fixed at intervals of 1.0m~1.5m.

● The power and control cables should be installed separately on the two sides of the trench on brackets with a vertical spacing of more than 300 mm. if this is not possible, the power cables should be placed on the brackets above the control cables.

2) Grounding cable

● The grounding cable alignment must comply with the relevant local standards.

3) Control cable

● The control cable should not be routed parallel to the power cable. If this cannot be avoided, a minimum distance of 300 mm must be maintained between the control cable and the mains cable. The control cable and the power cable should be routed in a 90-degree cross.

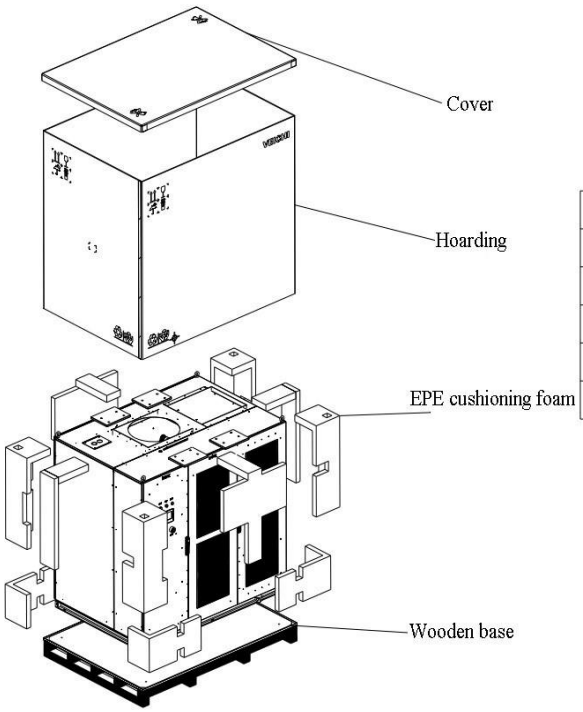
Note:

◆ High voltage cable ends: According to the requirements of the cable manufacturer, cable connectors must be installed at the ends, mainly for power cables, and the cable connectors need to be made by professionals.

3.2 Machine Installation

3.2.1 Packaging

Depending on the ease of logistics and the customer's agreement, we will take wooden boxes or simple packaging for logistics delivery. Whatever the method, we will ensure the safety of our products in transit. If you have any special requirements, please contact us before placing your order.



Step	Operation content
1	Place the product in a flat, open area and prepare an opening tool such as a hobby knife
2	Cut the packing tape on the outer carton with a hobby knife and take the top flap off
3	Peel off the hoarding from the velcro at the side of the hoarding
4	Unscrew the bolts that connect the machine to the wooden stack
5	Removal of EPE cushioning and PE bags etc. from the machine

Figure.3-4

● Definition of wooden crate packaging: a way of packaging in which the whole product is wrapped up in a wooden crate.

Simple packaging: the product has a pallet at the bottom, but the other side only plastic film and other waterproof and dustproof measures of the packaging method (part of the operation site applicable).

3.2.2 Transport

The product can be transported by car, train, ship and other means of transport. The product must be carefully placed during transport, rain and sunshine are strictly forbidden, and there should be no violent shocks, impacts or backwards placement. The temperature during transport should be kept within the range of -40°C to +70°C. The maximum height of the AC drive unit is 2600mm (excluding the fan), and the total height after packaging must not exceed 3000mm. When choosing

the means of transport, please also consider whether there are factors such as height limitation in the transport process.

3.2.3 Carrying

The ACH200 series high voltage AC drives are assembled on site from separate transformer cabinets and separate power cabinets, except for the smaller models which have a one-piece structure. The on-site handling of the cabinets can be carried out in three ways: crane, roller truck and roller bar (for example, the integrated frequency converter cabinet).

1) Cranes:

The base of the frequency conversion cabinet has lifting holes designed for the use of lifting tools, when lifting operations will be installed on the four lifting holes on the front and rear sides of the base, and then the sling (please do not use rope steel) through the buckle, and then use the crane to lift. In the contact part of the sling and the cabinet body place the sling at the bracket fixed at the top of the cabinet, after lifting in place you can choose to remove the bracket at the top of the cabinet and fasten the bolts in place, as shown in Figure 3-5:

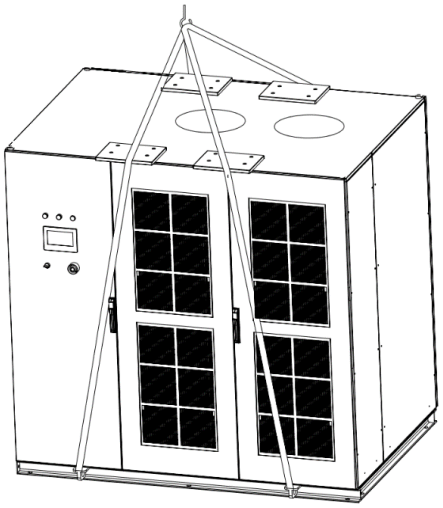


Figure.3-5

2) Rollers:

If a roller trolley is used, the rollers must be placed under the four corners of the cabinet base as shown in the diagram below:

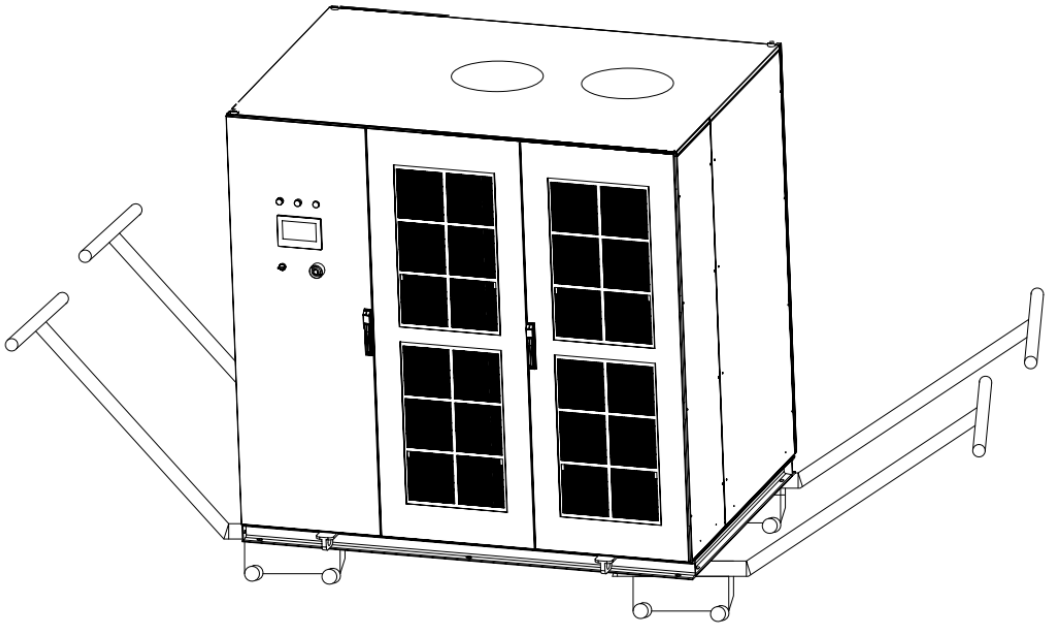


Figure.3-6

3) Rolling bar (recommended):

This is the easiest method. Place several side-by-side rollers on the floor, place the cabinet on top of the side by side rollers and move the rollers in a circular motion for handling. (The length of the roll bar should exceed the thickness of the cabinet; the diameter should not be less than 50 mm and the distance between the roll bars should not be greater than 500 mm).

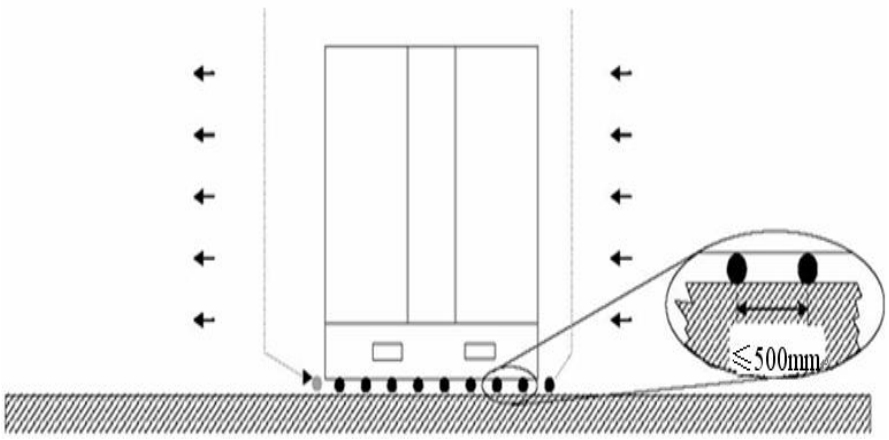


Figure.3-7

3.2.4 Unpacking

If you find any problems with your order or if the product does not meet the specifications you have ordered, please contact the agent who ordered the equipment or contact our nearest office.

1) Check the nameplate of the high voltage variable speed control system to confirm the model

and specification of the equipment you are ordering.

2) Check the appearance for any damage that may have occurred during transport and handling, such as the appearance of the cabinet for damage, the deformation of doors and side panels, and the loss of components inside the cabinet.

3) Open the cabinet door to check the inside of the cabinet, check for loose control cables, flooding, missing or damaged devices.

4) Check the equipment you have ordered against the delivery list to make sure it is complete.

Caution
1) Doors and side panels for paint loss
2) Loose or fallen electrical cables
3) Whether or not the supplied accessories are in good condition
4) Any water damage

3.2.5 Positioning and Fixing

It is recommended that the integrated frequency converter cabinet be mounted on a roll bar to a good channel base.

If there is an optional bypass cabinet, it is mounted in the same way on a well-made channel base and installed alongside the AC drive cabinet (to the left of the AC drive cabinet).

The assembly connection is positioned for levelling and then welded directly to the foundation channel.

The connection lines within and between cabinets should be done under the guidance of our professional staff.

In some cases the power unit, or cabinet top fan, is transported in a separate package and installed under the guidance of our professional staff upon arrival at the destination.

The following installation instructions are for general installation in industrial environments. For applications in special environments, please consult us for detailed installation procedures.

1) Ensure that all the environmental conditions described above are met before proceeding with the mechanical installation.

2) Use a level to check the level of the base. The maximum overall unevenness allowed is <5 mm. if the ground is not level, this will cause the cabinet to deform the cabinet doors to open and close unevenly.

3) If you need to move, please refer to the previous section on handling requirements for high voltage variable speed control systems for handling and moving.

4) Open all cabinet doors and carefully inspect the frequency control system and its accompanying equipment for possible transport damage. If any parts are damaged or missing, please contact our technical service department immediately. Please note the way in which the cabinet doors are opened.
5) Check if the cabinet doors can be opened and closed completely, if not, the cabinet needs to be adjusted. Check the limit switch on the door: after power-up the front door and back door of the cabinet cannot be opened except for the front door of the control cabinet. If the cabinet door is opened illegally the system will alarm.
6) Fine tune the cabinets and fasten the adjacent cabinets using the fastening bolts.
7) Connect the wiring inside the cabinet, as well as install and fix the power unit under the guidance of our professional staff.

Note: Please note the method of opening the cabinet door, do not force the door open, otherwise the unit will be damaged.

3.2.6 Installation of The Cabinet Top Fan

Depending on the model, the ACH200 series high voltage AC drives are fitted with different numbers of fans to allow for heat dissipation. Some models are shipped with the cabinet top fan already installed, some models are shipped with the cabinet top fan in a separate package and need to be installed and fastened by the user on site as shown in the diagram below.

A total of 8 bolts (M6*16) on the left and right edges of the fan, as shown in the diagram below:

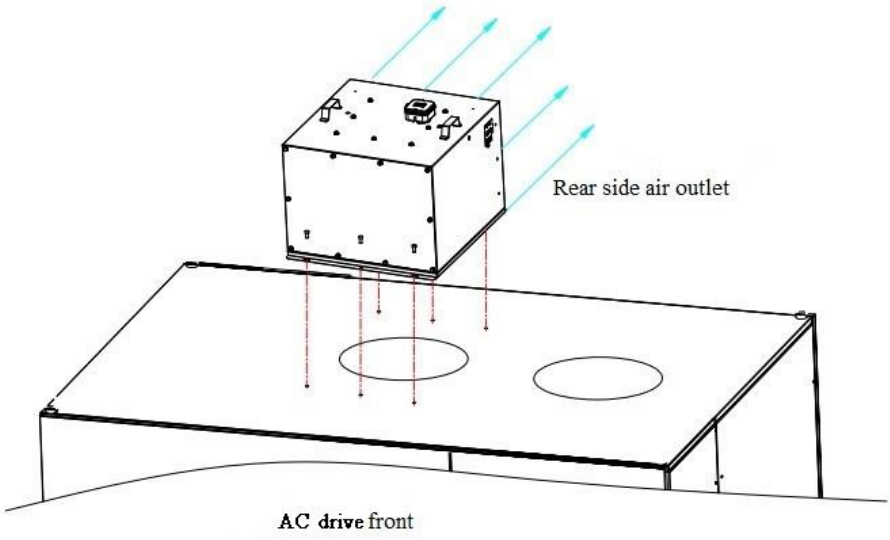


Figure.3-8

3.3 Electrical Installation

3.3.1 Precautions Before Electrical Installation

1) The input and output high voltage cables must be subjected to rigorous voltage resistance testing.
2) Input and output cables must be wired separately to prevent dangerous damage to the insulation.
3) The signal line from the site to the AC drive device should be wired separately from the strong electrical wiring, and the signal line must be stranded, preferably with a shielded line, with one end of the shield reliably grounded.
4) Always ensure that the frequency converter cabinet is reliably connected to the plant ground to ensure personal safety.
5) When the equipment is installed electrically, a special grounding pole should be laid for the control system, requiring a ground resistance of not more than 2 ohms.
6) Before measuring the insulation resistance of the transformer and conducting the frequency withstand voltage test, the transformer and the power unit must be disconnected.

3.3.2 Diagram of The Position of The Outlet Hole of The Complete Machine

In/Out line note:

1) Confirm the location of the respective inlet holes for the high voltage and low voltage power cables, and the low voltage control cables;

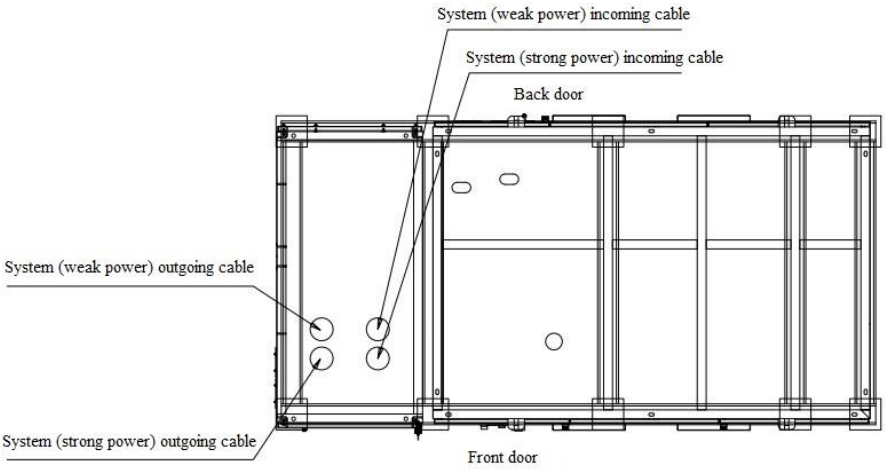
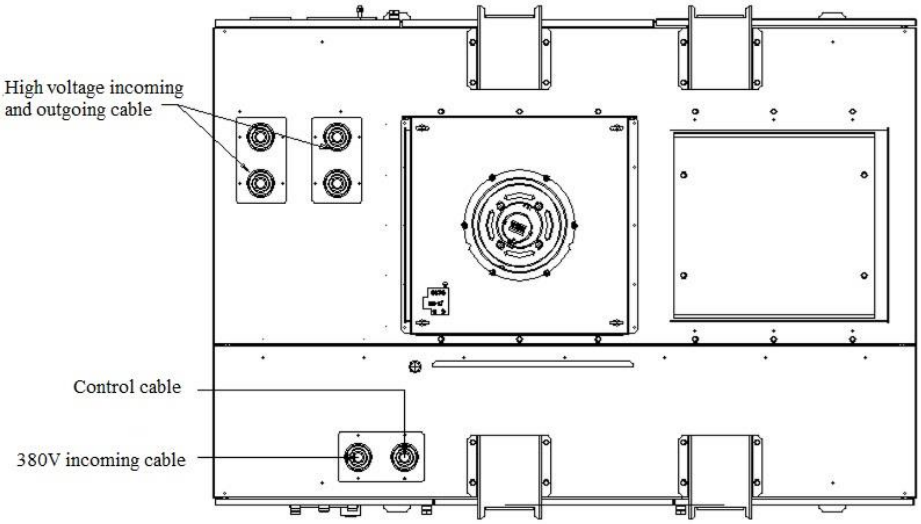


Figure.3-9



Top view of the frequency

Figure.3-10

2) Make sure that power and control cables are strictly separated.

3.3.3 System Grounding

Users must ensure that the grounding resistance is less than 4Ω, grounding with 5mm x 50mm copper row, and will be installed in the foundation channel steel frame under the cable trench, the main grounding point of the high-voltage system is directly connected to the copper row firmly, the copper row and then with the base of each cabinet to do safety grounding, the electronic system signal grounding points converge together and connected to the copper row, as shown in the following figure:

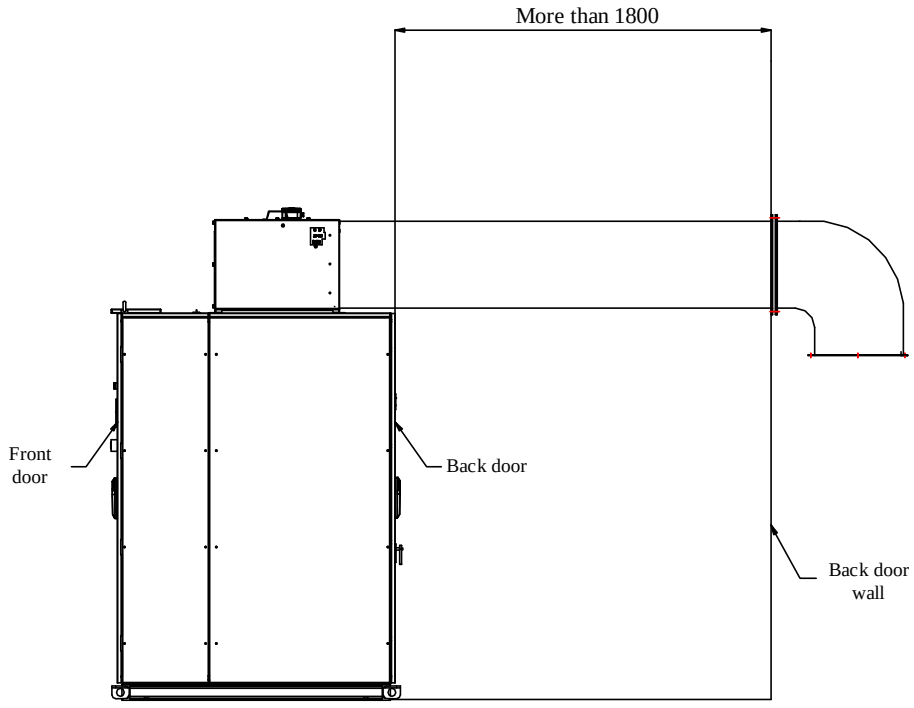


Figure.3-10

3.3.4 Main Circuit Wiring

The high-voltage cable connected to the high-voltage AC drive consists of the input 6kV or 10kV power cable, which should be of the corresponding voltage insulation class (7.2kV or 12kV). Its three phases A, B and C are connected to the corresponding R, S and T terminals of the frequency converter (some series of input terminals are named L1, L2 and L3). The three phases of the AC drive's output to the motor are also high-voltage cables of the corresponding specifications, with terminals named U, V and W, which are directly connected to the motor terminals. The connection of the high-voltage cables should also be noted:

1) Phase sequence requirements for both inputs and outputs;
2) Matching the input voltage to the voltage requirements of the AC drive;
3) The cable diameter and voltage resistance of the input and output shall meet the requirements;
4) High voltage switches on the power supply side should have effective lightning protection measures.

3.3.5 Wiring of the Control Circuit

The ACH200 series high voltage AC drive user I/O interface board provides 8 switch inputs, 8 switch outputs, 4 analogue inputs and 5 analogue outputs (switch and analogue can be extended according to user requirements), while optional relay outputs are supported.

User IO terminal description:

Classification	Terminal	Functional description of the terminal	Technical specification
Switching input	X1	Multi-function input option 1	1. Optocoupler isolated input with COM 2. Input voltage must be 24 V 3. Overhanging terminals indicate disconnection 4. Input impedance: 3.3K 5. Where X8 can be used as a high-speed pulse input terminal
	X2	Multi-function input option 2	
	X3	Multi-function input option 3	
	X4	Multi-function input option 4	
	X5	Multi-function input option 5	
	X6	Multi-function input option 6	
	X7	Multi-function input option 7	
	X8	Multi-function input option 8, for high speed pulse output	
Switching output	Y1	Multifunctional output option 1	1. Optocoupler isolated input with COM 2. Where Y8 can be used as a high-speed pulse output terminal 3. Default weak pull-up to 24V 4. Weak pull-up impedance 12K
	Y2	Multifunctional output option 2	
	Y3	Multifunctional output option 3	
	Y4	Multifunctional output option 4	
	Y5	Multifunctional output option 5	
	Y6	Multifunctional output option 6	
	Y7	Multifunctional output option 7	
	Y8	Multifunctional output option 8 for high speed pulse output	
Relay output	T01	Relay output terminal 1	Each relay has a normally open/normally closed output and the relays have a current carrying capacity of 3A
	T02	Relay output terminal 2	
	T03	Relay output terminal 3	
	T04	Relay output terminal 4	
	T05	Relay output terminal 5	

Classification	Terminal	Functional description of the terminal	Technical specification
	T06	Relay output terminal 6	
	T07	Relay output terminal 7	
	T08	Relay output terminal 8	
High-speed pulse input	HDI	High-speed pulse input terminal (common X8 terminal)	1. Optocoupler isolated input with COM 2. Input voltage must be 24 V 3. Overhanging terminals indicate disconnection 4. Input impedance: 1.1kΩ
High speed pulse output	HDO	High-speed pulse output terminal (common Y8 terminal)	1. Optocoupler isolation 2. Maximum output frequency 50.000kHz
Analogue input	AI1	Analogue input terminal 1	1. Loop connection to GND 2. The recommended input voltage is +10V, which comes with the AC drive speed control system 3. Range of -10V to +10V for external input voltage 4. In case of current input, the current range is 0mA to 20mA, where 20mA current corresponds to +10V 5. 20kΩ impedance for voltage input; 500Ω impedance for current input
	AI2	Analogue input terminal 2	
	AI3	Analogue input terminal 3	
	AI4	Analogue input terminal 4	
Analogue output	AO1	Analogue output terminal 1	1. Output voltage and current relative to GND terminal 2. Output voltage range 0V~+10V, output current range 0mA~20mA 3. For voltage output, the allowable output impedance is ≧5kΩ, for current output, the allowable output impedance is 100Ω~5000Ω
	AO2	Analogue output terminal 2	
	AO3	Analogue output terminal 3	
	AO4	Analogue output terminal 4	
	AO5	Analogue output terminal 5	
24V power supply	+24V	The system comes with its own 24V power supply for the digital inputs as well as the high-speed pulse inputs	--
	COM	24V power supply common	--

The layout of the user IO board is shown below:

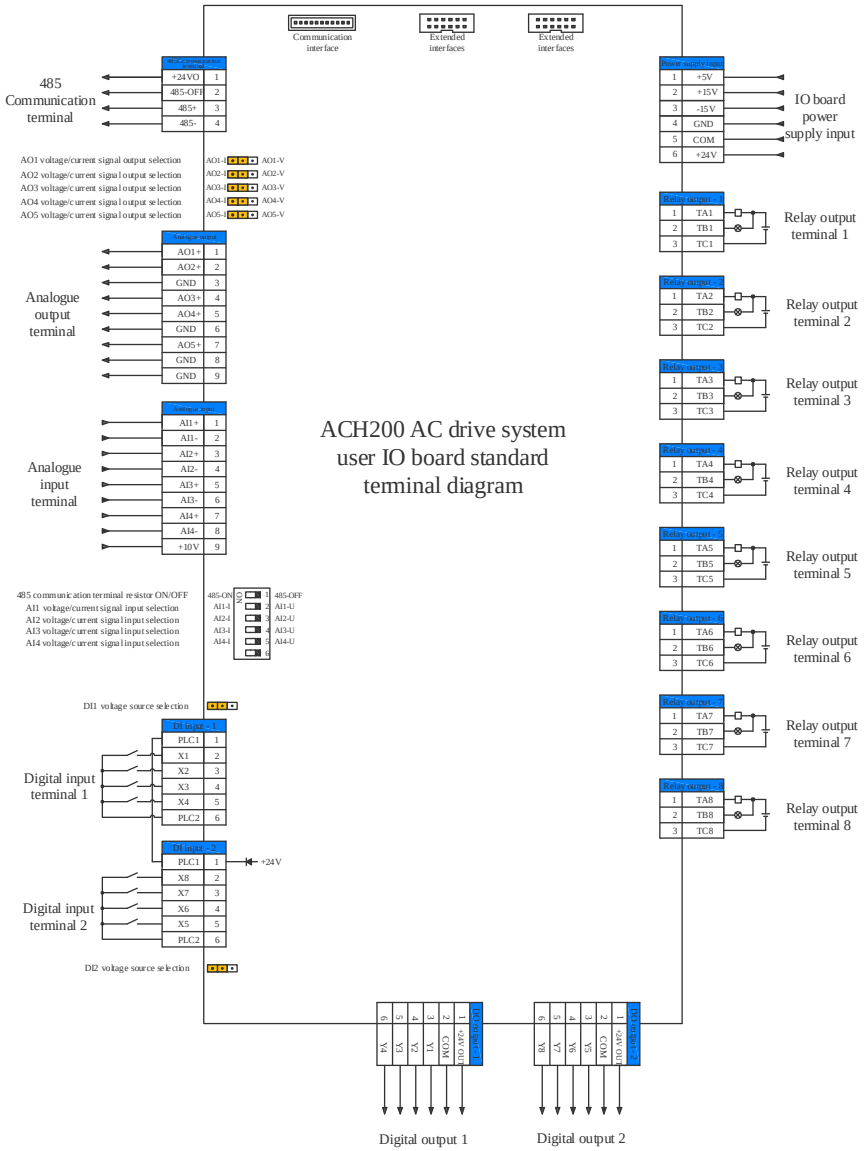


Figure.3-11

Chapter 4 System Commissioning and Operation

4.1 Commissioning process

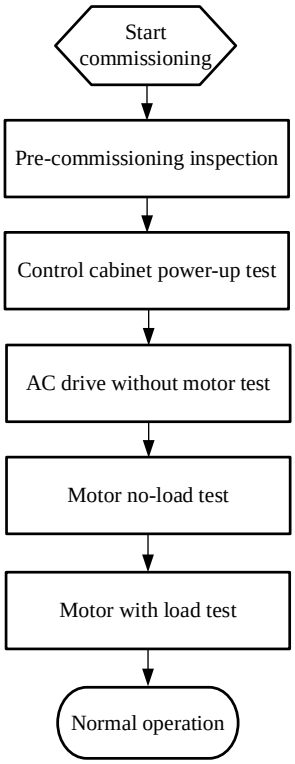


Figure.4-1

4.2 Commissioning Caution

Dangerous

1) The variable frequency speed control system is a high-voltage dangerous equipment, any operator must strictly comply with the operating procedures when operating.

2) After the installation of the equipment, reasonable parameters have been set, without the permission of the manufacturer, please do not modify and set the system parameters at will.

3) When the system is powered on, the control system should be powered on first, and the high-voltage closing signal should be closed only after the high-voltage "closing permission" is given.

4) When the AC drive is running, please do not open the cabinet door and wiring operation to

avoid danger.

5) Do not operate on the touch screen without training.

4.3 Pre-commissioning and Operation Inspection

Cautions
1) Ensure that there are no strange objects inside the cabinet. 2) Make sure there is no water damage inside or outside the cabinet. 3) Check all cables to ensure that no conductors are exposed due to abrasions or other improper transportation, and that there is no water damage. 4) Ensure that the cabinet is reliably connected to the factory floor to ensure personnel safety 5) Ensure that all user wiring is correct and tightened. 6) Make sure the wiring of the high voltage AC drive is correct and the doors of the electrical cabinets are closed as required before turning on the power, do not open the cabinet doors after the power is turned on.

Chapter 5 AC drive Operating Instructions

5.1 Pre-operation Preparation

Cautions
1) The input voltage should be within the allowable range of -15% to +10%. 2) The sequence of power on and power off should follow: when starting, close the control power first, then close the high voltage power; when stopping, after the motor stops, then disconnect the high voltage power, then disconnect the control power. 3) In the operation, the user should monitor the load operation at any time, and should stop in time when abnormal conditions occur, and emergency stop when necessary. 4) There should be no abnormal electromagnetic interference in the vicinity of the AC drive installation site. 5) The site operator must be trained and familiar with the structure of the equipment, and master the operation process, safety regulations and precautions. 6) High voltage operation procedures must be observed during maintenance, such as wearing insulated gloves, insulated shoes, safety glasses, etc. 7) Prohibit single person operation and maintenance on site. 8) Safety fence must be set up (marked with "high voltage danger") and must not be removed during use. 9) Do not put flammable materials (including equipment engineering drawings and manuals) near the AC drive. 10) When handling or measuring the AC drive components, please do not let the various signal and control lines short each other or touch other terminals. 11) Do not run when the cabinet door is open or open the cabinet door during operation, otherwise it will cause personal safety accidents. 12) Do not stop the cooling fan operation before disconnecting the high voltage, otherwise it will cause the equipment to overheat and may damage the equipment. 13) When performing maintenance or replacing the power unit, the cabinet door must be opened only after the AC drive has been disconnected from high voltage for more than 10 minutes (please refer to the AC drive cabinet door sign for the specific time), and make sure the unit power light is off before operation, because the AC drive is disconnected internally. 14) Dangerous high voltage may still exist for a short period of time after high voltage.

15) After the commissioning of the AC drive system is completed, its operating parameters have been set, non-professional personnel please do not modify without permission, otherwise it may cause abnormal shutdown or equipment failure.

5.2 Cabinet Door Buttons and Switches Description

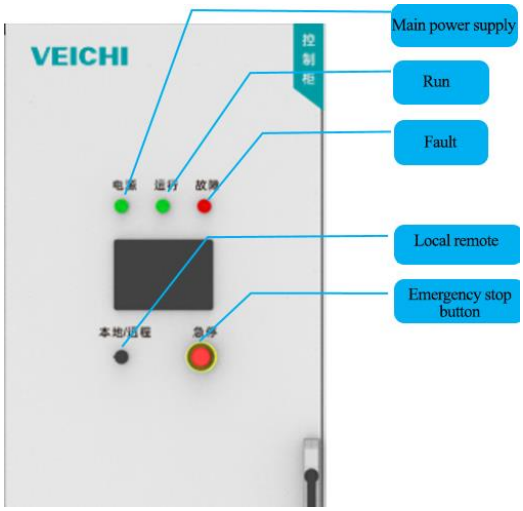


Figure.5-1

Name	Description
Main power indicator	If this light is on, the high voltage input is normal
Run indicator	If the light is on, the AC drive is running
Fault indicator	If the light is on, the AC drive is faulty
Local remote button	The switch is used for local and remote control switching of the AC drive
Emergency stop button	When an emergency fault occurs in the system, the user can minimize the damage by pressing this emergency stop button to make the AC drive no output and jump the upper high voltage switch in parallel.

5.3 AC drive Speed Regulation System Control Method

AC drive speed regulation system control method

Switchgear control methods, including "local" and "remote" type.

1) AC drive local control

When the switchgear is controlled locally, the control command is controlled by the local display, which mainly controls the start and stop of the AC drive, while the frequency setting is selected through the display.

2) Remote DCS control of AC drive

When the switchgear is controlled remotely, the control command is controlled by the remote terminal, which mainly controls the start/stop of the AC drive. And the frequency setting mode is selected by the display.

5.4 Operation Mode of AC drive Speed Control System

1) Open-loop operation

After the system is ready, if there is a start command, the high-voltage AC drive speed control system will start from the shutdown state according to the acceleration time provided by the system, and finally run according to the frequency set by the user. That is, the frequency of AC drive operation is only controlled by the personnel unilaterally.

2) Closed-loop operation

If closed-loop operation mode is selected in the parameter setting, the high-voltage AC drive speed control system will operate in closed-loop mode after starting. In the closed-loop mode, the user can set the desired value of the controlled quantity (pressure, etc.), and the high-voltage frequency conversion speed control system will automatically adjust the motor speed according to the actual value of the controlled quantity and the PID parameters set by the system, so that the actual value of the controlled quantity automatically follows the desired value.

3) Normal shutdown

During the operation of the variable frequency drive, as long as the external shutdown command is issued, the high voltage variable frequency drive speed control system can be shut down according to the shutdown mode set by the parameters.

4) Emergency shutdown

In any case, the "Emergency Stop" button on the local panel is valid. When the system receives the emergency stop command or a fault occurs, the pulse will be blocked immediately, the system will stop freely and the vacuum contactor of the system switch cabinet will be disconnected at the same time, only if there is no emergency stop command, the contactor inside the system switch cabinet can be closed and the AC drive can start.

If an emergency stop is needed to disconnect the user's high voltage, set the multi-function output terminal in the touch screen to "superior switch disconnect request".

5.5 Alarm Release and Fault Reset

1) Alarm release

The system provides an audible and visual alarm when a fault occurs. The user can click the "Alarm Release" button to clear the sound of the alarm. If an alarm occurs and the high voltage frequency control system is in operation, the system will continue to operate. If a new alarm occurs after clicking "Alarm Release", the system will reactivate the audible and visual alarms.

2) Fault reset

When a fault occurs in the system, it can be reset by pressing the fault button on the touch screen. If the fault still exists after the reset, and the fault is still the original fault, the fault needs to be dealt with in time, otherwise the AC drive will not start.

5.6 Normal Operation Procedure of Variable Frequency Speed Control System

Before using the ACH200 high voltage variable frequency speed control system, please be sure to read this section carefully to ensure that all operations will not affect the safety of the operator and the equipment. When the system is in shutdown and needs to be started up for operation, especially for the 1st start-up, the following steps should be followed:

◆ Local control, Digital given, Open-loop operation

1. Check the status of contactors and circuit breakers and various connections. Check the bypass cabinet to confirm that KM1, KM2 and KM3 vacuum contactors are completely disconnected; check the control cabinet to confirm that the control board connections, including the fiber optic part of the interface are reliably connected. Check that all miniature circuit breakers in the control cabinet are in the disconnected position (the circuit breakers in the control cabinet can be disconnected without repeatedly starting after operation).

2. Power on the control circuit. Close all the circuit breakers in the control cabinet to determine the system control power supply is normal.

3. Wait for the LCD touch screen to enter the main operation interface to ensure that there are no faults.

Figure.5-2

4. Enter the parameter setting interface for parameter setting. Select "Local Command Source" as the command source, and "Digital Given" as the frequency source, without closed loop mode.

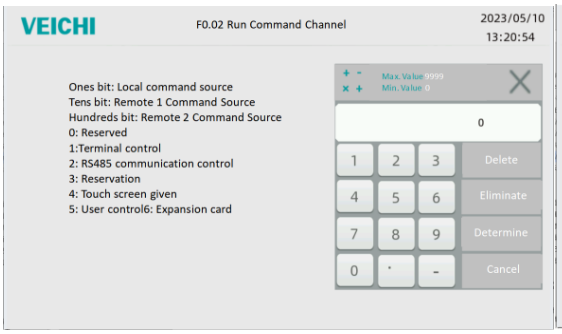


Figure.5-3

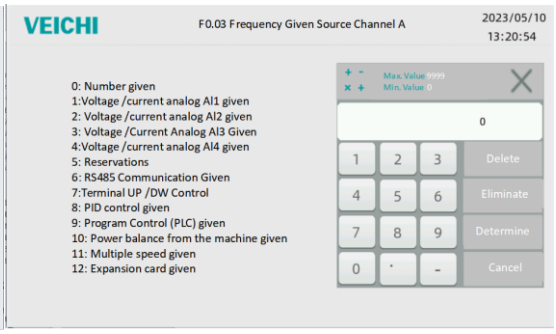


Figure.5-4

5. Press the " AC drive Closing Button" and wait for KM1 and KM2 to close (can be judged by the indicator light).

6. Notify the user to apply high voltage power to the AC drive (determine whether there is high voltage power to the system by the charged indicator on the cabinet door).

7. Press the start button on the control cabinet door. At this time, the motor will start according to the pre-set way. At the same time, the "Run" indicator on the control cabinet door should be lit; the output voltage, output current and output frequency change values are displayed on the HMI screen.

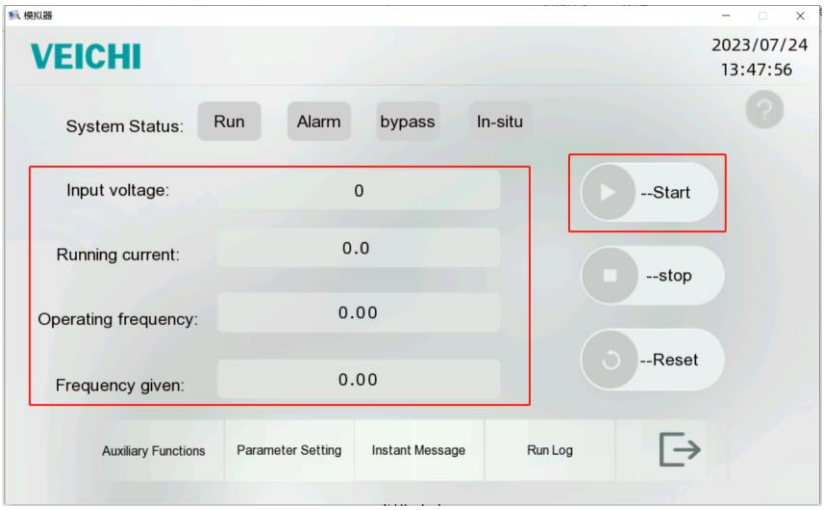


Figure.5-5

8. When the normal operation of the motor needs to change the speed, you can click on the main interface "Frequency given", set the required frequency, set the corresponding value, the target frequency is modified, the system will start to adjust the frequency.

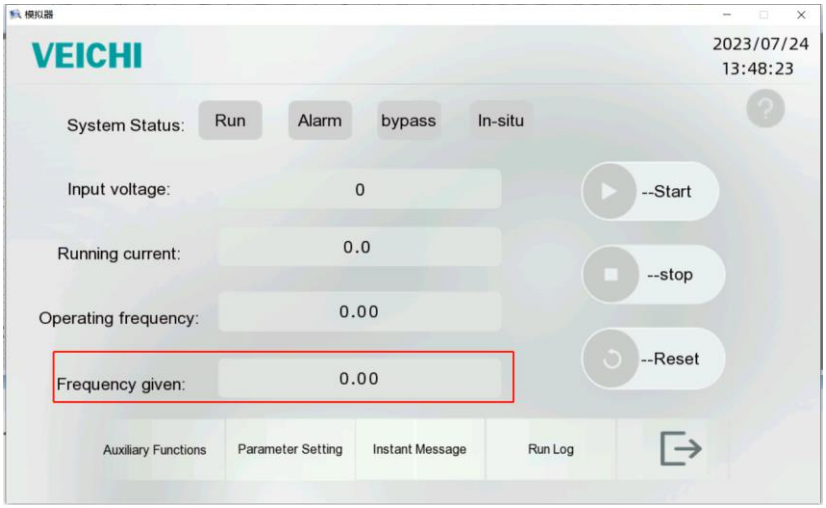


Figure.5-6

9. Press the " Stop button" on the control cabinet door when you need to stop, then the motor will stop in the specified way. Or " Emergency Stop" button will stop the motor and disconnect the high voltage vacuum contactor of the bypass cabinet.

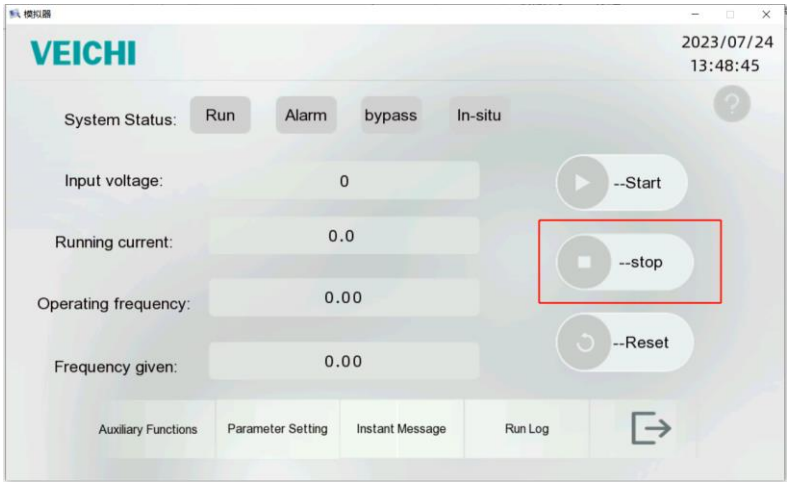


Figure.5-7

◆ Remote communication control, Digital given, Open-loop 0peration

1. Check the status of contactors and circuit breakers and various connections. Check the bypass cabinet to confirm that KM1, KM2 and KM3 vacuum contactors are completely disconnected; check the control cabinet to confirm that the control board connections, including the fiber optic part of the interface are reliably connected. Check that all miniature circuit breakers in the control cabinet are in the disconnected position (the circuit breakers in the control cabinet can be disconnected without repeatedly starting after operation).

2. Power on the control circuit. Close all the circuit breakers in the control cabinet to determine the system control power supply is normal.

3. Wait for the LCD touch screen to enter the main operating interface, to ensure that there is no fault.

4. Enter the parameter setting interface for parameter setting. Select "Remote Command Source" for the command source, "RS485 communication source" for the frequency setting source, and no closed loop mode.

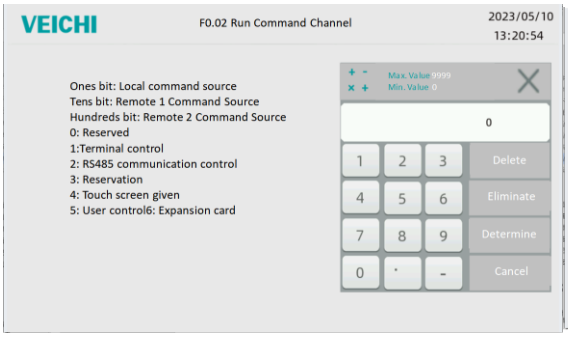


Figure.5-8

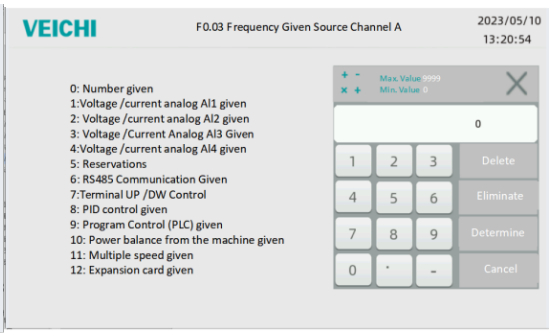


Figure.5-9

5. Press the "AC drive Close Button" and wait for KM1 and KM2 to close (can be judged by the indicator).

6. Inform the user to apply high voltage power to the AC drive (determine whether there is high

voltage power to the system through the charged indicator of the cabinet door) and wait for the system to issue the " Ready" signal.

7. Press the start button at the remote host computer. At this time, the motor will start according to the pre-set way. At the same time, the upper computer will receive the AC drive " Run" signal; and the output voltage, output current and output frequency change value will be displayed on the HMI screen.

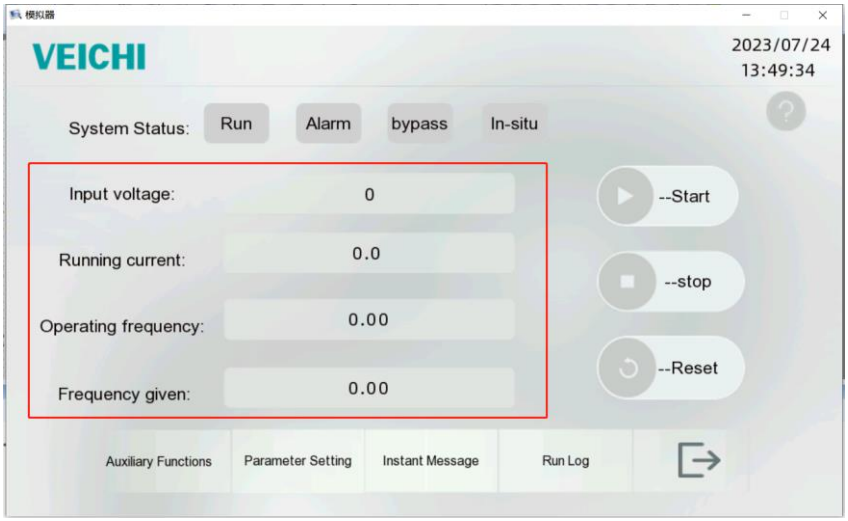


Figure.5-10

8. When the frequency needs to be changed, change the frequency given by the upper computer, and press the frequency save button of the upper computer.

9. When you need to stop the motor, press the " Stop" operation knob at the upper computer, then the motor will stop in the specified way. Or " Emergency stop" button will stop the motor and disconnect the high voltage vacuum contactor in the bypass cabinet.

◆ Remote communication control, Analog given, Open-loop operation

1. Check the status of contactors, circuit breakers and various connections. Check the bypass cabinet to confirm that KM1, KM2 and KM3 vacuum contactors are completely disconnected; check the control cabinet to confirm that the control board connections, including the fiber optic part of the interface are reliably connected. Check that all miniature circuit breakers in the control cabinet are in the disconnected position (you do not need to disconnect the circuit breakers in the control cabinet for repeated start-ups after operation). Connect the analog signal (4mA-20mA) to the Freq channel of the external terminal.

2. Power on the control circuit. Close all circuit breakers in the control cabinet to make sure the system control power is normal.

3. Wait for the LCD touch screen to enter the main operation interface to make sure there is no fault.

4. Enter the parameter setting interface for parameter setting. Command source select "Remote

Command Source", frequency source selects "Voltage/Current Analog Input", no closed loop mode.

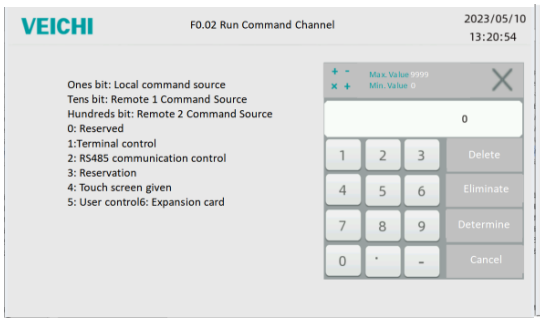


Figure.5-11

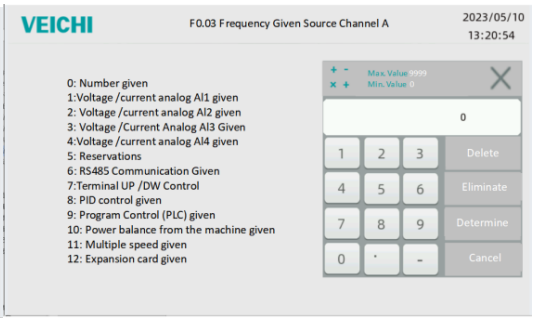


Figure.5-12

5. Press the "AC drive Close Button" and wait for KM1 and KM2 to close (can be judged by the indicator).

6. Inform the user to apply high voltage power to the AC drive (determine whether there is high voltage power to the system through the charged indicator of the cabinet door) and wait for the system to issue the " Ready" signal.

7. Press the start button at the remote host computer. At this time, the motor will start according to the pre-set way. At the same time, the upper computer will receive the AC drive " Run" signal; and the output voltage, output current and output frequency change value will be displayed on the HMI screen.

Figure.5-13

8. When the motor needs to change the speed in normal operation, adjust the analog given frequency channel signal so that the target frequency can be adjusted.

9. When stopping, press the " Stop" operation knob at the upper computer, then the motor will stop in the specified way. Or " Emergency stop" button will stop the motor and disconnect the high voltage vacuum contactor in the bypass cabinet.

Chapter 6 Touch Screen Display and Operation Examples

6.1 Monitoring Interface

The monitoring interface is shown in Figure.6-1, which is divided into two main areas, the system status display area and the system data display area.

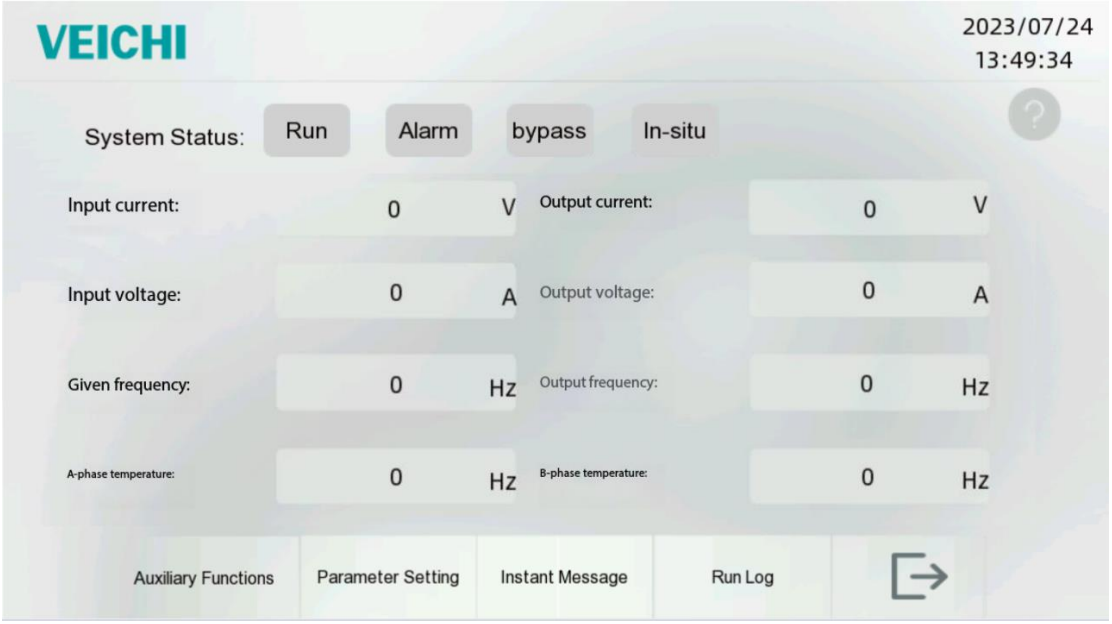


Figure.6-1

Note: This interface is the initial state monitoring interface, only used to monitor the system status and real-time data display of the system operation; if you need to change the given frequency, you need to click , first enter the login interface.

6.2 Login Interface

The login screen is shown in Figure.6-2, in which you can select operator, administrator and manufacturer.

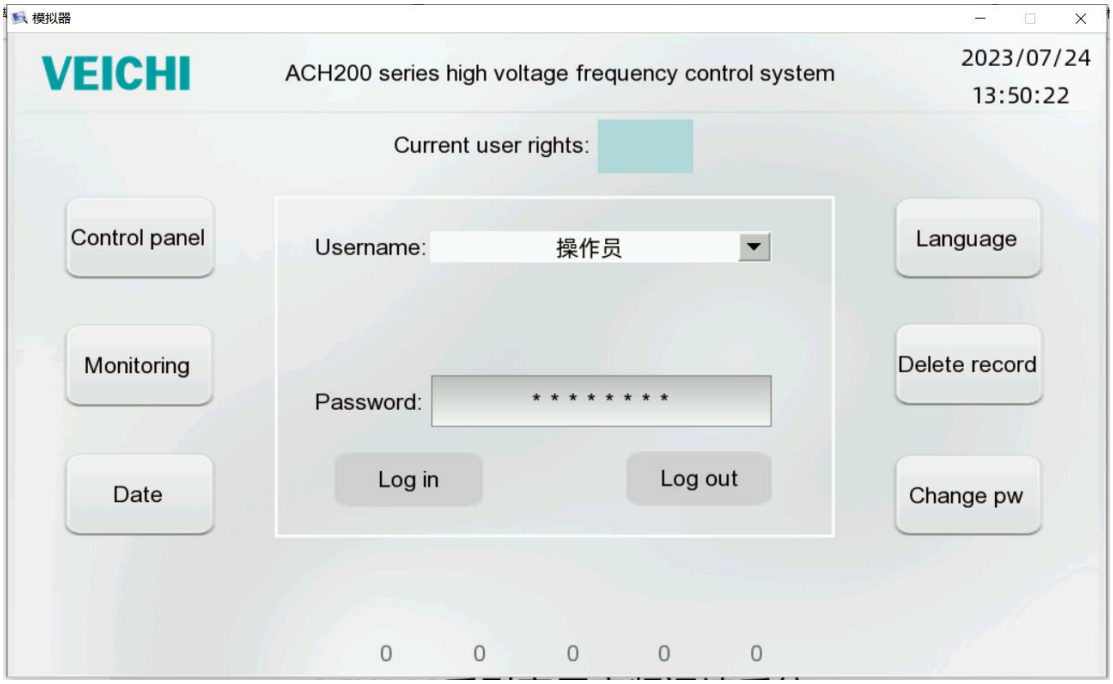


Figure.6-2

Note: Only enter the corresponding password to enter the corresponding interface, select operator, enter the corresponding password ******, the control panel will light up, click the control panel to enter the main interface; select administrator, enter the corresponding password ******, all the keys of the login interface will light up, click the control panel to enter the main interface; select manufacturer, enter the corresponding password ******, all the keys of the login interface will light up, click the control panel to enter the main interface; if no one touches this interface to operate, it will automatically jump back to the monitoring interface after 10s.

6.2.1 Control Panel

After logging in the corresponding user, click Control panel to enter the main interface, which can be operated by: operator, administrator, and manufacturer.

You can refer to Figure.6-3

6.2.2 Monitoring Screen

After logging in to the corresponding user, click Monitoring to enter the monitoring screen, you can view the current relevant operation information and can operate by: operator, administrator, manufacturer.

You can refer to Figure.6-1

6.2.3 Date & Time

After logging in the corresponding user, click Date to enter the Modify Date and Time screen, which allows you to correct the current time, and can be operated by: administrator, manufacturer. The screen is as follows:

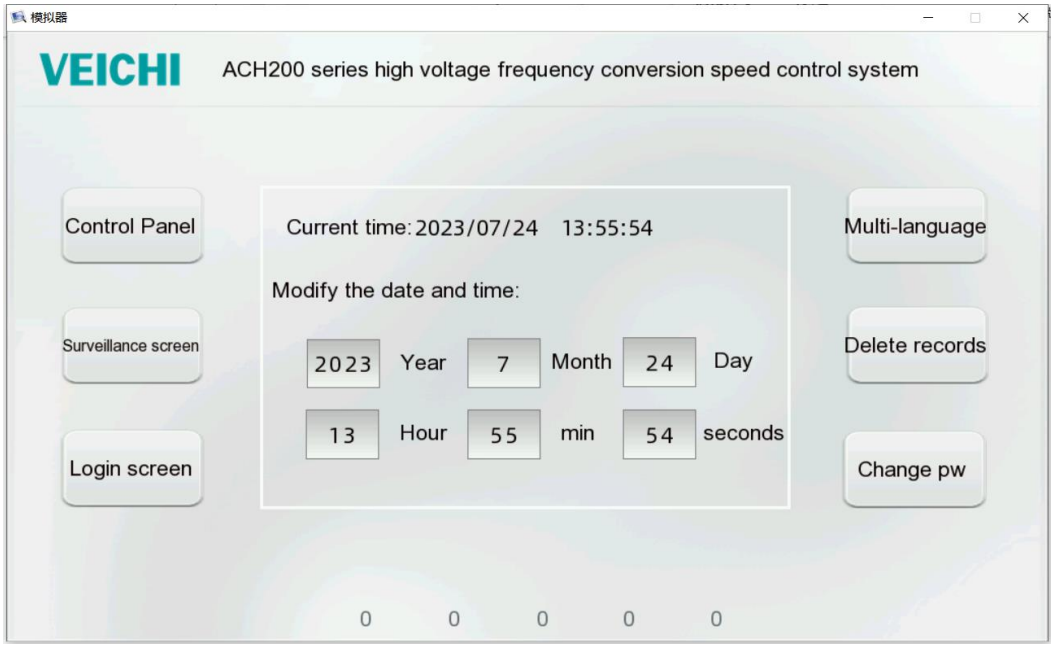


Figure.6-3

6.2.4 Multi-language

After logging in the corresponding user, click Multi-language to enter the language switch screen, you can switch the current language used, currently can support: Chinese, English, Russian. Operators: Administrators, manufacturers. The screen is as follows:

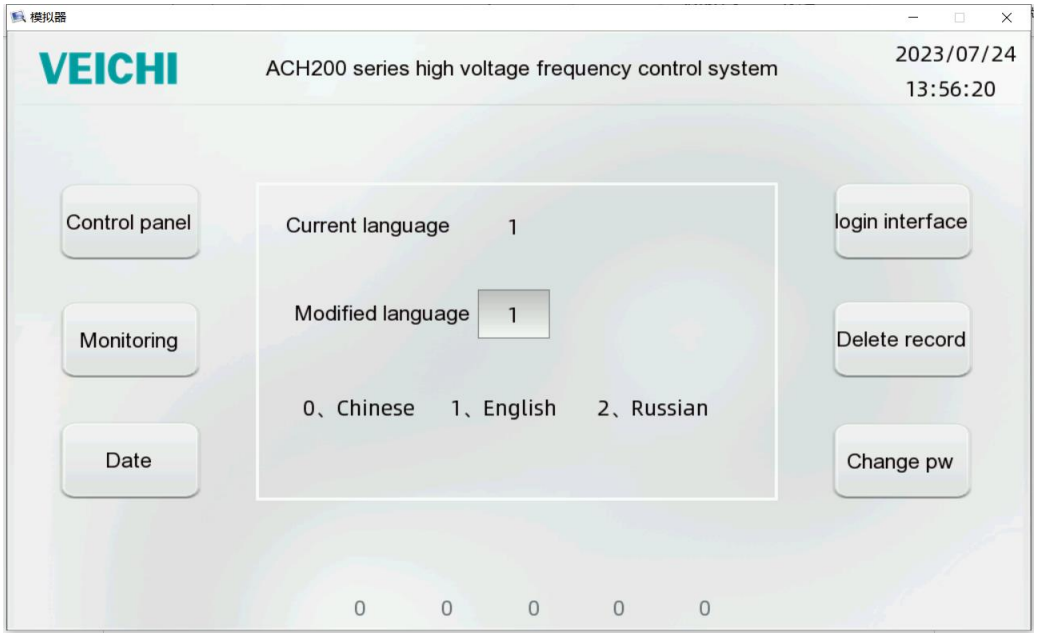


Figure.6-4

6.2.5 Delete Records

After logging in the corresponding user, click Delete record , you can delete the earlier related operation records or failure records, operator: administrator, manufacturer.

6.2.6 Modify Password

After logging in to the corresponding user, click 

, and enter the Change User Password screen, where you can change the password of the relevant user. Can be operated by: Manufacturer. The screen is as follows:

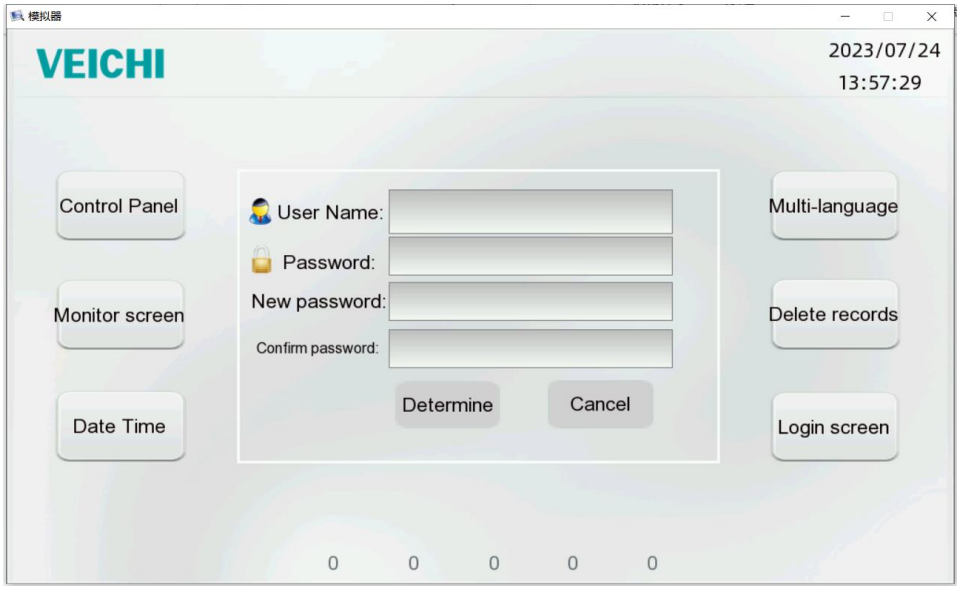


Figure.6-5

6.3 Home Screen

The Home screen is shown in Figure. 6-6, which can set the frequency and start/stop of the system.

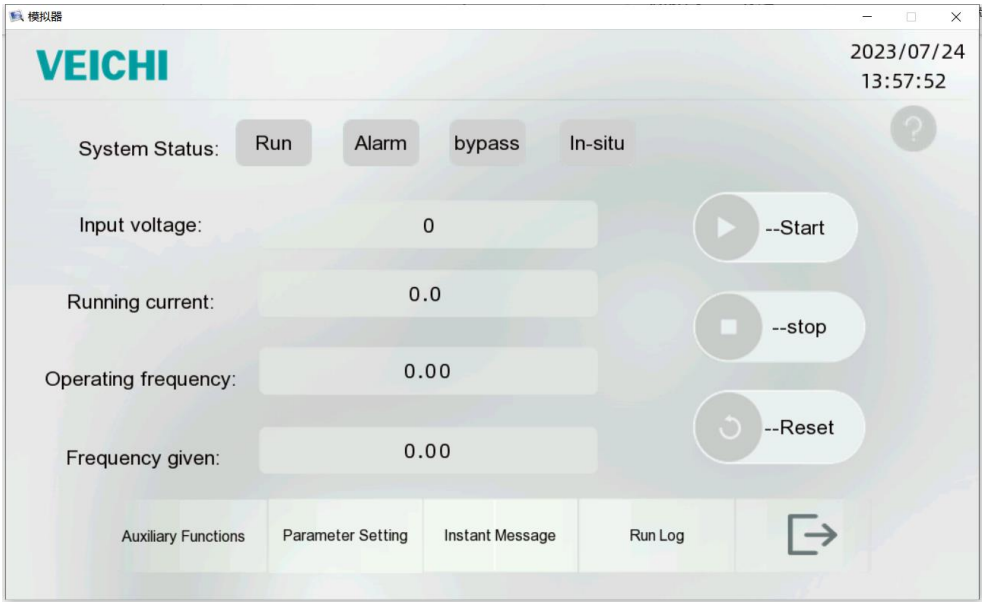


Figure.6-6

Note: Frequency setting, system startup, stop, and reset can be performed on this interface. Click the "" button in the upper right corner to enter the corresponding help instructions on this interface. According to this help prompt, you can quickly get started and operate. Click the "" button on this interface to directly return to the monitoring interface. The operator can only operate these, and other functions such as auxiliary functions, parameter settings, instant messages, and operation logs only have monitoring permissions. The administrator has no right to change any other parameters or operate any other buttons. However, they can click on some buttons to enter the next interface and modify and adjust the corresponding parameters.

6.4 Auxiliary Functions

The auxiliary function can have three modes for selection, which are: frequency conversion, mains frequency, and cut off high voltage power. When switching to frequency conversion, you can select forward jog, reverse jog, and reverse operation. The screen is as follows:

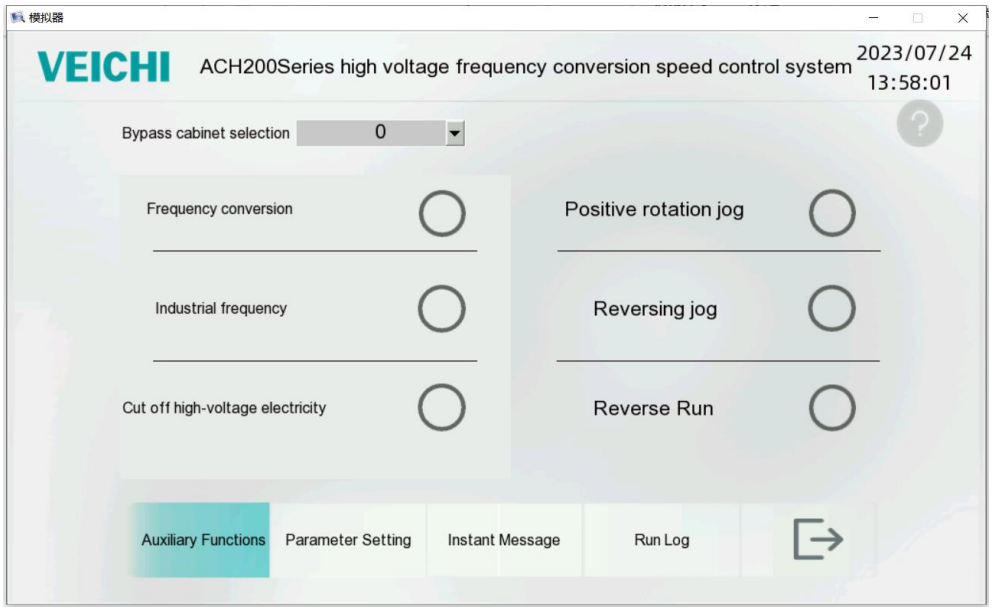


Figure.6-7

6.5 Parameter Setting

The parameter setting interface is shown in Figure.6-8. This interface allows the setting of parameter groups.

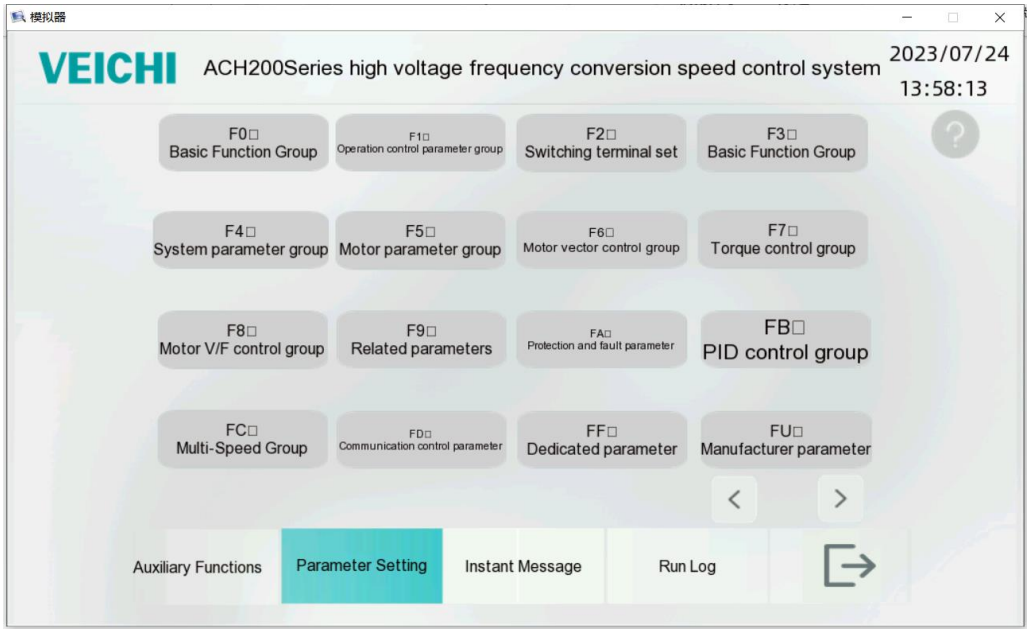


Figure.6-8

Note: In this interface, you can click on the corresponding parameter group for function and parameter setting debugging, detailed steps are as follows:

1. Click F0: Basic function parameter group, a pop-up window will appear as follows:

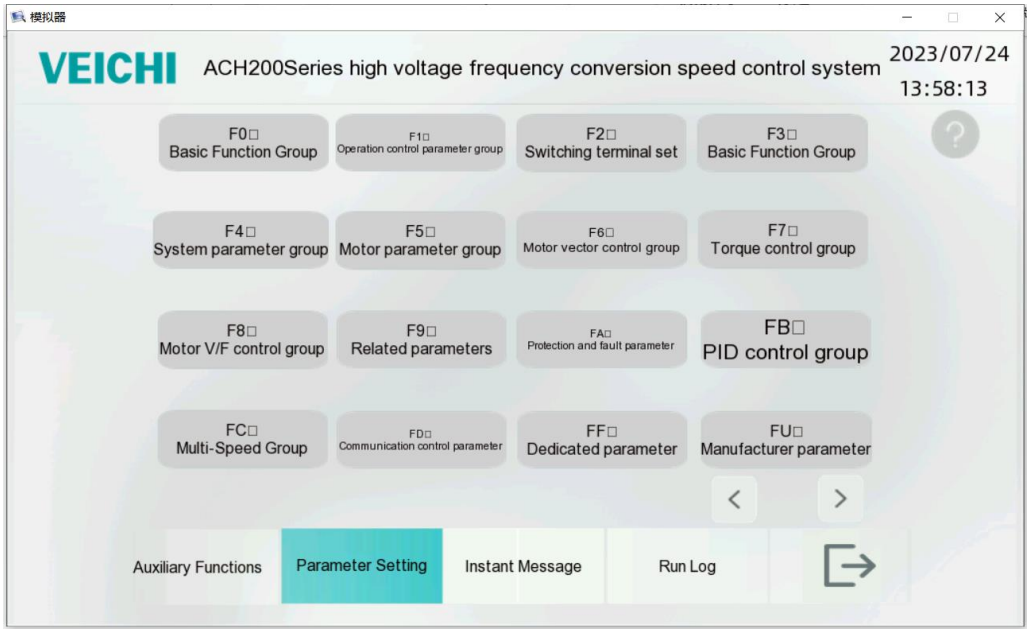


Figure.6-9

The left side is the function code of all parameters in F0 group, the middle is the range of set value, the right side is the definition of set value, the set value is divided into ten hundred thousand bits, click on the set value can be set directly, the definition of the corresponding value will be displayed at the right end, as shown in Figure.6-10 and Figure.6-11:

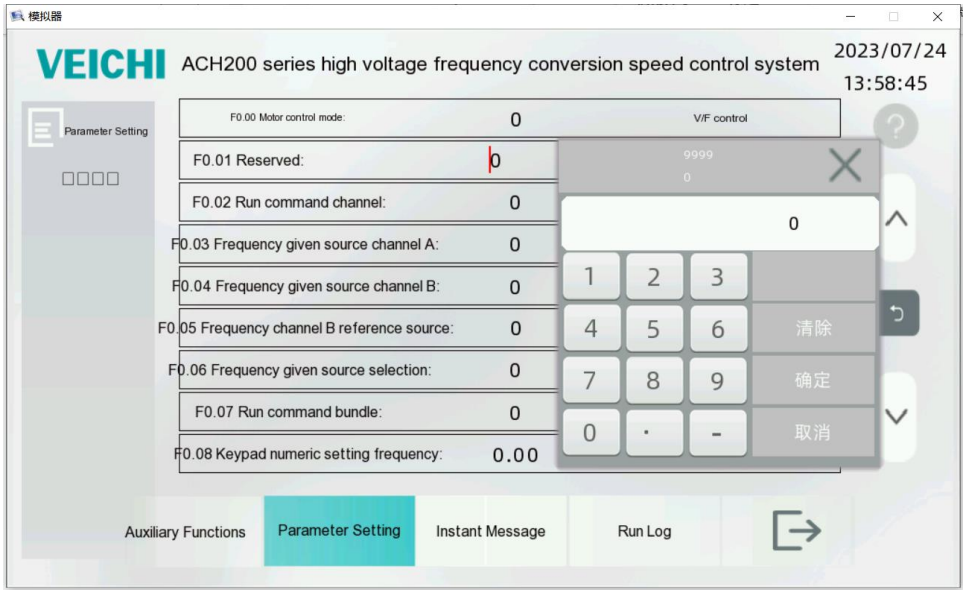


Figure.6-10

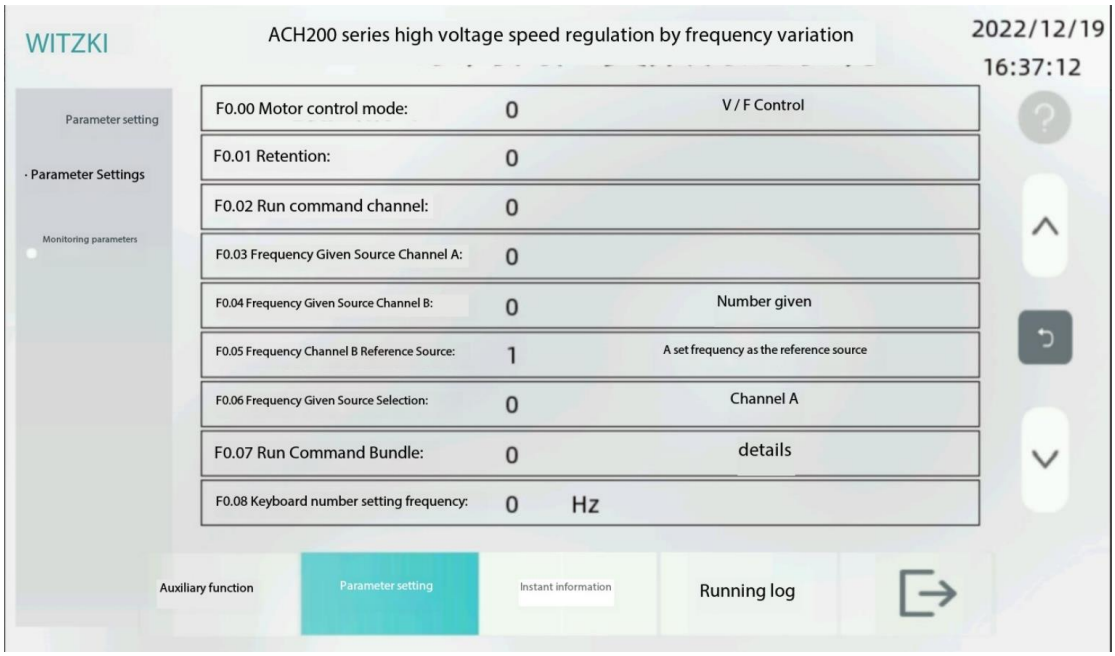


Figure.6-11

If the definition name is long and cannot be directly displayed, details will be displayed. Click on the details to view the complete definition name, as shown in Figures 6-12 and 6-13:

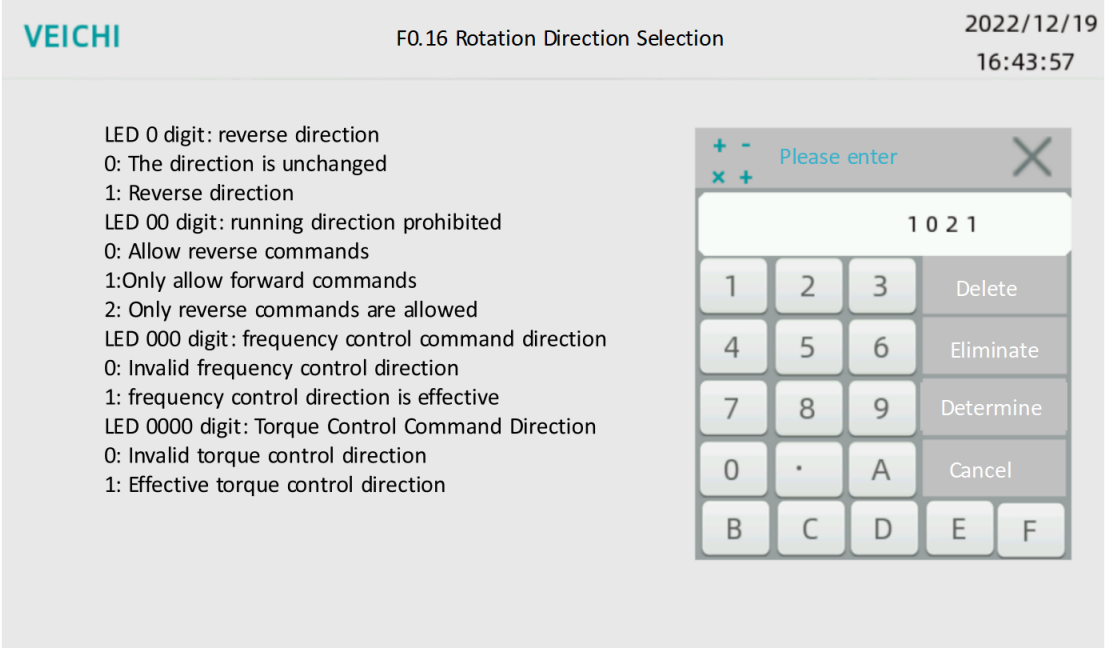


Figure.6-12

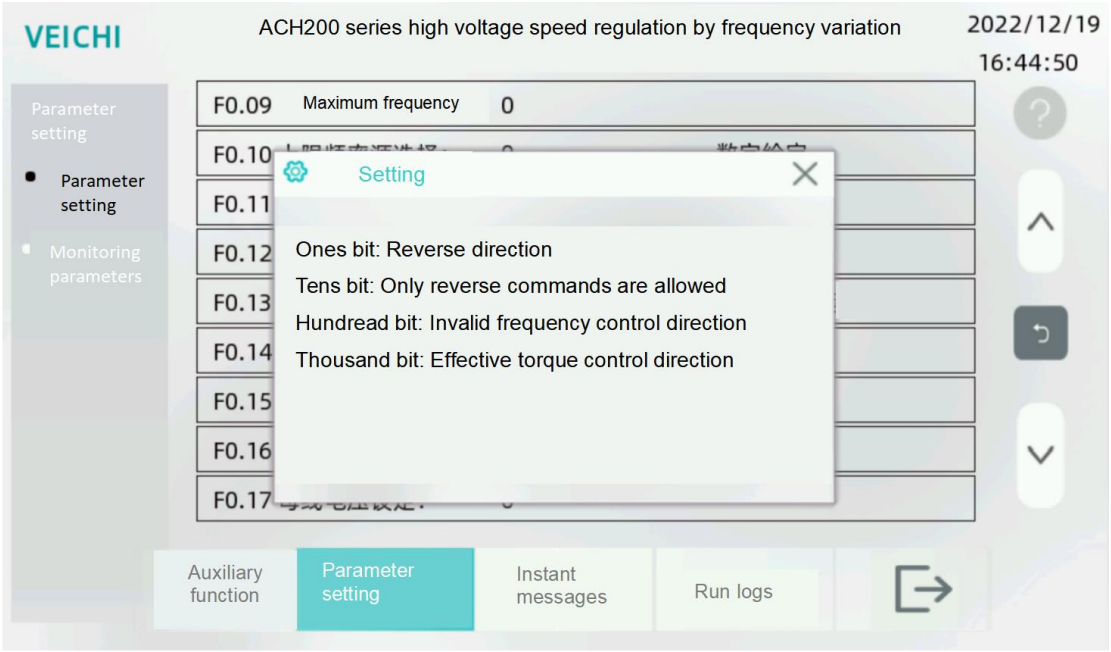


Figure.6-13

6.6 Instant Information

The instant information interface is shown in Figure.6-14. This interface can be used to monitor the real-time data of the current system operation status, including operation information, unit information, external IO, internal IO, bypass cabinet, etc., as shown in Figure.6-14 to Figure.6-18:

6.6.1 Operation Information

Display some parameters currently running. The screen is shown below:

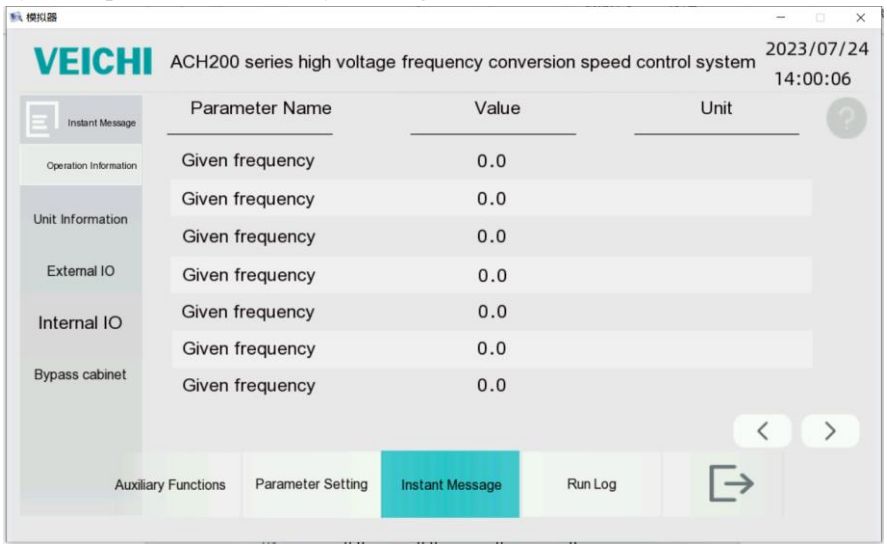


Figure.6-14

6.6.2 Unit Information

Displays the status information of the current unit. The screen is as follows:

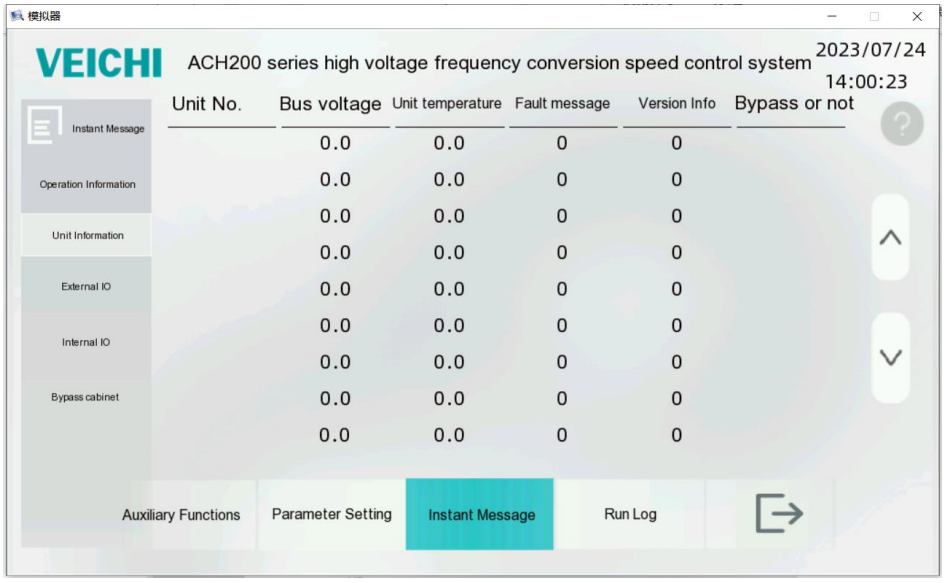


Figure.6-15

6.6.3 External IO

Display the function and status of the current IO. The screen is shown below:

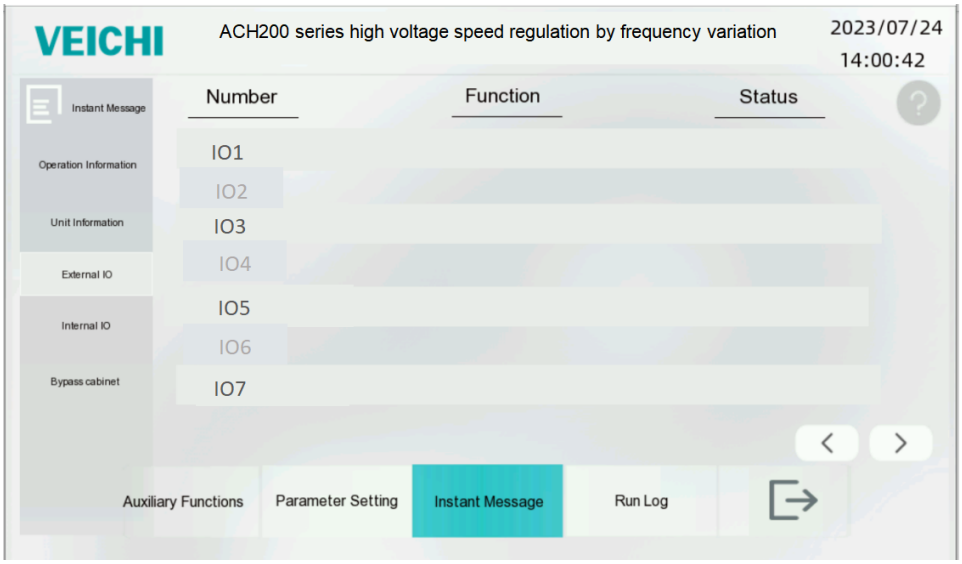


Figure.6-16

6.6.4 Internal IO

Displays the function and status of the current IO. The screen is as follows:

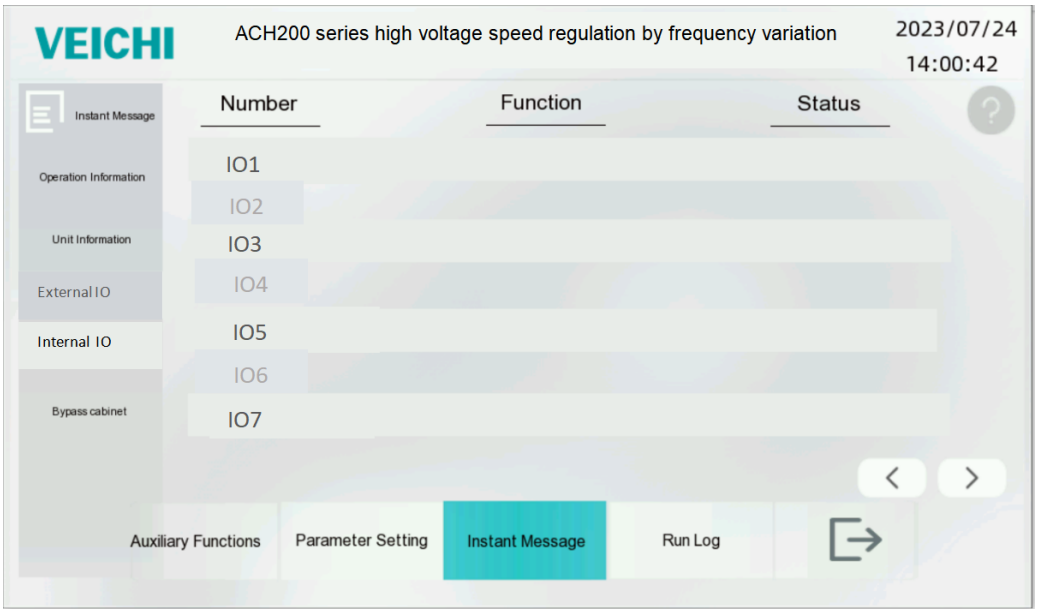


Figure.6-17

6.6.5 Bypass Cabinet

The function and status of the four bypass cabinets are displayed. The screen is as follows:

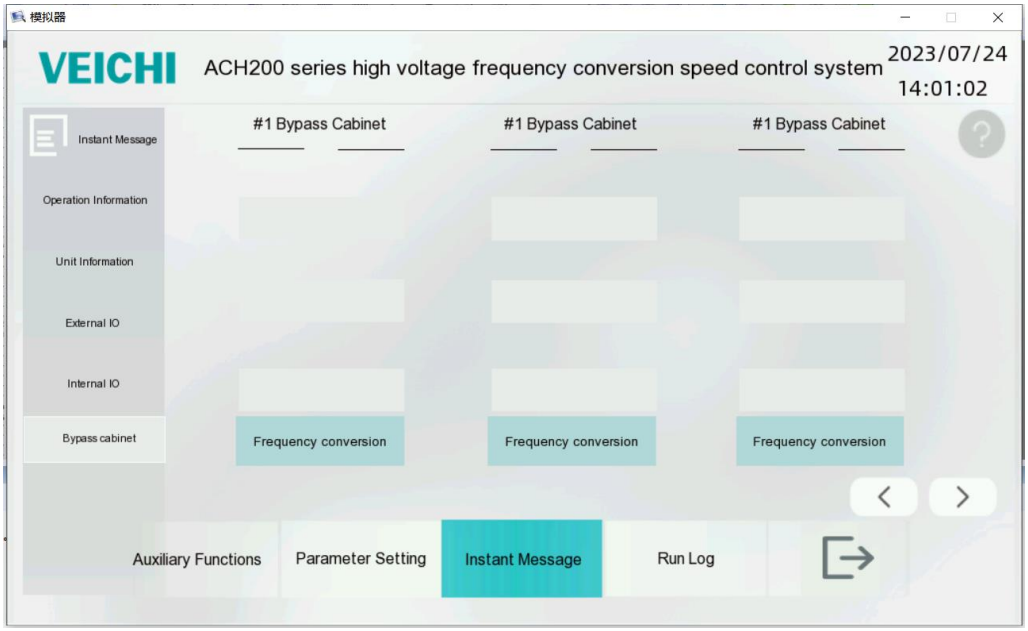


Figure.6-18

6.7 Running Log

The running log interface is shown in Figure.6-19. This interface can monitor and find running records, operation records, alarm records, fault records, etc., as shown in Figure.6-19 to Figure.6-22.

6.7.1 Running Records

After entering the running records screen, the HMI opens the running list by default. Each time the records are sampled: record date, record time, given frequency, running frequency, input voltage, input current, output voltage, output current, torque, and every time after a certain time, the next running record is collected.

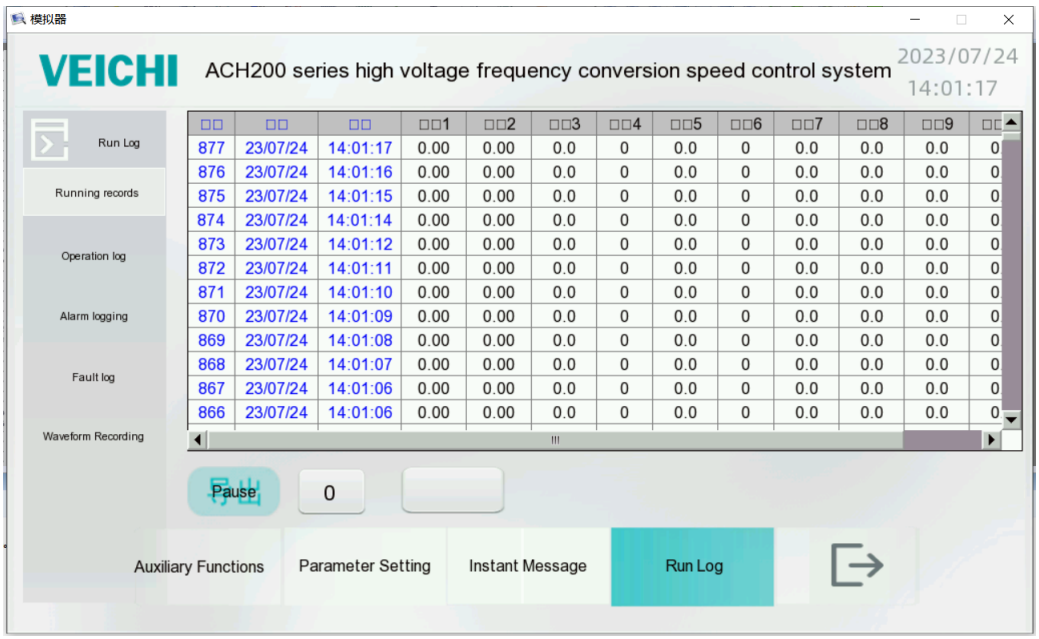


Figure.6-19

6.7.2 Operation Record

After entering the operation record screen, HMI opens the operation list by default, and each record sampling has: operation number, operation date, operation time, operation instruction, and each relevant AC drive operation is recorded once.

Figure.6-20

6.7.3 Alarm Record

After entering the alarm record screen, HMI opens the alarm list by default, and each sampling record has: alarm date, alarm time, alarm content, and the alarm is recorded once for each warning triggered by the AC drive.

Figure.6-21

6.7.4 Fault Record

After entering the fault record screen, HMI opens the fault list by default, and each sampling record has: fault name, fault value, and one record for each fault that triggers the AC drive.

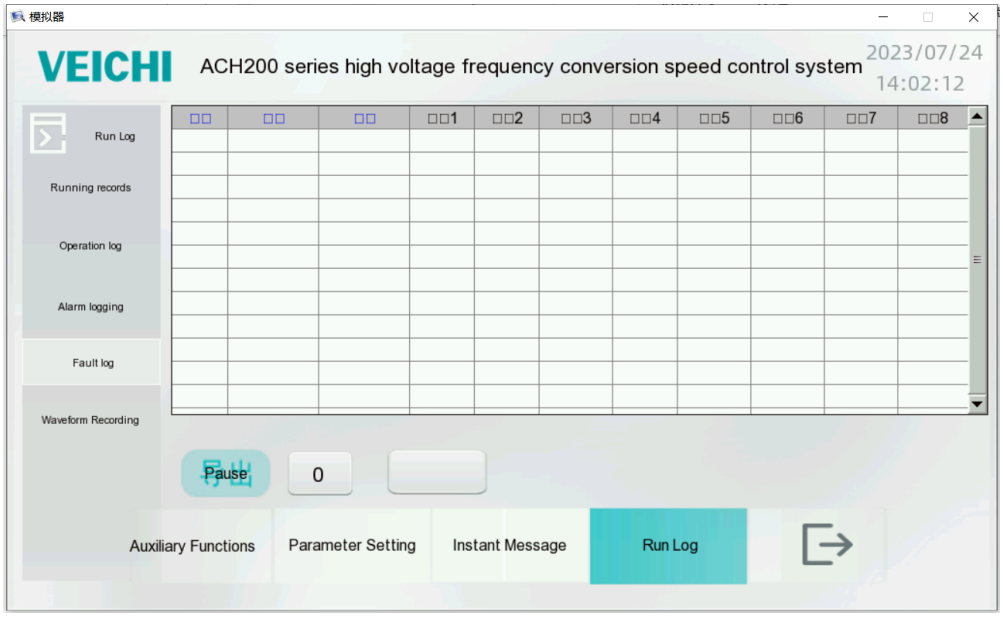


Figure.6-22

Chapter 7 Modbus Communication Protocol

ACH200 series AC drive is equipped with RS485 communication interface as standard, and master-slave communication using international standard Modbus communication protocol. Users can realize centralized control (setting AC drive control commands, operating frequency, modification of relevant function code parameters, monitoring of AC drive operating status and fault information, etc.) through PC/PLC, host computer, master AC drive, etc. to meet specific application requirements.

7.1 Rules of Communication

The MODBUS communication format is shown in the table below.

Project	Description
Interface	RS485 (RS232 interface requires additional RS232/RS485 converter)
Synchronization method	Asynchronous
Communication frames	Baud rate:1200、2400、4800、9600、19200、38400、57600bps
	Data length: 8-bit (fixed)
	Check: odd, even, none
	Stop bit: 1-bit (fixed)
Communication protocols	Modbus protocol (RTU (mode) only)

Note: ACH200 series only supports RTU mode.

7.2 Information Format

In RTU mode, a new frame starts with a transmission time pause interval of at least 3.5 bytes. The data fields transmitted immediately afterwards are, in order: slave address, operation command code, data and check word, and at the completion of the last byte transmission, another transmission time pause interval of at least 3.5 bytes indicates the end of the frame. the RTU data frame format is shown in the figure below.

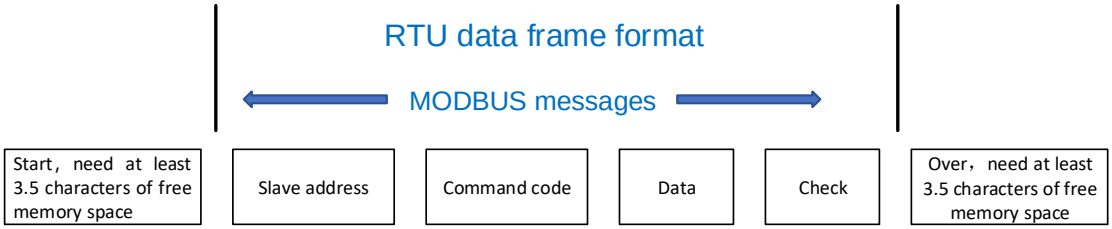


Figure.7-1

7.2.1 Slave Address

Please set the value of 0~247 (Decimal). When the slave address is set to 0, the host sends in a broadcast mode, and all slaves receive instructions.

For broadcast transmission, the slave station does not send response information to the master station.

7.2.2 Command Code

Command Code	Function
03H	Read slave parameters
06H	Write slave parameters

7.2.3 Data

The number of the AC drive parameter code and the data corresponding to the parameter code are combined into a series of data, including reading the data of the parameter code or a specific address, writing data to the parameter code or a specific address, etc.

7.2.4 Check

The standard Modbus communication uses two error detection methods, where parity is used to check each character and CRC detection is used to check a frame of data.

1. Parity check

The user can configure the controller to be odd or even parity, or no parity. This will determine how the odd or even parity bits are set in each character.

If odd or even parity is specified, the number of "1" bits will count towards the number of bits in each character (7 data bits in ASCII mode, 8 data bits in RTU). For example, the RTU character frame contains the following 8 data bits: 1 1 0 0 0 1 0 1, the whole number of "1's" is 4.

If even parity is used, the parity bit of the frame will be 0, so the whole number of "1's" will still be 4. If odd parity is used, the parity bit of the frame will be 1, and the number of "1s" will be 5.

If no parity bit is specified, no parity bit is transmitted, and no parity detection is performed. Instead of the additional stop bits, they are filled in the character frame to be transmitted.

2. CRC-16 (Cyclic Redundancy Check)

Using the RTU frame format, the frame includes a frame error detection field calculated based on the CRC method. the CRC field detects the content of the entire frame. the CRC field is two bytes and contains a 16-bit binary value. It is calculated by the transmitting device and added to the frame. The receiving device recalculates the CRC of the received frame and compares it with the value in the received CRC field. If the two CRC values are not equal, then there is an error in the transmission.

The CRC is first deposited into 0xFFFF and then a procedure is called to process more than 6 consecutive bytes in the frame with the value in the current register. Only the 8Bit data in each character is valid for CRC, the start and stop bits and the parity bits are invalid.

During CRC generation, each 8-bit character is individually dissociated with the register content (XOR), and the result is shifted in the direction of the least significant bit, with the highest significant bit filled with 0. The LSB is extracted and detected, and the register is individually dissociated with the preset value if the LSB is 1, or not performed if the LSB is 0. The whole process is repeated 8 times. After the last bit (bit 8) is completed, the next 8-bit byte is again individually dissociated with the current value of the register. The final value in the register is the CRC value after all the bytes in the frame have been executed.

This calculation method of CRC adopts the international standard CRC check rule. When editing the CRC algorithm, users can refer to the CRC algorithm of the relevant standard and write a CRC calculation program that really meets the requirements.

7.3 Communication Frame Structure

The communication data format is as follows:

Composition of bytes: including start bit, 8 data bits, parity bits and stop bits.

Start Bit	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	Check	Stop

The information of a frame must be transmitted in one continuous stream. If the interval time before the end of the entire frame transmission is more than 1.5 bytes, the receiving device will clear this incomplete information and incorrectly assume that the subsequent byte is the address field portion of the new frame. Similarly, if the interval between the beginning of a new frame and the previous frame is less than 3.5 bytes time, the receiving device will consider it as a continuation of the previous frame and, due to the misalignment of the frame, the final CRC check value will be incorrect, which causes a communication error.

7.4 Communication Instructions

Read slave parameter command code: 03H, reads N words (Word), and can read up to 20 consecutive words.

For example, if the AC drive with slave address 01H and memory start address 2100H ([C-00]) reads 3 consecutive words, the structure of the frame is described as follows:

RTU master command information:

START	3.5 bytes transmission time
Slave address	01H
Command code	03H
Start address high bit	21H
Start address low bit	00H
Number of data high bit	00H
Number of data low bit	03H
CRC CHK low bit	0FH
CRC CHK high bit	F7H
END	3.5 bytes transmission time

RTU slave response information (when normal):

START	3.5 bytes transmission time
Slave address	01H
Command code	03H
Number of bytes low	06H
Data address 2100H high bit	13H
Data address 2100H low bit	88H
Data address 2101H high bit	00H
Data address 2101H low bit	00H
Data address 2102H high bit	00H
Data address 2102H low bit	00H
CRC CHK low bit	90H
CRC CHK high bit	A6H
END	3.5 bytes transmission time

RTU slave response information (when normal):

START	3.5 bytes transmission time
Slave address	01H
Command code	83H
Error code	04H
CRC CHK low bit	40H
CRC CHK high bit	F3H
END	3.5 bytes transmission time

Write slave parameter command code: 06H, writes a word data (Word) to the specified data address, which can be used to modify the AC drive parameter value.

For example, write 5000 (1388H) to the 3000H address of the slave address 1 AC drive. Then the structure of the frame is described as follows:

RTU master command information:

START	3.5 bytes transmission time
Slave address	01H
Command code	06H
Write data address high bit	30H
Write data address low bit	00H
Data content high bit	13H
Data content low bit	88H
CRC CHK low bit	8BH
CRC CHK high bit	9CH
END	3.5 bytes transmission time

RTU slave response information (when normal):

START	3.5 bytes transmission time
Slave address	01H
Command code	06H
Write data address high bit	30H
Write data address low bit	00H
Data content high bit	13H
Data content low bit	88H
CRC CHK low bit	8BH
CRC CHK high bit	9CH
END	3.5 bytes transmission time

RTU slave response information (when abnormal):

START	3.5 bytes transmission time
Slave address	01H
Command code	86H
Error code	01H
CRC CHK low bit	83H
CRC CHK high bit	A0H
END	3.5 bytes transmission time

Loop self-test command code: 06H, sending back the same slave response information as the master command information, used to detect whether the signal transmission between the master and the slave is normal, the detection code and data can be set arbitrarily, the detection code has nothing to do with the parameter address of the AC drive.

For example, 5000 (1388H) is written to the 0000H detection code of the slave address 1 AC drive. Then the structure of the frame is described as follows:

RTU master command information:

START	3.5 bytes transmission time
Slave address	01H
Command code	08H
Detection code high bit	00H
Detection code low bit	00H
Data high bit	13H
Data low bit	88H
CRC CHK low bit	EDH
CRC CHK high bit	5DH
END	3.5 bytes transmission time

RTU slave response information (when normal):

START	3.5 bytes transmission time
Slave address	01H
Command code	08H
Detection code high bit	00H
Detection code low bit	00H
Data high bit	13H
Data low bit	88H
CRC CHK low bit	EDH
CRC CHK high bit	5DH
END	3.5 bytes transmission time

RTU slave response information (when abnormal):

START	3.5 bytes transmission time
Slave address	01H
Command code	88H
Error code	03H
CRC CHK low bit	06H
CRC CHK high bit	01H
END	3.5 bytes transmission time

7.5 Communication Control Parameter Group Address Description

ACH200 series function parameter address representation rules.

The address of the register is the function parameter serial number of the AC drive, which is divided into two parts: high byte and low byte. The high byte indicates the group serial number where the functional parameter is located, and the low byte indicates the group serial number of the functional parameter, which needs to be converted to hexadecimal.

The high byte of the address field is defined as follows:

Parameter group code number	Parameter address of this group
F0 Basic parameter group	0x00xx(No deposit EEPROM) 0x10xx(Deposit EEPROM)
F1 Operation control parameter group	0x01xx(No deposit EEPROM) 0x11xx(Deposit EEPROM)
F2 Switching terminal parameter group	0x02xx(No deposit EEPROM) 0x12xx(Deposit EEPROM)
F3 Analog terminal parameter group	0x03xx(No deposit EEPROM) 0x13xx(Deposit EEPROM)
F4 Keyboard parameter group	0x04xx(No deposit EEPROM) 0x14xx(Deposit EEPROM)

F5 Motor parameter group	0x05xx(No deposit EEPROM) 0x15xx(Deposit EEPROM)
F6 Vector control parameter set	0x06xx(No deposit EEPROM) 0x16xx(Deposit EEPROM)
F7 Torque control parameter group	0x07xx(No deposit EEPROM) 0x17xx(Deposit EEPROM)
F8 V/F control parameter group	0x08xx(No deposit EEPROM) 0x18xx(Deposit EEPROM)
FA Protection parameter group	0x0Axx(No deposit EEPROM) 0x1Axx(Deposit EEPROM)
FB Process PID control parameter set	0x0Bxx(No deposit EEPROM) 0x1Bxx(Deposit EEPROM)
FC multi-speed and simple PLC function	0x0Cxx(No deposit EEPROM) 0x1Cxx(Deposit EEPROM)
FD communication parameter group	0x0Dxx(No deposit EEPROM) 0x1Dxx(Deposit EEPROM)
C monitoring parameter group	0x21xx
C09 system monitoring parameters	0x2Axx
C10 Unit monitoring 1 group of parameters	0x2Bxx
C11 Unit monitoring 2 groups of parameters	0x2Cxx
MODBUS communication control parameter group	0x30xx or 0x20xx

Note: Due to the possibility of frequent rewriting of parameter values for communication, the life of EEPROM will be reduced if it is stored frequently. For users, some function code parameters do not need to be stored in the communication mode, but only need to change the value in the on-chip RAM to meet the usage requirements. If the upper half-byte of the address field of the function code parameter is 1, it will be written to EEPROM, that is, stored in power-down.

For example, if the function parameter [F0.14] is rewritten and not stored in the EEPROM, the address is expressed as 000EH, and if it is stored in the EEPROM, the address is expressed as 100EH.

Description of MODBUS communication control parameter group addresses:

Function description	Address definition	Description of data meaning		R/W characteristics
Communication given frequency	0x3000 or 0x2000	0~32000 Correspondence 0.00Hz~320.00Hz		W/R
Communication command setting	0x3001 or 0x2001	0000H: No order 0001H: Positive rotation operation 0002H: Reverse operation	0005H: Deceleration stop 0006H: Free stop	W/R

		0003H: Positive rotation point movement 0004H: Reversing point movement		0007H: Fault Reset 0008H: Run the ban command 0009H: Run the allow command	
AC drive status	0x3002 or 0x2002	Bit0	0: Downtime status	1: Operation Status	R
		Bit1	0: Non-accelerated state	1: Accelerated state	
		Bit2	0: Non-deceleration state	1: Deceleration status	
		Bit3	0: Positive	1: Reverse	
		Bit4	0: Trouble-free	1: AC drive failure	
		Bit5	0: Slave normal	1: Faulty slave or slave in emergency stop	
		Bit6	0: No warning	1: AC drive warning	
		Bit7	0: Power-up not completed	1: Power up completed	
AC drive fault code	0x3003or 0x2003	AC drive current fault code (see fault code table))			R
Communication given upper frequency	0x3004 or 0x2004	0~32000 Correspondence 0.00Hz~320.00Hz			W/R
Communication torque setting	0x3005 or 0x2005	0~1000 Correspondence 0.0%~100.0%			W/R
Torque control forward maximum frequency limit	0x3006 or 0x2006	0~1000 Correspondence 0.0%~100.0%			W/R
Torque control reverse maximum frequency limit	0x3007 or 0x2007	0~1000 Correspondence 0.0%~100.0%			W/R
PID giving	0x3008 or 0x2008	0~1000 Correspondence 0.0%~100.0%			W/R
PID feedback	0x3009 or 0x2009	0~1000 Correspondence 0.0%~100.0%			W/R
Voltage and frequency separation voltage value setting	0x300A or 0x200A	0~1000 Correspondence 0.0%~100.0%			W/R
Fault marker 1~16	0x300B or 0x200B	0~FFFF; bit0~bit15 Corresponding faults 1~16			R
Fault marker 17~32	0x300Cor 0x200C	0~FFFF; bit0~bit15 Corresponding faults 17~32			R
Fault marker 33~48	0x300D or 0x200D	0~FFFF; bit0~bit15 Corresponding faults 33~48			R

<table>
<tr><td>Fault marker 49~64</td><td>0x300E or 0x200E</td><td colspan="3">0~FFFF; bit0~bit14 Corresponding faults 49~63</td><td>R</td></tr>
<tr><td rowspan="8">AC drive special status</td><td rowspan="8">0x300F or 0x200F</td><td>Bit0</td><td>0: Downtime status</td><td>1: Operation Status</td><td rowspan="8">R</td></tr>
<tr><td>Bit1</td><td>0: Non-accelerated state</td><td>1: Accelerated state</td></tr>
<tr><td>Bit2</td><td>0: Non-deceleration state</td><td>1: Deceleration status</td></tr>
<tr><td>Bit3</td><td>0: Positive</td><td>1: Reverse</td></tr>
<tr><td>Bit4</td><td>0: Trouble-free</td><td>1: AC drive failure</td></tr>
<tr><td>Bit5</td><td>0: Chip unlock status</td><td>1: Chip lock status</td></tr>
<tr><td>Bit6</td><td>0: Rectification of undeveloped waves</td><td>1: Rectified waveform in</td></tr>
<tr><td>Bit7</td><td>0: AC drive undeveloped wave</td><td>1: AC drive wave generation</td></tr>
<tr><td>Fault and warning code reading</td><td>0x3010 or 0x2010</td><td colspan="3">0-63 are fault codes, 64- are the warning codes</td><td>R</td></tr>
<tr><td>Output terminal status</td><td>0x3020 or 0x2020</td><td colspan="2">External borrowing of AC drive output terminals, BII0--Y</td><td>BIT1--TA1-TB1-TC1; BIT2--TA2-TB2-TC2</td><td>R</td></tr>
<tr><td>Touch screen given run command</td><td>0x3201</td><td colspan="3">0: Invalid
1: Positive rotation
2: Reversal
3: Positive rotation point movement
4: Reversing point movement
5: Deceleration stop
6: Free stop
7: Fault Reset
8: Run prohibition command
Communication to 3001 address write 8, AC drive free stop, need to write 9 to 3001 or re-power to run
9: Run the allow command</td><td>W</td></tr>
</table>

AC drive status information	0x3202	Bit0: 0 - Stop 1-Fairwave operation Bit1: 0—Non-accelerated 1—Accelerate Bit2: 0—Non-deceleration 1—Deceleration Bit3: 0—Positive 1—Reverse Bit4: 0—AC drive normal 1—Faulty Bit5: 0—Slave normal 1—Faulty slave or slave in emergency stop Bit6: 0—No warning, 1—Early Warning Bit7: 0—Power-up not completed 1—Power up completed	R
AC drive fault codes	0x3203	Fault code	R

Note: Other function code addresses are shown in the "Communication Address" column of the function code summary table. When using the write command (06H), if the highest bit of the function code parameter address field is 0, it will only be written to the AC drive RAM, and will not be stored in the power down, if the high half-byte of the function code parameter address field is 1, it will be written to EEPROM, that is, stored in the power down, such as F0 group: 0x00XX (write RAM) 0x10XX (stored in EEPROM).

Chapter 8 Functional Parameter Table

"●" : Indicates that this parameter can be changed when the AC drive is in operation;

"○" : Indicates that the parameter cannot be changed when the AC drive is in operation;

"×": Indicates that the parameter can only be read, not changed;

"–": Indicates that the parameter is a "factory parameter" and is limited to factory settings;

"※": Indicates that the parameter is related to the model of the AC drive;

"▲": Indicates that the parameter is valid only in rectifier mode, not in AC drive;

"△": Indicates that the parameter is valid only in AC drive mode and not in rectifier mode.

Note: The parameter codes not marked with "△" and "▲" indicate no specific distinction between rectifier and AC drive modes.

8.1 Summary Table of Basic Functional Parameters

8.1.1 F0 Basic Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F0.00	Motor control method	Asynchronous motor control mode: 0: V/F control 1: Reserved 2: Reserved 3: PG-free high-performance vector control 4: High performance vector control with PG Synchronous motor control mode: 5: Reserved 6: PG-free high-performance vector control 7: With PG vector control Other control modes: 8: Voltage and frequency separated output	0	○△	0x000

F0.02	Run command channel	One digits: local command source Ten digits: Remote 1 command source Hundred digits: Remote 2 command source 0: Reserved 1: Terminal control 2: RS485 communication control 3: Reserved 4: Touch screen giving 5: User control 6: Expansion card	114	●	0x002
F0.03	Frequency given source channel A	0: Digital give 1: Voltage/current analog AI1 given 2: Voltage/current analog AI2 given 3: Voltage/current analog AI3 given 4: Voltage/current analog AI4 given 5: Reserve 6: RS485 communication give 7: Terminal UP/DW control 8: PID control give 9: Program control (PLC) give 10: Power balance slave giving 11: Multi-segment speed giving 12: Expansion card giving	0	●△	0x003
F0.04	Frequency given source channel B		1	●△	0x004
F0.05	Frequency channel B reference source	0: The maximum output frequency is used as the reference source 1: A set frequency as the reference source	0	●△	0x005
F0.06	Frequency Feed Source Selection	0: Channel A 1: Channel B 2: Channel A+Channel B 3: Channel A - Channel B 4: Channel A, B both maximum value 5: Channel A, B both minimum value	0	●△	0x006
F0.07	Run command bundle	One digits: Keyboard command bundle Ten digits: Terminal command bundle Hundred digits: communication command bundle Thousand digits: CAN card command bundle 0: No bundle	0000	●△	0x007

		1: Digital give 2: Voltage/current analog AI1 give 3: Voltage/current analog AI2 given 4: Voltage/current analog AI3 give 5: Voltage/current analog AI4 given 6: Reserve 7: RS485 communication give 8: Terminal UP/DW control 9: PID control give A: Program control (PLC) giving B: Power balance slave giving C: Multi-segment speed giving D: Expansion card			
F0.08	Keypad numeric setting frequency	0.00Hz ~ upper limit frequency	50.00Hz	●△	0x008
F0.09	Maximum frequency	Upper limit frequency ~600.00Hz	50.00Hz	○△	0x009
F0.10	Upper limit frequency source selection	0: Digital give 1: Voltage/current analog AI1 given 2: Voltage/current analog AI2 given 3: Voltage/current analog AI3 given 4: Voltage/current analog AI4 given 5: Reserved 6: RS485 communication given 7: Expansion card	0	●△	0x00A
F0.11	Upper limit frequency digital setting	Lower limit frequency ~ Maximum frequency	50.00Hz	●△	0x00B
F0.12	Lower limit frequency	0.00Hz ~ upper limit frequency	0.00Hz	●△	0x00C
F0.13	Lower frequency operation mode	0: Stop output and enter pause operation state 1: Operate at the lower frequency limit	1	○△	0x00D
F0.14	Acceleration time 1	0.01s~650.00s	By Model	※●△	0x00E
F0.15	Deceleration time1	0.01s~650.00s	By Model	※●△	0x00F
F0.16	Rotation direction selection	LED digit: operation direction is reversed 0: direction remains unchanged 1: Direction is reversed LED ten digits: operation	0000	○△	0x010

		direction is prohibited 0: Forward and reverse command allowed 1: Only forward command is allowed 2: Only reverse command allowed LED hundred digits: frequency control command direction 0: Frequency control direction is invalid 1: Frequency control direction is valid LED thousand digits: Torque control command direction 0: Torque control direction is invalid 1: Torque control direction is valid			
F0.18	Test mode selection	Setting range: 0~FFFF	0000	◯	0x012
F0.19	Parameter initialization	0: No operation 1: Restore factory values (without restoring motor parameters and FD communication parameter group) 2: Restore factory value (restore motor parameters, not restore FD parameter group) 3: Restore factory values (restore all parameters) 4: Clear the fault record The rest of the values: no operation	0	◯	0x013

8.1.2 F1 Operation Control Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F1.00	Start-up operation method	0: Started from the starting frequency 1: DC braking first then start from start frequency 2: Speed tracking start (only valid for closed loop)	0	○△	0x100
F1.01	Start pre-excitation time	0.00s~60.00s	0.00s	○△	0x101
F1.02	Start-up frequency	0.00Hz~60.00Hz	0.50Hz	○△	0x102
F1.03	Start-up frequency duration	0.0s~50.0s	0.0s	○△	0x103
F1.04	Pre-start braking current	0.0%~150.0%	60.0%	○△	0x104
F1.05	Pre-start braking time	0.0s~60.0s	0.0s	○△	0x105
F1.07	RPM tracking time	0.00s~60.00s	0.50s	○△	0x107
F1.08	Rotational speed tracking stop delay	0.00s~60.00s	1.00s	○△	0x108
F1.09	Rotational speed tracking current	80.0%~400.0%	120.0%	○△	0x109
F1.10	Shutdown method	0: Deceleration stop 1: Free stop	1	●△	0x10A
F1.11	Stop DC brake start frequency	0.00Hz~5.00Hz	1.00Hz	○△	0x10B
F1.12	Stopping DC braking current	0.0%~150.0%	60.0%	○△	0x10C
F1.14	Downtime DC brake duration	0.0s~60.0s	0.0s	○△	0x10E
F1.15	Downtime detection frequency	0.00Hz~50.00Hz	0.50Hz	●△	0x10F
F1.16	Acceleration and deceleration options	LED one digits: time reference selection 0: Maximum frequency 1: Fixed frequency 50Hz 2: Set frequency LED ten digits: S acceleration and deceleration selection 0: Linear acceleration and deceleration 1: S curve acceleration and deceleration	0000	○△	0x110
F1.17	Acceleration start S-curve time	0.00s~10.00s	0.20s	○△	0x111

F1.18	Accelerated end S-curve time	0.00s~10.00s	0.20s	◯△	0x112
F1.19	Deceleration start S-curve time	0.00s~10.00s	0.20s	◯△	0x113
F1.20	Deceleration end S-curve time	0.00s~10.00s	0.20s	◯△	0x114
F1.21	Acceleration time 2	0.01s~650.00s	10.00s	●△	0x115
F1.22	Deceleration time 2	0.01s~650.00s	10.00s	●△	0x116
F1.23	Acceleration time 3	0.01s~650.00s	10.00s	●△	0x117
F1.24	Deceleration time 3	0.01s~650.00s	10.00s	●△	0x118
F1.25	Acceleration time 4	0.01s~650.00s	10.00s	●△	0x119
F1.26	Deceleration time 4	0.01s~650.00s	10.00s	●△	0x11A
F1.38	Point operation frequency setting	0.00Hz~maximum frequency	5.00Hz	●△	0x126
F1.39	Tap acceleration time	0.01s~650.00s	10.00s	●△	0x127
F1.40	Tap deceleration time	0.01s~650.00s	10.00s	●△	0x128

8.1.3 F2 Switching Terminal Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F2.00	Internal multi-function input terminalsX1	See 8.4 Terminal input and output function selection table	0	◯	0x200
F2.01	Internal multi-function input terminalsX2		0	◯	0x201
F2.02	Internal multi-function input terminalsX3		0	◯	0x202
F2.03	Internal multi-function input terminalsX4		0	◯	0x203
F2.04	Internal multi-function input terminalsX5		0	◯	0x204
F2.05	Internal multi-function input terminalsX6		0	◯	0x205
F2.06	Internal multi-function input terminalsX7		0	◯	0x206

F2.07	Internal multi-function input terminalsX8		0	○	0x207
F2.08	Internal multi-function input terminalsX9		0	○	0x208
F2.09	Internal multi-function input terminalsX10		0	○	0x209
F2.10	Internal multi-function input terminalsX11		0	○	0x20A
F2.11	Internal multi-function input terminalsX12		0	○	0x20B
F2.12	Internal multi-function input terminalsX13		0	○	0x20C
F2.13	F2.13		0	○	○
F2.14	F2.14		0	○	○
F2.15	F2.15		0	○	○
F2.16	F2.16	User multi-function input terminalX1 User multi-function input terminalX2	See 8.4 Terminal input and output function selection table	○	○
F2.17	F2.17	--	0	○	○
F2.18	User multi-function input terminalX3		0	○	0x212
F2.19	User multi-function input terminalX4		0	○	0x213
F2.20	User multi-function input terminalX5		0	○	0x214
F2.21	User multi-function input terminalX6		0	○	0x215
F2.22	User multi-function input terminalX7		0	○	0x216
F2.23	User multi-function input terminalX8		0	○	0x217
F2.24	Internal X1~X16 terminal characteristics selection	0: Closed and valid 1: Closed and valid bit0-bit15:X1-X16	0x1000	●	0x218

F2.25	User X1~X8 terminal characteristics selection	0: Closed and valid 1: Closed and valid bit0-bit8:X1-X8	0x1000	●	0x219
F2.26	X1 Effective detection delay	0.000s~6.000s	0.010s	●	0x21A
F2.27	X1 Invalid detection delay	0.000s~6.000s	0.010s	●	0x21B
F2.28	X2 Effective detection delay	0.000s~6.000s	0.010s	●	0x21C
F2.29	X2 Invalid detection delay	0.000s~6.000s	0.010s	●	0x21D
F2.30	X3 Effective detection delay	0.000s~6.000s	0.010s	●	0x21E
F2.31	X3 Invalid detection delay	0.000s~6.000s	0.010s	●	0x21F
F2.32	X4 Effective detection delay	0.000s~6.000s	0.010s	●	0x220
F2.33	X4 Invalid detection delay	0.000s~6.000s	0.010s	●	0x221
F2.34	Terminal control operation mode	0: Two-wire system 1 1: Two-wire system 2 2: Three-wire system 1 3: 3-wire system 2	0	○	0x222
F2.35	Terminal start protection	0: off 1: on LED one digit: terminal start protection in case of exit abnormality LED ten digits: Pointing terminal start protection when exiting abnormality LED hundred digits: start protection when command channel is switched to terminal LED thousand digits: Reserved	0111	○	0x223
F2.37	Internal multi-function output terminals(Y1)	See 8.4 Terminal input and output function selection table	0	○	0x225
F2.38	Internal multi-function output terminals(Y2)		0	○	0x226
F2.39	Internal multi-function output terminals(Y3)		0	○	0x227
F2.40	Internal multi-function output terminals(Y4)		0	○	0x228
F2.41	Internal multi-function output terminals(Y5)		0	○	0x229
F2.42	Internal multi-function output terminals(Y6)		0	○	0x22A

F2.43	Internal multi-function output terminals(Y7)		0	○	0x22B
F2.44	Internal multi-function output terminals(Y8)		0	○	0x22C
F2.45	Internal multi-function output terminals(Y9)		0	○	0x22D
F2.46	Internal multi-function output terminals(Y10)		0	○	0x22E
F2.47	Internal multi-function output terminals(Y11)		0	○	0x22F
F2.48	Internal multi-function output terminals(Y12)		0	○	0x230
F2.49	Internal multi-function output terminals(Y13)		0	○	0x231
F2.50	Internal multi-function output terminals(Y14)		0	○	0x232
F2.51	Internal multi-function output terminals(Y15)		0	○	0x233
F2.52	Internal multi-function output terminals(Y16)		0	○	0x234
F2.53	Internal relay output(T1)	See 8.4 Terminal input and output function selection table	0	○	0x235
F2.54	Internal relay output(T2)		0	○	0x236
F2.55	Internal relay output(T3)		0	○	0x237
F2.56	Internal relay output(T4)		0	○	0x238
F2.57	Internal relay output(T5)		0	○	0x239
F2.58	Internal relay output(T6)		0	○	0x23A
F2.59	Internal relay output(T7)		0	○	0x23B
F2.60	Internal relay output(T8)		0	○	0x23C
F2.61	Internal relay output(T9)		0	○	0x23D
F2.62	Internal relay output(T10)		0	○	0x23E
F2.63	Internal relay output(T11)		0	○	0x23F
F2.64	Internal relay output(T12)		0	○	0x240
F2.65	Internal relay output(T13)		0	○	0x241

F2.66	Internal relay output(T14)		0	○	0x242
F2.67	Internal relay output(T15)		0	○	0x243
F2.68	Internal relay output(T16)		0	○	0x244
F2.69	User multi-function output terminal(Y1)	See 8.4 Terminal input and output function selection table	0	○	0x245
F2.70	User multi-function output terminal(Y2)		0	○	0x246
F2.71	User multi-function output terminal(Y3)		0	○	0x247
F2.72	User multi-function output terminal(Y4)		0	○	0x248
F2.73	User multi-function output terminal(Y5)		0	○	0x249
F2.74	User multi-function output terminal(Y6)		0	○	0x24A
F2.75	User multi-function output terminal(Y7)		0	○	0x24B
F2.76	User multi-function output terminal(Y8)		0	○	0x24C
F2.77	User relay output(T1)		0	○	0x24D
F2.78	User relay output(T2)		0	○	0x24E
F2.79	User relay output(T3)		0	○	0x24F
F2.80	User relay output(T4)		0	○	0x250
F2.81	User relay output(T5)		0	○	0x251
F2.82	User relay output(T6)		0	○	0x252
F2.83	User relay output(T7)		0	○	0x253
F2.84	User relay output(T8)		0	○	0x254

F2.85	Internal multifunctional output polarity selection	0: Positive polarity 1: Negative polarity bit0-bit15: Y1-Y16	0	●	0x255
F2.86	Internal relay output polarity selection	0: Positive polarity 1: Negative polarity bit0-bit15: T1-T16	0	●	0x256
F2.87	User output terminal polarity selection	0: Positive polarity 1: Negative polarity bit0-bit7: Y1-Y8 bit8-bit15: T1-T8	0	●	0x257
F2.88	Multi-function input terminal EX6 (expansion card X6)	See terminal X function	0	○	0x258
F2.89	Multi-function input terminal EX6 (expansion card X7)		0	○	0x259
F2.90	Multi-function input terminal EX6 (expansion card X8)		0	○	0x25A
F2.91	Multi-function input terminal EX6 (expansion card X9)		0	○	0x25B
F2.92	Multi-function input terminal EX6 (expansion card X10)		0	○	0x25C
F2.94	Multifunctional output Y terminal (expansion card Y)	See 8.4 Terminal input and output function selection table	0	○	0x25E
F2.95	Multi-function relay terminal (expansion card relay)		0	○	0x25F

F2.96	EX6~X10 terminal characteristics selection	0: Closed and valid 1: Closed and valid bit0-bit15: EX6-EX10	0x1000	●	0x260
F2.98	Expansion card output terminal polarity selection	0: Positive polarity 1: Negative polarity bit0 Y1 bit1 T1	0x1000	●	0x262

8.1.4 F3 Analog Terminal Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F3.00	AI1 (VS) lower limit value	0.00V~10.00V	0.00V	●	0x300
F3.01	AI1 (VS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x301
F3.02	AI1 (VS) upper limit value	0.00V~10.00V	10.00V	●	0x302
F3.03	AI1 (VS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x303
F3.04	AI1 (AS) lower limit value	0.00mA~20.00mA	4.00mA	●	0x304
F3.05	AI1 (AS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x305
F3.06	AI1 (AS) upper limit value	0.00mA~20.00mA	20.00mA	●	0x306
F3.07	AI1 (AS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x307
F3.08	AI1 filtering time	0.000s~6.000s	0.010s	●	0x308
F3.09	AI2 (VS) lower limit value	0.00V~10.00V	0.00V	●	0x309
F3.10	AI2 (VS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x30A
F3.11	AI2 (VS) upper limit value	0.00V~10.00V	10.00V	●	0x30B
F3.12	AI2 (VS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x30C
F3.13	AI2 (AS) lower limit value	0.00mA~20.00mA	4.00mA	●	0x30D

F3.14	AI2 (AS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x30E
F3.15	AI2 (AS) upper limit value	0.00mA~20.00mA	20.00mA	●	0x30F
F3.16	AI2 (AS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x310
F3.17	AI2 filtering time	0.000s~6.000s	0.010s	●	0x311
F3.18	AI3 (VS) lower limit value	0.00V~10.00V	0.00V	●	0x312
F3.19	AI3 (VS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x313
F3.20	AI3 (VS) upper limit value	0.00V~10.00V	10.00V	●	0x314
F3.21	AI3 (VS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x315
F3.22	AI3 (AS) lower limit value	0.00mA~20.00mA	4.00mA	●	0x316
F3.23	AI3 (AS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x317
F3.24	AI3 (AS) upper limit value	0.00mA~20.00mA	20.00mA	●	0x318
F3.25	AI3 (AS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x319
F3.26	AI3 filtering time	0.000s~6.000s	0.010s	●	0x31A
F3.27	AI4 (VS) lower limit value	0.00V~10.00V	0.00V	●	0x31B
F3.28	AI4 (VS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x31C
F3.29	AI4 (VS) upper limit value	0.00V~10.00V	10.00V	●	0x31D
F3.30	AI4 (VS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x31E
F3.31	AI4 (AS) lower limit value	0.00mA~20.00mA	4.00mA	●	0x31F
F3.32	AI4 (AS) lower limit corresponding setting	0.00%~100.00%	0.00%	●	0x320

F3.33	AI4 (AS) upper limit value	0.00mA~20.00mA	20.00mA	●	0x321
F3.34	AI4 (AS) upper limit corresponding setting	0.00%~100.00%	100.00%	●	0x322
F3.35	AI4 filtering time	0.000s~6.000s	0.010s	●	0x323
F3.36	AI Selection	One digits: AI1 selection 0: VS;1: AS Ten digits: AI2 selection 0: VS;1: AS Hundred digits: AI3 selection 0: VS;1: AS Thousand digits: AI4 selection 0: VS;1: AS	0000	●	0x324
F3.37	Analog input curve selection	LED one digits: AI1 reserved 0: Straight line (default) 1: Curve 1 2: Curve 2 LED ten digits: AI2 0: Linear (default) 1: Curve 1 2: Curve 2 LED hundred digits: AI3 0: Linear (default) 1: Curve 1 2: Curve 2 LED thousand digits: AI4 0: Linear (default) 1: Curve 1 2: Curve 2	0000	●	0x325
F3.39	Lower limit value of curve 1	0.00V~10.00V	0.00V	●	0x327
F3.40	The lower limit of curve 1 corresponds to the setting	0.00%~100.00%	0.00%	●	0x328
F3.41	Curve 1 Inflection point 1 Input voltage	0.00V~10.00V	3.00V	●	0x329
F3.42	Curve 1 inflection point 1 corresponds to the setting	0.00%~100.00%	30.00%	●	0x32A
F3.43	Curve 1 Inflection point 2 Input voltage	0.00V~10.00V	6.00V	●	0x32B
F3.44	Curve 1 inflection point 2 corresponds to the setting	0.00%~100.00%	60.00%	●	0x32C

F3.45	Upper limit of curve 1	0.00V~10.00V	10.00V	●	0x32D
F3.46	The upper limit of curve 1 corresponds to the setting	0.00%~100.00%	100.00%	●	0x32E
F3.47	Lower limit value of curve 2	0.00V~10.00V	0.00V	●	0x32F
F3.48	The lower limit of curve 2 corresponds to the setting	0.00%~100.00%	0.00%	●	0x330
F3.49	Curve 2 inflection point 1 input voltage	0.00V~10.00V	3.00V	●	0x331
F3.50	Curve 2 inflection point 1 corresponds to the setting	0.00%~100.00%	30.00%	●	0x332
F3.51	Curve 2 inflection point 2 input voltage	0.00V~10.00V	6.00V	●	0x333
F3.52	Curve 2 inflection point 2 input voltage	0.00%~100.00%	60.00%	●	0x334
F3.53	Upper limit of curve 2	0.00V~10.00V	10.00V	●	0x335
F3.54	The upper limit of curve 2 corresponds to the setting	0.00%~100.00%	100.00%	●	0x336
F3.55	AO output signal type	LED one digits: AO1 0: 0V~10V 1: 4.00mA~20.00mA 2: 0.00mA~20.00mA LED ten digits: AO2 0: 0V~10V 1: 4.00A~20.00mA 2: 0.00mA~20.00mA LED hundred digits: AO3 0: 0V~10V 1: 4.00mA~20.00mA 2: 0.00mA~20.00mA LED thousand digits: AO4-AO5 0: 0V~10V 1: 4.00mA~20.00mA 2: 0.00mA~20.00mA	0000	●	0x337
F3.56	AO1 output selection	0: Given frequency 1: Output frequency 2: Output current 3: Input voltage 4: Output voltage 5: Mechanical speed 6: Given torque 7: Output torque	1	●	0x338
F3.57	AO2 output selection		2	●	0x339
F3.58	AO3 output selection		3	●	0x33A
F3.59	AO4 output selection		4	●	0x33B

F3.60	AO5 output selection	8: PID amount of dosing 9: PID feedback amount 10: Output power 11: Input power 12: Input current	5	●	0x33C
F3.61	AO1 Output Gain	25.0%~200.0%	100.0%	●	0x33D
F3.62	A01 output signal bias	-10.0%~10.0%	0.0%	●	0x33E
F3.63	A01 output filtering	0.000s~6.000s	0.010s	●	0x33F
F3.64	AO2 output gain	25.0%~200.0%	100.0%	●	0x340
F3.65	A02 Output signal bias	-10.0%~10.0%	0.0%	●	0x341
F3.66	A02 Output filtering	0.000s~6.000s	0.010s	●	0x342
F3.67	AO3 Output Gain	25.0%~200.0%	100.0%	●	0x343
F3.68	A03 Output signal bias	-10.0%~10.0%	0.0%	●	0x344
F3.69	A03 Output filtering	0.000s~6.000s	0.010s	●	0x345
F3.70	AO4 Output Gain	25.0%~200.0%	100.0%	●	0x346
F3.71	A04 Output signal bias	-10.0%~10.0%	0.0%	●	0x347
F3.72	A04 Output filtering	0.000s~6.000s	0.010s	●	0x348
F3.73	AO5 Output Gain	25.0%~200.0%	100.0%	●	0x349
F3.74	A05 Output signal bias	-10.0%~10.0%	0.0%	●	0x34A
F3.75	A05 Output filtering	0.000s~6.000s	0.010s	●	0x34B

8.1.5 F4 System Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F4.32	AC drive-side PWM carrier frequency	0.7kHz~16.0kHz	Model Setting	※ ●△	0x420

F4.33	AC drive-side PWM control mode 1	LED one digit: carrier associated with temperature 0: Temperature independent 1: temperature dependent LED ten digits: carrier associated with output frequency 0: not related 1: related LED hundred digits: Reserved LED thousand digits: PWM modulation method 0: Only three-phase modulation is used 1: Two-phase three-phase modulation automatic switching	1110	●△	0x421
F4.34	AC drive-side PWM control mode 2	LED one digit: over-commissioning switch 0: Off 1: open LED ten digits: dual sampling dual update mode switch 0: open 1: off LED hundred digits: deadband compensation switch 0: off 1: On LED thousand digits: Reserved	9110	●△	0x422
F4.35	AC drive-side deadband compensation time	0~65535	306	●△	0x423

8.1.6 F5 Motor Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F5.00	Motor type	0: Asynchronous motor (AM) 1: Permanent magnet synchronous motor (PM)	0	×△	0x500
F5.01	Number of motor poles	2~98	4	◯△	0x501
F5.02	Motor rated power	0.1kW~1000.0kW	Model Setting	※ ◯△	0x502
F5.03	Motor rated frequency	0.01Hz~ Maximum frequency	Model Setting	※ ◯△	0x503

F5.04	Motor rated speed	1rpm~65000rpm	Model Setting	※ ○△	0x504
F5.05	Motor rated voltage	1V~1500V	Model Setting	※ ○△	0x505
F5.07	Asynchronous motor no-load current	0.1A~3000.0A	Model Setting	※ ○△	0x507
F5.08	Asynchronous motor stator resistance	0.01%~50.00%	Model Setting	※ ○△	0x508
F5.09	Rotor resistance of asynchronous motors	0.01%~50.00%	Model Setting	※ ○△	0x509
F5.10	Asynchronous motor stator leakage inductance	0.01%~50.00%	Model Setting	※ ○△	0x50A
F5.11	Asynchronous motor stator inductance	0.1%~2000.0%	Model Setting	※ ○△	0x50B
F5.12	Synchronous machine stator resistance	0.01%~50.00%	Model Setting	※ ○△	0x50C
F5.13	Synchronizer D-axis inductor	0.01%~200.00%	Model Setting	※ ○△	0x50D
F5.14	Synchronizer Q-axis inductor	0.01%~200.00%	Model Setting	※ ○△	0x50E
F5.15	Synchronous machine counter-electromotive force	0V~3500V	Model Setting	※ ○△	0x50F
F5.16	Synchronizer encoder mounting angle	0.0°~360.0°	Model Setting	※ ●△	0x510
F5.20	Motor parameter self-tuning selection	0: No operation 1: Rotational self-learning 2: Static type self-learning 3: Stator resistance self-learning	0	○△	0x514
F5.21	Synchronous motor pole search function	LED one digits: closed-loop vector 0: off 1: on 2: On at first power-up LED ten digits: open-loop vector 0: off 1: on 2: On at first power-up LED Hundred: Reserved LED thousands: Reserved	3110	○△	0x515
F5.22	Synchronous motor pole search current	0.0%~400.0%	100.0%	○△	0x516

F5.30	Speed feedback or encoder type	LED one digits: Encoder type 0: ABZ encoder 1: Rotary transformer LED ten digits: Encoder direction 0: Same direction 1: opposite direction LED hundred digits: broken wire detection 0: off 1: on LED thousand digits: Z pulse correction 0: off 1: On	1000	◯△	0x51E
F5.31	Number of ABZ encoder lines	1~10000	1024	◯△	0x51F
F5.32	Broken wire detection time	0.100s~60.000s	0.500s	●△	0x520
F5.33	Number of resolver poles	2~128	2	◯△	0x521
F5.34	Encoder ratio molecule	1~32767	1	◯△	0x522
F5.35	Encoder ratio denominator	1~32767	1	◯△	0x523
F5.36	Encoder speed measurement first order filtering	0.0ms~100.0ms	1.0ms	●△	0x524
F5.39	Open-loop PG feedback display switch selection	One digits: C-29PG feedback display switch 0: Close PG feedback display 1: Turn on the PG feedback display	0000	●△	0x527

8.1.7 F6 Motor Vector Control Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
F6.00	ASR (speed loop) proportional gain 1	0.01~100.00	4.00	●△	0x600
F6.01	ASR (speed loop) integration time 1	0.000s~6.000s	0.500s	●△	0x601
F6.02	ASR filtering time1	0.0ms~100.0ms	0.0ms	●△	0x602
F6.03	ASR switching frequency1	0.00Hz~maximum frequency	0.00Hz	●△	0x603

F6.04	ASR (speed loop) proportional gain 2	0.01~100.00	10.00	●△	0x604
F6.05	ASR (speed loop) integration time2	0.000s~6.000s	0.100s	●△	0x605
F6.06	ASR filtering time2	0.0ms~100.0ms	0.0ms	●△	0x606
F6.07	ASR switching frequency2	0.00Hz~maximum frequency	0.00Hz	●△	0x607
F6.08	Electric torque limiting	0.0%~400.0%	180.0%	●△	0x608
F6.09	Power generation torque limitation	0.0%~400.0%	180.0%	●△	0x609
F6.10	Current loop D-axis proportional gain	0.001~4.000	0.400	●△	0x60A
F6.11	Current loop D-axis integration gain	0.001~4.000	1.000	●△	0x60B
F6.12	Current loop Q-axis proportional gain	0.001~4.000	0.400	●△	0x60C
F6.13	Current loop Q-axis integration gain	0.001~4.000	1.000	●△	0x60D
F6.15	Vector differential compensation	0.0%~250.0%	100.0%	●△	0x60F
F6.16	Vector start torque limiting	0.0%~250.0%	0.0%	●△	0x610
F6.27	Motor shaft power limit	0.0%~250.0%	200.0%	●△	0x61B
F6.28	Motor weak magnetic current limit	0.0%~250.0%	60.0%	○△	0x61C
F6.29	Motor weak magnetic feedforward gain	0.0%~200.0%	10.0%	●△	0x61D
F6.30	Motor weak magnetic gain	0.0%~500.0%	10.0%	●△	0x61E
F6.32	MTPA gain	0.0%~400.0%	100.0%	●△	0x620
F6.33	MTPA filtering time	0.0ms~100.0ms	1.0ms	●△	0x621
F6.36	High frequency pull-in current	0.0%~50.0%	10.0%	●△	0x624
F6.37	Pull-in current frequency	0.0%~100.0%	10.0%	●△	0x625

8.1.8 F7 Torque Control Parameters

Code	Name	Setting range and definition	Factory setting	Properties	Address
F7.00	Torque/speed control	0: Speed control 1: Torque control	0	●△	0x700
F7.01	Torque-giving channel selection	0: Keypad digit giving 1: Keypad potentiometer give 2: VS 3: AI 4: Reservations 5: Reserved 6: RS485 communication given 7: CAN 8: Expansion card	0	●△	0x701
F7.02	Torque keypad digital setting	0.0%~100.0%	0.0%	●△	0x702
F7.03	Torque input lower limit value	0.00%~100.00%	0.00%	●△	0x703
F7.04	The lower limit corresponds to the setting	-200.00%~200.00%	0.00%	●△	0x704
F7.05	Torque input upper limit value	0.00%~100.00%	100.00%	●△	0x705
F7.06	The upper limit corresponds to the setting	-200.00%~200.00%	100.00%	●△	0x706
F7.07	Given a first-order filtering time	0.000s~6.000s	0.100s	●△	0x707
F7.08	Upper limit of output torque	0.0%~250.0%	150.0%	●△	0x708
F7.09	Lower limit of output torque	0.0%~250.0%	0.0%	●△	0x709
F7.10	Torque control positive speed limit selection	0: Function code F7.12 setting 1: Reserve 2: VS*F7.12 3: Reserve 4: AS*F7.12 5: Reserve 6: RS485 Communication*F7.12 7: CAN Card*F7.12 8: Extension Card*F7.12	0	●△	0x70A
F7.11	Torque control reversing speed limit selection	0: Function code F7.13 setting 1: Reserved 2: VS*F7.13 3: Reserve 4: AS&F7.13 5: Reserve 6: RS485	0	●△	0x70B

		Communication&F7.13 7: CAN Card*F7.13 8: Extension Card*F7.13			
F7.12	Torque control maximum speed limit for forward rotation	0.0%~100.0%	100.0%	●△	0x70C
F7.13	Torque control reversal maximum speed limit	0.0%~100.0%	100.0%	●△	0x70D

8.1.9 F8 V/F Control Parameters

Code	Name	Setting range and definition	Factory setting	Properties	Address
F8.00	Linear V/F curve selection	0: linear V/F curve; 1 to 9: reserved; 10: square V/F curve; 11: custom V/F curve;	0	○△	0x800
F8.01	Self-setting voltage V1	0.0%~100.0%	3.0%	○△	0x801
F8.02	Self-setting frequency F1	0.00Hz~Max Frequency	1.00Hz	○△	0x802
F8.03	Self-setting voltage V2	0.0%~100.0%	28.0%	○△	0x803
F8.04	Self-setting frequency F2	0.00Hz~Max Frequency	10.00Hz	○△	0x804
F8.05	Self-setting voltageV3	0.0%~100.0%	55.0%	○△	0x805
F8.06	Self-setting frequencyF3	0.00Hz~Max Frequency	25.00Hz	○△	0x806
F8.07	Self-setting voltageV4	0.0%~100.0%	78.0%	○△	0x807
F8.08	Self-setting frequencyF4	0.00Hz~Max Frequency	37.50Hz	○△	0x808
F8.09	Self-setting voltageV5	0.0%~100.0%	100.0%	○△	0x809
F8.10	Self-setting frequencyF5	0.00Hz~Max Frequency	50.00Hz	○△	0x80A
F8.11	Output voltage percentage	25.0%~120.0%	100.0%	○△	0x80B
F8.12	Torque boost	0.0%~30.0%	Model determination	●△	0x80C
F8.13	Torque boost cut-off frequency	0.0%~100.0%	100.0%	●△	0x80D
F8.14	Differential compensation gain	0.0%~200.0%	100.0%	●△	0x80E
F8.15	Transition compensation limit	0.0%~300.0%	10.0%	●△	0x80F
F8.16	Rotation difference compensation filtering time	0.000s~6.000s	0.5000s	●△	0x810

F8.17	Oscillation rejection gain	0.0%~900.0%	100.0%	●△	0x811
F8.18	Oscillation rejection filter coefficient	1.0~100.0	1.0	●△	0x812
F8.19	Automatic energy saving control	0: Off 1: On	0	○△	0x813
F8.20	Energy saving step-down frequency lower limit	0.00Hz~50.00Hz	15.00Hz	○△	0x814
F8.21	Energy saving step-down voltage lower limit	20.0%~100.0%	50.0%	○△	0x815
F8.22	Energy-saving step-down voltage regulation rate	0.000V/ms~0.200V/ms	0.010 V/ms	●△	0x816
F8.23	Energy-saving step-down voltage ramp-up rate	0.000V/ms~2.000V/ms	0.200 V/ms	●△	0x817
F8.30	Voltage-frequency separated output voltage source	0: Function code F8.31 setting 1: Reserved 2: Voltage/current analog AI1 given 3: Voltage/current analog AI2 given 6: PID give 7: RS485 communication give 8: CAN communication give	0	●△	0x81E
F8.31	Digital setting of voltage and frequency separation output voltage	0.0%~100.0%	0.0%	●△	0x81F
F8.32	Voltage-frequency separation voltage acceleration time	0.00s~100.00s	10.00s	●△	0x820
F8.33	Pressure-frequency separation voltage deceleration time	0.00s~100.00s	10.00s	●△	0x821
F8.34	Pressure-frequency separation stop mode	0: Output voltage, output frequency acceleration and deceleration do not affect each other 1: After the output voltage drops to 0V, the output frequency drops again	0	●△	0x822
F8.35	V/F control overcurrent suppression lower limit frequency	0.00%~50.00%	0.00%	●△	0x823

8.1.10 FA Protection and Fault Parameter Sets

Code	Name	Setting range and definition	Factory setting	Properties	Address
FA.00	Overcurrent suppression function	0: Inhibition is always effective 1: Acceleration and deceleration are effective, constant speed is not effective	0	●△	0xA00
FA.01	Overcurrent Inhibit Point	0.0%~300.0%	160.0%	●△	0xA01
FA.02	Overcurrent suppression gain	0.0%~500.0%	100.0%	●△	0xA02
FA.03	Current hardware protection settings	LED one digits: Wave-by-wave current limiting (CBC) 0: Off 1: On LED ten digits: OC protection interference suppression 0: off 1: Primary interference suppression 2: Secondary interference suppression LED hundred digits: SC protection interference suppression 0: Off 1: First-level interference suppression 2: Secondary interference suppression LED thousand digits: Reserved	0001	○	0xA03
FA.04	Input overvoltage protection point	100%~200%	135%	○	0xA04
FA.05	Protection option1	One digit: Busbar overvoltage protection 0: Close 1: On Ten digits: power under-voltage protection 0: off 1: open Hundred digits: R, S, T temperature protection switch, 7 means 3 are open, 0 means all off Thousand digits: U, V, W temperature protection switch, 7 means 3 are open, 0 means all off	7711	○	0xA05

FA.06	Busbar overvoltage suppression function	LED one digits: overvoltage suppression control 0: Disable 1: Enable only during deceleration 2: Enable in both acceleration and deceleration LED ten digits: over-excitation control 0: Disable 1: Enable LED hundred digits: reserved LED thousand digits: reserved	0002	○△	0xA06
FA.07	Busbar overvoltage suppression point	110.0%~150.0%	Model Setting	※○△	0xA07
FA.08	Bus overvoltage suppression gain	0.0%~500.0%	10.0%	●△	0xA08
FA.09	undervoltage suppression	0: prohibited 1: enable	0	●△	0xA09
FA.10	Undervoltage suppression point	60.0% ~ 90.0%	80.0%	●△	0xA0A
FA.11	Undervoltage suppression factor	0.0%~500.0%	100.0%	●△	0xA0B
FA.12	Busbar undervoltage protection point	60.0%~90.0%	60.0%	※○	0xA0C
FA.13	Input protection selection	LED one digits: rectifier side overload protection switch 0: Closed 1: Open LED ten digits: Input overvoltage selector switch 0: Closed 1: Open LED hundred digits: product selection protection switch 0: Closed 1: Open LED thousand digits: test mode AC detection fault selection 0: Closed 1: Open	1111	○	0xA0D
FA.14	reservations	0: cloture 1: opens	0	○	0xA0E
FA.15	Protection option 3	LED one digits: Output phase loss protection 0: Off 1: On	1112	○	0xA0F

		2: Slightly unbalanced output phase loss LED ten digits: Input phase loss protection 0x00XX: ten-digit value & 0x3 0: cloture 1: Software input phase loss turn-on (3-phase AC detection + bus bar fluctuation cycle detection) 2: Hardware input out-of-phase on 0xXX: The ten-digit value is shifted two places to the right & 0x3, selecting the action when the busbar detects a phase loss 1: Software input phase loss warning Other values: software input phase failure LED hundred digits: CPU overload 0: off 1: on LED thousand digits: grid anomalies 0: off 1: on			
FA.16	Motor overload protection factor	0.0%~250.0%	100.0%	○△	0xA10
FA.17	Load warning checkout setting	LED one digit: checkout selection (protection 1) 0: untested 1: Detecting excessive loads 2: Overload detection at constant speed only 3: Detecting insufficient load 4: Insufficient load detection at constant speed only LED ten digits: alarm selection 0: Alarm, continue to run 1: Fail-safe operation and free stop LED hundred digits: checkout selection (protection 2) 0: untested 1: Detecting excessive loads 2: Overload detection at constant speed only 3: Detecting insufficient	0000	○△	0xA11

		load 4: Insufficient load detection at constant speed only LED thousand digits: alarm selection 0: Alarm, continue to run 1: Fail-safe operation and free stop			
FA.18	Load warning detection level1	0.0%~200.0%	130.0%	○△	0xA12
FA.19	Load warning detection time1	0.0s~60.0s	5.0s	○△	0xA13
FA.20	Load warning detection level2	0.0%~200.0%	30.0%	○△	0xA14
FA.21	Load warning detection time2	0.0s~60.0s	5.0s	○△	0xA15
FA.22	Input out-of-phase threshold	0.0%~30.0%	10.0%	○	0xA16
FA.23	Excessive speed deviation protection	LED one digits: checkout selection 0: untested 1: Constant speed detection only 2: Always. LED ten digits: alarm selection 0: Freedom to stop and report faults 1: Alarm and continue to run LED hundredth and thousandth digits: Reserved	0000	○△	0xA17
FA.24	Excessive speed deviation detection threshold	0.0%~60.0%	10.0%	○△	0xA18
FA.25	Speed deviation detection time	0.0s~60.0s	2.0s	○△	0xA19
FA.26	Flying protection action	LED one digits: checkout selection 0: untested 1: Constant speed detection only 2: Always testing. LED ten digits: alarm selection 0: Freedom to stop and report faults 1: Alarm and continue to run LED hundredth and thousandth digits: Reserved	0002	○△	0xA1A

FA.27	Flying Detection Threshold	0.0%~150.0%	110.0%	◯△	0xA1B
FA.28	time of flight detection	0.000s~2.000s	0.050s	◯△	0xA1C
FA.29	Midpoint Voltage Ring Ratio	0.01~10.00	1.00	●	OxA1D
FA.30	Midpoint voltage loop integration	0.000~1.000	0.008	●	OxA1E
FA.31	AC Motion Selection	One digits: AC side undervoltage selection 0: off 1: on Ten digits: AC side input contactor selection 0: not valid 1: valid Hundredth digits: low-frequency overload protection 0: Open 1: Close Thousand digits: delayed reset 0: delay 1: no delay	0011	◯	0xA1F
FA.32	AC input undervoltage point	0%~90%	60%	◯	0xA20
FA.33	Transformer fault selection	0: Warning 1: Shutdown 2: Trip	1	--	0xA21
FA.37	Failure self-recovery times	0~5	0	◯	0xA25
FA.38	Failure self-recovery interval	0.1s~100.0s	10.0s	◯	0xA26
FA.39	Troubleshooting information	See Fault Message Code Table for details	--	×	0xA27
FA.40	Fault type	See Fault Message Code Table for details	--	×	0xA28
FA.41	Frequency of faulty operation	0.00Hz~Maximum Frequency	0.00Hz	×	0xA29
FA.42	Fault Output Voltage	0V~1500V	--	×	0xA2A
FA.43	Fault Output Current	0.1A~2000.0A	--	×	0xA2B
FA.44	Fault bus voltage	0V~3000V	--	×	0xA2C
FA.45	Maximum module temperature	0℃~100℃	--	×	0xA2D
FA.46	Minimum module temperature	0℃~100℃	--	×	0xA2E
FA.47	Faulty AC drive status	LED one digits: running direction 0: forward 1: reverse LED ten digits: operation	--	×	0xA2F

		status 0: Shutdown 1: Speed stabilization 2: Acceleration 3: Deceleration LED hundred digits: Reserved LED thousand digits: reserved			
FA.48	Type of previous failure	See Fault Message Code Table for details	--	×	0xA30
FA.49	Previous Troubleshooting Information	See Fault Message Code Table for details	--	×	0xA31
FA.50	Frequency of previous faulty operation	0.00Hz~ Max. frequency	--	×	0xA32
FA.51	Previous Fault Output Voltage	0V~1500V	--	×	0xA33
FA.52	Previous fault output current	0.1A~2000.0A	--	×	0xA34
FA.53	Previous fault bus voltage	0V~3000V	--	×	0xA35
FA.54	Maximum temperature of previous module	0℃~100℃	--	×	0xA36
FA.55	Previous Module Minimum Temperature	0℃~100℃	--	×	0xA37
FA.56	Previous fault AC drive status	LED one digits: running direction 0: forward 1: reverse LED ten digits: running status 0: Shutdown 1: Stabilized speed 2: Acceleration 3: Deceleration LED hundred digits: reserved LED thousand digits: reserved	--	×	0xA38
FA.57	Type of first two failures	See Fault Message Code Table for details	--	×	0xA39
FA.58	Type of first three failures	See Fault Message Code Table for details	--	×	0xA3A
FA.59	First four failure types	See Fault Message Code Table for details	--	×	0xA3B
FA.60	First five failure types	See Fault Message Code Table for details	--	×	0xA3C

8.1.11 FB Process PID Control Parameter Set

Code	Name	Setting range and definition	Factory setting	Properties	Address
FB.00	PID controller given signal source	0: Keypad numeric PID given 1: Reserved 2: Current/voltage analog AI1 given 3: current/voltage analog AI2 given 6: RS485 communication given 7: CAN communication given 8: Terminal selection 9: Active current component (CAN communication)	9	●△	0xB00
FB.01	Digital PID feed/feedback	0.00%~100.00%	50.00%	●△	0xB01
FB.02	PID given change time	0.00s~60.00s	1.00s	●△	0xB02
FB.03	PID controller feedback signal source	0: Keypad numeric PID given 1: Reserved 2: current/voltage analog AI1 given 3: current/voltage analog AI2 given 6: RS485 communication given 7: CAN communication given 8: Terminal selection 9: Active current component (local)	9	●△	0xB03
FB.04	Feedback signal filtering time	0.000s~6.000s	0.010s	●△	0xB04
FB.05	Feedback signal gain	0.00~10.00	1.00	●△	0xB05
FB.06	Setting and feedback ranges	0.0~100.0	100.0	●△	0xB06

FB.07	PID Control options	LED one digits: Feedback characteristic selection 0: Positive characteristic 1: negative characteristic LED ten digits, hundred digits: reserved LED thousand digits: differential adjustment property 0: Differential for deviation 1: Differential for feedback	0100	●△	0xB07
FB.08	PID preset output	0.0%~100.0%	100.0%	●△	0xB08
FB.09	Preset output runtime	0.0s~6500.0s	0.0s	●△	0xB09
FB.10	PID control deviation limit	0.0%~100.0%	0.0%	●△	0xB0A
FB.11	Proportional gain P1	0.000~4.000	0.100	●△	0xB0B
FB.12	Integration time I1	0.0s~600.0s	5.0s	●△	0xB0C
FB.13	Differential gain D 1	0.000s~6.000s	0.000s	●△	0xB0D
FB.14	proportional gain P2	0.000~4.000	0.500	●△	0xB0E
FB.15	Points time I2	0.0s~600.0s	5.0s	●△	0xB0F
FB.16	differential gain D2	0.000s~6.000s	0.000s	●△	0xB10
FB.17	PID parameter switching conditions	0: no switch 1: Switching using DI terminals 2: Switching according to deviation	0	●△	0xB11
FB.18	Toggle Deviation Low	0.0%~100.0%	20.0%	●△	0xB12
FB.19	Toggle deviation high value	0.0%~100.0%	80.0%	●△	0xB13
FB.21	differential limiting	0.0%~100.0%	5.0%	●△	0xB15
FB.22	PID output upper limit	0.0%~100.0%	2.0%	●△	0xB16
FB.23	PID output lower limit	-Fb.22~Fb.22	-2.0%	●△	0xB17

FB.24	PID output filtering time	0.000s~6.000s	0.000s	●△	0xB18
FB.25	Feedback disconnection detection time	0.0s~120.0s	1.0s	●△	0xB19
FB.26	Feedback break action selection	0: Continue PID operation without reporting a fault 1: Stop and report fault 2: Continue PID operation and output alarm signal 3: Run at current frequency, output alarm signal	0	●△	0xB1A
FB.27	Upper limit of disconnection alarm	0.0%~100.0%	100.0%	●△	0xB1B
FB.28	Disconnection alarm lower limit	0.0%~100.0%	0.0%	●△	0xB1C
FB.29	Closed loop pause checkout threshold	0.0%~100.0%	0.0%	●△	0xB1D
	Hibernate function enable switch (version 7609)	0: Do not open hibernation 1: Hibernate function is turned on			
FB.30	Closed-loop pause detection time	0.0s~600.0s	1.0s	●△	0xB1E

8.1.12 FC Multi-segment Speed, PLC Function Parameter Group

Code	Name	Setting range and definition	Factory setting	Properties	Address
FC.00	PLC multi-speed1	0.00Hz~maximum frequency	10.00Hz	●△	0xC00
FC.01	PLC multi-speed2	0.00Hz~maximum frequency	20.00Hz	●△	0xC01
FC.02	PLC multi-speed3	0.00Hz~maximum frequency	30.00Hz	●△	0xC02
FC.03	PLC multi-speed4	0.00Hz~maximum frequency	40.00Hz	●△	0xC03
FC.04	PLC multi-speed5	0.00Hz~maximum frequency	50.00Hz	●△	0xC04

FC.05	PLC multi-speed6	0.00Hz~maximum frequency	40.00Hz	●△	0xC05
FC.06	PLC multi-speed7	0.00Hz~maximum frequency	30.00Hz	●△	0xC06
FC.07	PLC multi-speed8	0.00Hz~maximum frequency	20.00Hz	●△	0xC07
FC.08	PLC multi-speed9	0.00Hz~maximum frequency	10.00Hz	●△	0xC08
FC.09	PLC multi-speed10	0.00Hz~maximum frequency	20.00Hz	●△	0xC09
FC.10	PLC multi-speed11	0.00Hz~maximum frequency	30.00Hz	●△	0xC0A
FC.11	PLC multi-speed12	0.00Hz~maximum frequency	40.00Hz	●△	0xC0B
FC.12	PLC multi-speed13	0.00Hz~maximum frequency	50.00Hz	●△	0xC0C
FC.13	PLC multi-speed14	0.00Hz~maximum frequency	40.00Hz	●△	0xC0D
FC.14	PLC multi-speed15	0.00Hz~maximum frequency	30.00Hz	●△	0xC0E
FC.15	PLC operation mode selection	LED one digit: cyclic mode 0: Stop after single cycle 1: Continuous cycle 2: Hold final value after single cycle LED ten digits: timing unit 0: Second 1: minute 2: Hour LED hundred digits: reserved LED thousand digits: start mode 0: Rerun from the first stage 1: Rerun from the stage of the stop moment 2: Continue running with the remaining time of the phase of the stop moment	0000	●△	0xC0F
FC.16	PLC section 1 running time	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC10
FC.17	PLC section 2 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC11
FC.18	PLC section 3 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC12
FC.19	PLC section 4 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC13
FC.20	PLC segment 5 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC14
FC.21	PLC segment 6 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC15
FC.22	PLC segment 7 operation time	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC16

FC.23	PLC section 8 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC17
FC.24	PLC section 9 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC18
FC.25	PLC section 10 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC19
FC.26	PLC section 11 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC1A
FC.27	PLC section 12 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC1B
FC.28	PLC section 13 operation time	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC1C
FC.29	PLC segment 14 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC1D
FC.30	PLC section 15 runtime	0.0s/m/h~6500.0s/m/h	10.0 (s/m/h)	●△	0xC1E
FC.31	PLC segment 1-15 direction and acceleration/deceleration time	LED one digit: the direction of operation of this segment 0: forward 1: Reverse LED ten digits: this section acceleration and deceleration time 0: Acceleration and deceleration time 1 1: Acceleration and deceleration time 2 2: Acceleration and deceleration time 3 3: acceleration and deceleration time 4 LED hundred digits: reserved LED thousand digits: Reserved	0000	●△	0xC1F

8.1.13 FD Communication Control Function Parameter Group

Note: 485 communication has two ways, the terminal 485 communication named 485-1, RJ45 485 communication named 485-2

Code	Name	Setting range and definition	Factory setting	Properties	Address
FD.00	Master-Slave Selection	LED one digit: 485-1 communication master and slave selection LED ten digits: 485-2 communication master-slave selection LED hundred digits: Extended 485-3 communication master-slave selection LED thousand digits: Reserved 0: Slave 1: Master 2: Keypad	0000	○	0xD00

		3: Special slave, reply slave status 4: Special master: receive slave status			
FD.01	485-1 communication address	1~247	1	●	0xD01
FD.02	485-2 communication address	1~247	1	●	0xD02
FD.03	Expanded 485-3 communication address	1~247	1	●	0xD03
FD.04	Communication baud rate selection	LED one digit: 485-1 communication: LED ten digits: 485-2 communication: LED hundred digits: Extended 485-3 communication: 0: 1200 bps;1: 2400 bps 2: 4800 bps;3: 9600 bps 4: 19200 bps 5: 38400 bps	0333	○	0xD04
FD.05	Modbus data format	LED one digits: 485-1 communication data format: LED ten digits: 485-2 communication data format: LED hundred digits: Extended 485-3 communication data format: 0: (N, 8, 1) No checksum Data bit: 8 Stop bit: 1 1: (E, 8, 1) even parity Data bit: 8 Stop bit: 1 2: (O, 8, 1) Odd parity Data bit: 8 Stop bit: 1 3: (N, 8, 2) No parity Data bit: 8 Stop bit: 2 4: (E, 8, 2) Even parity Data bit: 8 Stop bit: 2 5: (O, 8, 2) Odd parity Data digits: 8 Stop bit: 2	0000	○	0xD05
FD.06	Communication ratio setting	0.00~5.00	1.00	●	0xD06
FD.07	Modbus communication answer delay time	0ms~500ms	0ms	●	0xD07
FD.08	Modbus communication timeout failure time	0.1s~100.0s	1.0s	●	0xD08

FD.09	Modbus communication fault action mode selection	Modbus transmission response processing LED one digit: 485-1 communication: LED ten digits: 485-2 communication: LED hundred digits: Extended 485-3 communication: 0: Write operation with response 1: No response for write operation	0	●	0xD09
FD.10	Modbus transmission response processing	Modbus transmission response processing LED one digits: 485-1 communication: LED ten digits: 485-2 communication: LED hundred digits: Extended 485-3 communication: 0: Write operation with response 1: No response for write operation	0	●	0xD0A
FD.11	Host send selection	LED one digits: first set of transmit frames selected 0: invalid 1: Host run command 2: Host given frequency 3: Host output frequency 4: Host upper limit frequency 5: Host given torque 6: Host output torque 7: Torque control forward speed limit 8: Torque control reverse speed limit 9: Host PID giving A: Host PID feedback B: Reservation C: Torque current component LED ten digits: second group of sending frame selection Same as above LED hundred digits: the third group of sending frame selection Same as above LED thousand digits: fourth group of transmit frame selection Same as above	0C31	●	0xD0B

FD.12	CAN communication protocol selection	0: CANopen slave 1: Veichi Custom Slave 2: Veichi Custom Master	FD.12	●	0xD0C
FD.13	CAN communication address	1~247	FD.13	●	0xD0D
FD.14	Communication baud rate selection	0: 20kbps 1: 50 kbps 2:100kbps 3: 125kbps 4:250kbps 5: 500kbps 6: 1Mbps	FD.14	●	0xD0E
FD.15	Custom cyclic transmission parameter selection	One digits, Ten digits, Hundred digits and Thousand digits 0: Invalid 1: Host run command 2: Host given frequency 3: Host output frequency 4: Host upper limit frequency 5: Host given torque 6: Host output torque 7: Torque control forward speed limit 8: Torque control reverse speed limit 9: Host PID giving A: Host PID feedback B: Voltage frequency separation voltage command C: active current component	FD.15	●	0xD0F
FD.16	Customized cyclic sending parameter selection	One digits, Ten digits, Hundred digits and Thousand digits 0: invalid 1: Slave operation status 2: Slave output current 3: Slave output frequency 4: Slave output power 5: Slave input voltage 6: Slave fault code 7: Slave Output Torque 8: Slave DC bus voltage 9: Slave motor voltage A: Slave module temperature	0x0000	●	0xD10

FD.17	CAN Macro Definition Selection	0: General purpose 1: Wind power 1 (Lenz) 2: Wind power 2 (Bonfiglioli)	0	●	0xD11
FD.18	CAN PDO selection	0: Invalid 1: Valid (F00.10 - F00.39)	0	●	0xD12
FD.19	Slave ready (number of CAN slaves)	0: Not ready 1: Ready	0	●	0xD13
FD.20	PID gives quantitative receive calibration enable	Setting range: 0~9999	0	●	0xD14
FD.21	PID gives a quantitative receive value calibration value	Setting range: 0~9999	170	●	0xD15
FD.22	DP card address	1~247	1	●	0xD16
FD.23	Expansion port communication disconnection handling	LED one digit: internal IO disconnection action mode LED ten digits: external IO disconnection action mode LED hundred digits: external IO expansion card disconnection action mode LED thousand digits: fast expansion card disconnection mode 0: No detection 1: Alarm and free stop 2: Warning and continue operation	0	●	0xD17

8.2 Summary Table of Monitoring Parameters

Code	Name	Units	Address	Code	Name	Units	Address
C0.00	Given frequency	0.01Hz	0x2100	C0.20	Input current reactive component	0.1A	0x2114
C0.01	Output frequency	0.01Hz	0x2101	C0.21	Fault mark1	0xFFFF	0x2115
C0.02	Output current	0.1A	0x2102	C0.22	Fault mark2	0xFFFF	0x2116
C0.03	Output Voltage	0.1V	0x2103	C0.23	Fault mark3	0xFFFF	0x2117
C0.04	Input Current	0.1A	0x2104	C0.24	Fault mark4	0xFFFF	0x2118
C0.05	Input Voltage	1V	0x2105	C0.25	AC drive power rating	0.1kW	0x2119

C0.06	Motor temperature	0.1℃	0x2106	C0.26	Frequency converter rated voltage	1V	0x211A
C0.07	Mechanical speed	1RPM	0x2107	C0.27	Frequency converter rated current	0.1A	0x211B
C0.08	Given Torque	0.1%	0x2108	C0.28	Software Versions	00.00	0x211C
C0.09	Output torque	0.1%	0x2109	C0.29	FPGA Software Versions	XXXX	0x211D
C0.10	PID dosing amount	0.1%	0x210A	C0.30	PG feedback frequency	0.01Hz	0x211E
C0.11	PID feedback amount	0.1%	0x210B	C0.31	Internal IO board input terminal status	FFFF	0x211F
C0.12	Average bus voltage	0.1V	0x210C	C0.32	Internal IO board Y terminal status	FFFF	0x2120
C0.13	Output power	kW	0x210D	C0.33	Internal IO board T terminal status	FFFF	0x2121
C0.14	Output Power Factor	--	0x210E	C0.34	User IO board X terminal status	FFFF	0x2122
C0.15	Output current active component	0.1A	0x210F	C0.35	User IO board output terminal status	FFFF	0x2123
C0.16	Output current reactive component	0.1A	0x2110	C0.36	Fault warning code	--	0x2124
C0.17	Input power	kW	0x2111	--	--	--	--
C0.18	Input Power Factor	--	0x2112	--	--	--	--
C0.19	Input current active component	0.1A	0x2113	--	--	--	--

Note: The C-50~52 three-phase output current needs to be monitored when the output phase loss protection is turned on (FA.15 bits are non-zero).

8.3 Terminal Input and Output Function Selection

X	Function	X	Function	X	Function
0	No function	38	Buffered contactor feedback input	68	Remote 1 / Remote 2 switching
1	Forward running	39	Reserved	69	Control power normal
2	Reverse rotation operation	40	Timer trigger terminal	70	Reactor over-temperature fault
3	Three-wire operation (Xi)	41	Timer clear terminal	71	Pre-charge contactor feedback 1
4	Forward rotation point operation	42	Counter clock input terminal	72	Pre-charge contactor feedback 2
5	Reverse rotation pointing	38	Buffered contactor feedback input	73	Pre-charge main contactor feedback
6	Free stop	39	Reserved	74	Bypass cabinet 1 incoming contactor/blade feedback
7	Enable (emergency stop)	40	Timer trigger terminal	75	Bypass cabinet 1 outgoing contactor/knife feedback
8	Fault reset	41	Timer clear terminal	76	Bypass cabinet 1 frequency contactor/blade feedback
9	External fault input	42	Counter clock input terminal	77	Bypass cabinet 2 incoming contactor/knife feedback
10	Frequency increment (UP)	43	Counter zero terminal	78	Bypass cabinet 2 outgoing contactor/knife feedback

11	Frequency decrement (DW)	44	DC brake command	79	Bypass cabinet 2 frequency contactor/knife feedback
12	Frequency increment/decrement clear (UP/DW clear)	45	Pre-excitation command terminal	80	Bypass cabinet 3 incoming contactor/knife feedback
13	Channel A cut to channel B	46	Reserved (motor selection terminal)	81	Bypass cabinet 3 outgoing contactor/knife feedback
14	Frequency channel combination switch to A	47	Four-quadrant rectifier starts separately	82	Bypass cabinet 3 frequency contactor/knife feedback
15	Frequency channel combination switch to B	48	Command channel cut to keypad	83	Bypass cabinet 4 incoming contactor/knife feedback
16-19	Multi-Speed Terminals 1-4	49	Command channel cut to terminal	84	Bypass cabinet 4 outlet contactor/knife gate feedback
20	PID control cancellation	50	Command channel cut to communication	85	Bypass cabinet 4 frequency contactor/knife feedback
21	PID control pause	51	Command channel switch to expansion card	86	Bypass cabinet 5 incoming contactor/knife feedback
22	PID characteristic switching	52	Run Prohibition	87	Bypass cabinet 5 outgoing contactor/knife feedback
23	PID parameter switching	53	Positive rotation disable	88	Bypass cabinet 5 frequency contactor/knife feedback
24-26	PID Feeder Switching 1-3	54	Reversing Prohibition	89	Auto up-cut enable
27-29	PID feedback switching 1-3	59	Output contactor feedback	90	Up-cut command
30	Program run (PLC) pause	60	Speed-torque control switching	91	Undercut command
31	Program operation (PLC) restart	61	Position control switching	--	--
32	Acceleration and deceleration time selection terminal 1	62	Reserved	--	--
33	Acceleration and deceleration time selection terminal 2	63	Local remote switching	--	--
34	Acceleration and deceleration pause	64	Transformer over-temperature alarm	--	--
35	Pendulum frequency input	65	Transformer over-temperature fault	--	--

36	Pendulum frequency pause	66	Cabinet door travel switch	--	--
37	Pendulum frequency reset	67	Cabinet top blower status feedback	--	--
Y	**Function**	**Y**	**Function**	**Y**	**Function**
0	No output	36	High voltage closing allowed	72	Bypass cabinet 3 IFC contactor closing(IFC 1)
1	Frequency converter in operation	37	High voltage tripping	73	Bypass cabinet 3 IFC contactor break (IFC 1)
2	AC drive in reverse rotation	38	AC drive run contactor output	74	Synchronous switching contactor 3 unlocked
3	Frequency converter in forward rotation	39	Main power indication	75	Motor 3 automatic cutting work frequency
4	Fault Trip Alarm 1 (Alarm during fault self-recovery)	40	Alarm	76	Motor 3 AC drive indication
5	Fault Trip Alarm 2 (No alarm during fault self-recovery)	41	HMI communication failure	77	Motor 3 industrial frequency indication
6	External fault shutdown	42	Remote 1/2 indication	78	Switch 4 closing allowed
7	AC drive undervoltage	43	Fan operation	79	Switchgear 4 high voltage tripping
8	AC drive operation is ready	44	Bypass cabinet 1 incoming contactor closed	80	Bypass cabinet 4 incoming contactor closing
9	Output frequency level detection 1 (FDT1)	45	Bypass cabinet 1 incoming contactor break	81	Bypass cabinet 4 incoming contactor break
10	Output frequency level detection 2 (FDT2)	46	Bypass cabinet 1 outgoing contactor closing (contactor 1)	82	Bypass cabinet 4 outgoing contactor closing (contactor 1)
11	The given frequency is reached	47	Bypass cabinet 1 outgoing contactor break (frequency contactor 1)	83	Bypass cabinet 4 outgoing contactor break (frequency contactor 1)
12	In zero speed operation	48	Bypass cabinet 1 frequency contactor closing (frequency contactor 1)	84	Bypass cabinet 4 frequency contactor closing (frequency contactor 1)
13	Reserved	49	Bypass cabinet 1 IFC contactor breaking (IFC contactor 1)	85	Bypass cabinet 4 IFC contactor breaking (IFC contactor 1)
14	Reserved	50	Synchronous switching contactor 1 unlocked	86	Synchronous switching contactor 4 unlocked
15	Program run cycle period completed	51	Motor 1 automatic cutting industrial frequency	87	Motor 4 automatic cutting work frequency
16	Program run phase run completed	52	Motor 1 frequency indication	88	Motor 4 frequency indication
17	PID feedback exceeds upper limit	53	Motor 1 industrial frequency indication	89	Motor 4 work frequency indication

18	PID feedback below lower limit	54	Switchgear 2 closing allowed	90	Switchgear 5 closing allowed
19	PID feedback sensor disconnected	55	Switchgear 2 high voltage tripped	91	Switchgear 5 high voltage tripped
20	Reserved	56	Bypass cabinet 2 incoming contactor closed	92	Bypass cabinet 5 incoming contactor closed
21	Reserved	57	Bypass cabinet 2 incoming line contactor break	93	Bypass cabinet 5 incoming contactor break
22	Reserved	58	Bypass cabinet 2 outgoing contactor closing (AC drive contactor 1)	94	Bypass cabinet 5 outgoing contactor closing (AC drive contactor 1)
23	Retention	59	Bypass cabinet 2 outgoing contactor break (AC drive contactor 1)	95	Bypass cabinet 5 outgoing contactor break (AC drive contactor 1)
24	Energy consumption braking in	60	Bypass cabinet 2 IFC contactor closed (IFC 1)	96	Bypass cabinet 5 IFC contactor closing (IFC 1)
25	PG feedback disconnection	61	Bypass cabinet 2 industrial frequency contactor break (industrial frequency contactor 1)	97	Bypass cabinet 5 industrial frequency contactor breaking (industrial frequency contactor 1)
26	Emergency stop	62	Synchronous switching contactor 2 unlocked	98	Synchronous switching contactor 5 unlocked
27	Load pre-warning output 1	63	Motor 2 automatic cutting work frequency	99	Motor 5 automatic cutting work frequency
28	Load pre-alarm output 2	64	Motor 2 frequency indication	100	Motor 5 frequency indication
29	Pre-alarm output	65	Motor 2 work frequency indication	101	Motor 5 work frequency indication
30	Reserved	66	Switchgear 3 closing allowed	102	Specified fault output
31	Reserved	67	Switchgear 3 high voltage tripping	103	Pre-charge contactor break
32	Reserved	68	Bypass cabinet 3 incoming contactor closed	104	Pre-charge main contactor break
33	Reserved	69	Bypass cabinet 3 incoming contactor is closed	105	Pre-charge main contactor closing
34	Reserved	70	Bypass cabinet 3 outgoing contactor closing (AC drive contactor 1)	--	--
35	AC drive failure	71	Bypass cabinet 3 outgoing contactor break (AC drive contactor 1)	--	--

8.4 Summary Table of System Failure Parameters

8.4.1 Version Number Parameter Group

Code	Name	Unit	Address	Code	Name	Unit	Address
C9.00	DSP Version Number	None	0x2A00	C9.03	Voltage acquisition board version number	None	0x2A03
C9.01	FPGA Version Number	None	0x2A01	C9.04	Internal IO version number	None	0x2A04
C9.02	Unit Version Number	None	0x2A02	C9.05	External IO version number	None	0x2A05

8.4.2 Fault Message Description

C9-27-C9-59 Indicates the fault details, each word is represented by bit, 1 indicates that the bit is faulty.

Code	Name	Unit	Address	Code	Name	Unit	Address
C9.27	Fault word 1	None	0x2A1B	C9.44	Fault word 18	None	0x2A2C
C9.28	Fault word 2	None	0x2A1C	C9.45	Fault word 19	None	0x2A2D
C9.29	Fault word 3	None	0x2A1D	C9.46	Fault word 20	None	0x2A2E
C9.30	Fault word 4	None	0x2A1E	C9.47	Fault word 21	None	0x2A2F
C9.31	Fault word 5	None	0x2A1F	C9.48	Fault word 22	None	0x2A30
C9.32	Fault word 6	None	0x2A20	C9.49	Fault word 23	None	0x2A31
C9.33	Fault word 7	None	0x2A21	C9.50	Fault word 24	None	0x2A32
C9.34	Fault word 8	None	0x2A22	C9.51	Fault word 25	None	0x2A33
C9.35	Fault word 9	None	0x2A23	C9.52	Fault word 26	None	0x2A34
C9.36	Fault word 10	None	0x2A24	C9.53	Fault word 27	None	0x2A35
C9.37	Fault word 11	None	0x2A25	C9.54	Fault word 28	None	0x2A36
C9.38	Fault word 12	None	0x2A26	C9.55	Fault word 29	None	0x2A37

C9.39	Fault word 13	None	0x2A27	C9.56	Fault word 30	None	0x2A38
C9.40	Fault word 14	None	0x2A28	C9.57	Fault word 31	None	0x2A39
C9.41	Fault word 15	None	0x2A29	C9.58	Fault word 32	None	0x2A3A
C9.42	Fault word 16	None	0x2A2A	C9.59	Fault word 33	None	0x2A3B
C9.43	Fault word 17	None	0x2A2B	--	--	--	--

Detailed fault descriptions are shown below:

C9-27 Fault marker 1	bit0	1	Drive failure 1
	bit1	2	Drive failure 2
	bit2	3	Drive failure 3
	bit3	4	Drive failure 4
	bit4	5	Drive failure 5
	bit5	6	Drive failure 6
	bit6	7	Overcurrent in acceleration
	bit7	8	Overcurrent in deceleration
	bit8	9	Over-current in constant speed
	bit9	10	Overvoltage in acceleration
	bit10	11	Overpressure in deceleration
	bit11	12	Excessive pressure during deceleration
	bit12	13	Busbar undervoltage
	bit13	14	Motor overload
	bit14	15	AC drive overload
	bit15	16	Input out of phase

C9-28 Fault marker 2	bit0	17	Output out of phase
	bit1	18	Rectifier overheating
	bit2	19	AC drive overheating
	bit3	20	External faults
	bit4	21	Communication failure
	bit5	22	Current detection fault
	bit6	23	Motor self-learning fault
	bit7	24	EEPROM failure
	bit8	25	System failure 1
	bit9	26	Brake unit failure
	bit10	27	System fault 2
	bit11	28	System fault 3
	bit12	29	Parameter copy exception
	bit13	30	PG card connection abnormal
	bit14	31	Overvoltage during shutdown
	bit15	32	PID disconnection fault

C9-29 Fault marker 3	bit0	33	Keyboard does not recognize the fault prompt
	bit1	34	Initial angle learning failure
	bit2	35	Excessive speed deviation
	bit3	36	Speedy Protection
	bit4	37	Load protection 1
	bit5	38	Load protection 2
	bit6	39	CPU timing timeout
	bit7	40	FLASH not unlocked fault
	bit8	41	System fault 4
	bit9	42	Input contactor failure
	bit10	43	Output contactor failure
	bit11	44	CAN disconnection fault
	bit12	45	Rectifier side frequency detection abnormality
	bit13	46	Product Failure
	bit14	47	Power supply undervoltage
	bit15	48	Midpoint voltage imbalance

C9-30 Fault marker 4	bit0	49	Rectifier side overload
	bit1	50	Rectifier side overcurrent protection
	bit2	51	AC side input overvoltage
	bit3	52	Rectifier SD fault
	bit4	53	Rectifier HALL fault
	bit5	54	Test mode exception
	bit6	55	AC input undervoltage
	bit7	56	CAN master detects slave failure
	bit8	57	Reserved 1
	bit9	58	Other over-temperature faults
	bit10	59	Buffer contactor failure
	bit11	60	Expansion card failure
	bit12	61	SPI communication fault
	bit13	62	FPGA Failure
	bit14	63	Reserved 2
	bit15	64	Reserved 3

C9-31 Fault marker 5	bit0	65	Bypass 1KM1 fault
	bit1	66	Bypass 1KM2 fault
	bit2	67	Bypass 1KM3 fault
	bit3	68	Bypass 2KM1 fault

	bit4	69	Bypass 2KM2 fault
	bit5	70	Bypass 2KM3 fault
	bit6	71	Bypass 3KM1 fault
	bit7	72	Bypass 3KM2 fault
	bit8	73	Bypass 3KM3 Fault
	bit9	74	Bypass 4KM1 fault
	bit10	75	Bypass 4KM2 fault
	bit11	76	Bypass 4KM3 fault
	bit12	77	Bypass 5KM1 fault
	bit13	78	Bypass 5KM2 fault
	bit14	79	Bypass 5KM3 fault
	bit15	80	Pre-charge fault

C9-32 Failure mark 6	bit0	81	Transformer overtemperature fault
	bit1	82	Travel switch failure
	bit2	83	Fan failure
	bit3	84	Control power failure
	bit4	85	Reactor failure
	bit5	86	Internal IO disconnection fault
	bit6	87	External IO disconnection fault
	bit7	88	Expansion card disconnection failure
	bit8	89	Fast expansion card disconnection fault
	bit9	90	Reserved 6_5
	bit10	91	Reserved 6_6
	bit11	92	Reserved 6_7
	bit12	93	Reserved 6_8
	bit13	94	Reserved 6_9
	bit14	95	Reserved 6_10
	bit15	96	Reserved 6_11

C9-33 Failure mark 7	bit0	97	A1 busbar overvoltage
	bit1	98	Undervoltage in A1 bus operation
	bit2	99	A1 over temperature
	bit3	100	A1 input overvoltage
	bit4	101	A1 input out of phase
	bit5	102	A1 input unbalance
	bit6	103	A1 driver failure
	bit7	104	A1 overcurrent
	bit8	105	bit0
	bit9	106	bit1
	bit10	107	bit2
	bit11	108	bit3

	bit12	109	bit4
	bit13	110	bit5
	bit14	111	bit6
	bit15	112	bit7

C9-34 Failure mark 8	bit0	113	A2 busbar overvoltage
	bit1	114	Undervoltage in A2 bus operation
	bit2	115	A2 over temperature
	bit3	116	A2 input overvoltage
	bit4	117	A2 input is out of phase
	bit5	118	A2 input unbalance
	bit6	119	A2 driver failure
	bit7	120	A2 overcurrent
	bit8	121	A2 bypass fault
	bit9	122	A2arm communication fault
	bit10	123	A2 fiber optic communication failure
	bit11	124	A2 bus shutdown undervoltage
	bit12	125	A2 reserved 1
	bit13	126	A2 reserved 2
	bit14	127	A2 reserved 3
	bit15	128	A2 reserved 4

C9-35 Fault marker 9	bit0	129	A3 busbar overvoltage
	bit1	130	Undervoltage in A3 bus operation
	bit2	131	A3 over temperature
	bit3	132	A3 input overvoltage
	bit4	133	A3 input out of phase
	bit5	134	A3 input unbalance
	bit6	135	A3 driver failure
	bit7	136	A3 overcurrent
	bit8	137	A3 bypass fault
	bit9	138	A3 arm communication fault
	bit10	139	A3 fiber optic communication failure
	bit11	140	A3 bus shutdown undervoltage
	bit12	141	A3 reserved 1
	bit13	142	A3 reserved 2
	bit14	143	A3 reserved3
	bit15	144	A3 reserved 4

C9-36 Fault mark 10	bit0	145	A4 busbar overvoltage
	bit1	146	Undervoltage in A4 bus operation
	bit2	147	A4 over temperature

	bit3	148	A4 input overvoltage
	bit4	149	A4 input out of phase
	bit5	150	A4 input unbalance
	bit6	151	A4 driver failure
	bit7	152	A4 overcurrent
	bit8	153	A4 bypass fault
	bit9	154	A4 arm communication fault
	bit10	155	A4 fiber optic communication failure
	bit11	156	A4 bus shutdown undervoltage
	bit12	157	A4 reserved 1
	bit13	158	A4 reserved 2
	bit14	159	A4 reserved3
	bit15	160	A4 reserved 4

C9-37 Failure mark 11	bit0	161	A5 busbar overvoltage
	bit1	162	A5 undervoltage in bus operation
	bit2	163	A5 over temperature
	bit3	164	A5 input overvoltage
	bit4	165	A5 input is out of phase
	bit5	166	A5 input unbalance
	bit6	167	A5 driver failure
	bit7	168	A5 overcurrent
	bit8	169	A5 bypass fault
	bit9	170	A5 arm communication fault
	bit10	171	A5 fiber optic communication failure
	bit11	172	A5 bus stop undervoltage
	bit12	173	A5 reserved 1
	bit13	174	A5 reserved 2
	bit14	175	A5 reserved 3
	bit15	176	A5 reserved 4

C9-39 Failure mark 13	bit0	193	A7 busbar overvoltage
	bit1	194	A7 undervoltage in bus operation
	bit2	195	A7 over temperature
	bit3	196	A7 input overvoltage
	bit4	197	A7 input is out of phase
	bit5	198	A7 input unbalance
	bit6	199	A7 driver failure
	bit7	200	A7 overcurrent
	bit8	201	A7 bypass fault
	bit9	202	A7 arm communication fault
	bit10	203	A7 fiber optic communication failure

	bit11	204	A7 bus stop undervoltage
	bit12	205	A7 reserved 1
	bit13	206	A7 reserved 2
	bit14	207	A7 reserved 3
	bit15	208	A7 reserved 4

C9-40 Failure mark 14	bit0	209	A8 busbar overvoltage
	bit1	210	A8 undervoltage in bus operation
	bit2	211	A8 over temperature
	bit3	212	A8 input overvoltage
	bit4	213	A8 input out of phase
	bit5	214	A8 input unbalance
	bit6	215	A8 driver failure
	bit7	216	A8 drive failure
	bit8	217	A8 bypass fault
	bit9	218	A8 arm communication fault
	bit10	219	A8 fiber optic communication failure
	bit11	220	A8 bus stop undervoltage
	bit12	221	A8 reserved 1
	bit13	222	A8 reserved 2
	bit14	223	A8 reserved 3
	bit15	224	A8 reserved 3

C9-41 Failure mark 15	bit0	225	A9 busbar overvoltage
	bit1	226	A9 undervoltage in busbar operation
	bit2	227	A9 overtemperature
	bit3	228	A9 input overvoltage
	bit4	229	A9 input is out of phase
	bit5	230	A9 input unbalance
	bit6	231	A9 driver failure
	bit7	232	A9 overcurrent
	bit8	233	A9 bypass fault
	bit9	234	A9 arm communication fault
	bit10	235	A9 fiber optic communication failure
	bit11	236	A9 bus stop undervoltage
	bit12	237	A9 reserved 1
	bit13	238	A9 reserved 2
	bit14	239	A9 reserved 3
	bit15	240	A9 reserved 4

C9-42 Fault marker 16	bit0	241	B1 busbar overvoltage

	bit1	242	Undervoltage in B1 bus operation
	bit2	243	B1 over temperature
	bit3	244	B1 input overvoltage
	bit4	245	B1 input out of phase
	bit5	246	B1 input unbalance
	bit6	247	B1 driver failure
	bit7	248	B1 overcurrent
	bit8	249	B1 bypass fault
	bit9	250	B1 Brm communication fault
	bit10	251	B1 fiber optic communication failure
	bit11	252	B1 bus shutdown undervoltage
	bit12	253	B1 reserved 1
	bit13	254	B1 reserved 2
	bit14	255	B1 reserved 3
	bit15	256	B1 reserved 4

C9-43 Failure mark 17	bit0	257	B2 busbar overvoltage
	bit1	258	Undervoltage in B2 bus operation
	bit2	259	B2 overtemperature
	bit3	260	B2 input overvoltage
	bit4	261	B2 input is out of phase
	bit5	262	B2 input unbalance
	bit6	263	B2 driver failure
	bit7	264	B2 overcurrent
	bit8	265	B2 bypass fault
	bit9	266	B2 Brm communication fault
	bit10	267	B2 fiber optic communication failure
	bit11	268	B2 bus shutdown undervoltage
	bit12	269	B2 reserved 1
	bit13	270	B2 reserved 2
	bit14	271	B2 reserved 3
	bit15	272	B2 reserved 4

C9-44 Failure mark 18	bit0	273	B3 busbar overvoltage
	bit1	274	Undervoltage in B3 bus operation
	bit2	275	B3 over temperature
	bit3	276	B3 input overvoltage
	bit4	277	B3 input is out of phase
	bit5	278	B3 input unbalance
	bit6	279	B3 driver failure
	bit7	280	B3 overcurrent
	bit8	281	B3 bypass fault

	bit9	282	B3 Brm communication fault
	bit10	283	B3 fiber optic communication failure
	bit11	284	B3 bus shutdown undervoltage
	bit12	285	B3 reserved 1
	bit13	286	B3 reserved 2
	bit14	287	B3 reserved 3
	bit15	288	B3 reserved 4

C9-45 Fault marker 19	bit0	289	B4 busbar overvoltage
	bit1	290	Undervoltage in B4 bus operation
	bit2	291	B4 over temperature
	bit3	292	B4 input overvoltage
	bit4	293	B4 input is out of phase
	bit5	294	B4 input unbalance
	bit6	295	B4 driver failure
	bit7	296	B4 overcurrent
	bit8	297	B4 bypass fault
	bit9	298	B4 Brm communication fault
	bit10	299	B4 fiber optic communication failure
	bit11	300	B4 bus shutdown undervoltage
	bit12	301	B4 reserved 1
	bit13	302	B4 reserved 2
	bit14	303	B4 reserved 3
	bit15	304	B4 reserved 4

C9-46 Failure mark 20	bit0	305	B5 busbar overvoltage
	bit1	306	Undervoltage in B5 bus operation
	bit2	307	B5 over temperature
	bit3	308	B5 input overvoltage
	bit4	309	B5 input is out of phase
	bit5	310	B5 input unbalance
	bit6	311	B5 driver failure
	bit7	312	B5 overcurrent
	bit8	313	B5 busbar overvoltage
	bit9	314	Undervoltage in B5 bus operation
	bit10	315	B5 over temperature
	bit11	316	B5 input overvoltage
	bit12	317	B5 input is out of phase
	bit13	318	B5 input unbalance
	bit14	319	B5 driver failure
	bit15	320	B5 overcurrent

C9-47 Fault marker 21	bit0	321	B6 busbar overvoltage
	bit1	322	B6 undervoltage in bus operation
	bit2	323	B6 over temperature
	bit3	324	B6 input overvoltage
	bit4	325	B6 input is out of phase
	bit5	326	B6 input unbalance
	bit6	327	B6 driver failure
	bit7	328	B6 overcurrent
	bit8	329	B6 bypass fault
	bit9	330	B6 Brm communication fault
	bit10	331	B6 fiber optic communication failure
	bit11	332	B6 bus shutdown undervoltage
	bit12	333	B6 reserved 1
	bit13	334	B6 reserved 2
	bit14	335	B6 reserved 3
	bit15	336	B6 reserved 4

C9-48 Fault mark 22	bit0	337	B7 busbar overvoltage
	bit1	338	B7 undervoltage in bus operation
	bit2	339	B7 over temperature
	bit3	340	B7 input overvoltage
	bit4	341	B7 input is out of phase
	bit5	342	B7 input unbalance
	bit6	343	B7 driver failure
	bit7	344	B7 overcurrent
	bit8	345	B7 bypass fault
	bit9	346	B7 Brm communication fault
	bit10	347	B7 fiber optic communication failure
	bit11	348	B7 bus shutdown undervoltage
	bit12	349	B7 reserved 1
	bit13	350	B7 reserved 2
	bit14	351	B7 reserved 3
	bit15	352	B7 reserved 4

C9-49 Failure mark 23	bit0	353	B8 busbar overvoltage
	bit1	354	B8 undervoltage in bus operation
	bit2	355	B8 over temperature
	bit3	356	B8 input overvoltage
	bit4	357	B8 input is out of phase
	bit5	358	B8 input unbalance
	bit6	359	B8 driver failure
	bit7	360	B8 overcurrent

	bit8	361	B8 bypass fault
	bit9	362	B8 Brm communication fault
	bit10	363	B8 fiber optic communication failure
	bit11	364	B8 bus shutdown undervoltage
	bit12	365	B8 reserved 1
	bit13	366	B8 reserved 2
	bit14	367	B8 reserved 3
	bit15	368	B8 reserved 4

C9-50 Failure mark 24	bit0	369	B9 busbar overvoltage
	bit1	370	B9 undervoltage in bus operation
	bit2	371	B9 overtemperature
	bit3	372	B9 input overvoltage
	bit4	373	B9 input is out of phase
	bit5	374	B9 input unbalance
	bit6	375	B9 driver failure
	bit7	376	B9 overcurrent
	bit8	377	B9 bypass fault
	bit9	378	B9 Brm communication fault
	bit10	379	B9 fiber optic communication failure
	bit11	380	B9 bus stop undervoltage
	bit12	381	B9 reserved 1
	bit13	382	B9 reserved 2
	bit14	383	B9 reserved 3
	bit15	192	A6 reserved 4

C9-51 Fault marker 25	bit0	385	C1 bus over-voltage
	bit1	386	Undervoltage in C1 bus operation
	bit2	387	C1 over temperature
	bit3	388	C1 input overvoltage
	bit4	389	C1 input out of phase
	bit5	390	C1 input unbalance
	bit6	391	C1 driver failure
	bit7	392	C1 overcurrent
	bit8	393	C1 bypass fault
	bit9	394	C1 Crm communication fault
	bit10	395	C1 fiber optic communication failure
	bit11	396	C1 bus shutdown undervoltage
	bit12	397	C1 reserved 1
	bit13	398	C1 reserved 2
	bit14	399	C1 reserved 3
	bit15	400	C1 reserved 4

C9-52 Failure mark 26	bit0	401	C2 bus over-voltage
	bit1	402	Undervoltage in C2 bus operation
	bit2	403	C2 over temperature
	bit3	404	C2 input overvoltage
	bit4	405	C2 input out of phase
	bit5	406	C2 input unbalance
	bit6	407	C2 driver failure
	bit7	408	C2 overcurrent
	bit8	409	C2 bypass fault
	bit9	410	C2 Crm communication fault
	bit10	411	C2 fiber optic communication failure
	bit11	412	C2 bus shutdown undervoltage
	bit12	413	C2 reserved 1
	bit13	414	C2 reserved 2
	bit14	415	C2 reserved 3
	bit15	416	C2 reserved 4

C9-53 Failure mark 27	bit0	417	C3 bus over-voltage
	bit1	418	Undervoltage in C3 bus operation
	bit2	419	C3 overtemperature
	bit3	420	C3 input overvoltage
	bit4	421	C3 input out of phase
	bit5	422	C3 input unbalance
	bit6	423	C3 driver failure
	bit7	424	C3 overcurrent
	bit8	425	C3 bypass fault
	bit9	426	C3 Crm communication fault
	bit10	427	C3 fiber optic communication failure
	bit11	428	C3 bus shutdown undervoltage
	bit12	429	C3 reserved 1
	bit13	430	C3 reserved 2
	bit14	431	C3 reserved 3
	bit15	432	C3 reserved 4

C9-54 Failure mark 27	bit0	433	C4 busbar overvoltage
	bit1	434	Undervoltage in C4 bus operation
	bit2	435	C4 over temperature
	bit3	436	C4 input overvoltage
	bit4	437	C4 input out of phase
	bit5	438	C4 input imbalance
	bit6	439	C4 driver failure
	bit7	440	C4 overcurrent

	bit8	441	C4 bypass fault
	bit9	442	C4 Crm communication fault
	bit10	443	C4 fiber optic communication failure
	bit11	444	C4 bus shutdown undervoltage
	bit12	445	C4 reserved 1
	bit13	446	C4 reserved 2
	bit14	447	C4 reserved 3
	bit15	448	C4 reserved 4

C9-55 Failure mark 29	bit0	449	C5 busbar overvoltage
	bit1	450	Undervoltage in C5 bus operation
	bit2	451	C5 overtemperature
	bit3	452	C5 input overvoltage
	bit4	453	C5 input out of phase
	bit5	454	C5 input unbalance
	bit6	455	C5 driver failure
	bit7	456	C5 overcurrent
	bit8	457	C5 bypass fault
	bit9	458	C5 Crm communication fault
	bit10	459	C5 fiber optic communication failure
	bit11	460	C5 bus shutdown undervoltage
	bit12	461	C5 reserved 1
	bit13	462	C5 reserved 2
	bit14	431	C3 reserved 3
	bit15	432	C3 reserved 4

C9-56 Failure mark 30	bit0	465	C6 busbar overvoltage
	bit1	466	Undervoltage in C6 bus operation
	bit2	467	C6 over temperature
	bit3	468	C6 input overvoltage
	bit4	469	C6 input is out of phase
	bit5	470	C6 input unbalance
	bit6	471	C6 driver failure
	bit7	472	C6 overcurrent
	bit8	473	C6 bypass fault
	bit9	474	C6 Crm communication fault
	bit10	475	C6 fiber optic communication failure
	bit11	476	C6 bus shutdown undervoltage
	bit12	477	C6 reserved 1
	bit13	478	C6 reserved 2
	bit14	479	C6 reserved 3
	bit15	480	C6 reserved 4

C9-57 Failure mark 31	bit0	481	C7 busbar overvoltage
	bit1	482	Undervoltage in C7 bus operation
	bit2	483	C7 Over Temperature
	bit3	484	C7 input overvoltage
	bit4	485	C7 input overvoltage
	bit5	486	C7 input unbalance
	bit6	487	C7 driver failure
	bit7	488	C7 overcurrent
	bit8	489	C7 bypass fault
	bit9	490	C7 Crm communication fault
	bit10	491	C7 fiber optic communication failure
	bit11	492	C7 bus shutdown undervoltage
	bit12	493	C7 bus shutdown undervoltage
	bit13	494	C7 reserved 2
	bit14	495	C7 reserved 3
	bit15	496	C7 reserved 4

C9-58 Failure mark 32	bit0	497	C8 busbar overvoltage
	bit1	498	Under-voltage in C8 bus operation
	bit2	499	C8 overtemperature
	bit3	500	C8 input overvoltage
	bit4	501	C8 input out of phase
	bit5	502	C8 input unbalance
	bit6	503	C8 driver Failure
	bit7	504	C8 overcurrent
	bit8	505	C8 bypass fault
	bit9	506	C8 Crm communication fault
	bit10	507	C8 fiber optic communication failure
	bit11	508	C8 bus shutdown undervoltage
	bit12	509	C8 reserved 1
	bit13	510	C8 reserved 2
	bit14	511	C8 reserved 3
	bit15	512	C8 reserved 4

C9-59 Failure mark 33	bit0	513	C9 busbar overvoltage
	bit1	514	C9 undervoltage in busbar operation
	bit2	515	C9 over temperature
	bit3	516	C9 input overvoltage
	bit4	517	C9 input is out of phase
	bit5	518	C9 input unbalance
	bit6	519	C9 driver failure
	bit7	520	C9 overcurrent

	bit8	521	C9 bypass fault
	bit9	522	C9 Crm communication fault
	bit10	523	C9 fiber optic communication failure
	bit11	524	C9 bus stop undervoltage
	bit12	525	C9 reserved 1
	bit13	526	C9 reserved 2
	bit14	527	C9 reserved 3
	bit15	528	C9 reserved 4

Chapter 9 Troubleshooting and Countermeasures

There are two types of messages that appear under abnormal conditions in a variable frequency speed control system, one is an alarm message and the other is a fault message. When there is an alarm, the system can still continue to work, but will light up the alarm indicator and trigger an audible and visual alarm. When a fault occurs, the system will automatically shut down, while lighting the fault indicator and triggering an audible and visual alarm. Only after the fault is completely removed and the "Fault Reset" button is pressed, the fault can be removed and the system can be turned on again. All alarms and faults are recorded in the information system and can be viewed by clicking on the "History" button.

9.1 Safety Precautions

Warning	●This product carries a dangerous voltage and it controls a potentially dangerous motion mechanism. Failure to comply with the regulations or operate it in accordance with the requirements of this manual may result in personal injury or death, damage to the product and associated systems. ●Only trained professionals are allowed to operate this product, and before using this product, be familiar with all the safety instructions and regulations of operation in this manual; proper operation and maintenance is a reliable guarantee to achieve safe and stable operation of this product. ●Do not perform wiring work while the power is on, otherwise there is a risk of death by electric shock; when wiring, inspection, maintenance, etc., cut off the power to all associated equipment and make sure the DC voltage of the main circuit has dropped to a safe level, and wait 5 minutes before performing the relevant work.
Attention	●Prevent children and the public from coming in contact with or near this product. ●This product can only be used in accordance with the manufacturer's specified purpose and may not be used in special areas related to emergency, rescue, marine, medical, aviation, nuclear facilities, etc. without permission. ●Unauthorized modifications, use of parts not sold or recommended by the manufacturer of this product may result in malfunction.
Important	●Be sure to deliver this manual to the actual user to ensure that the actual user reads it carefully before using it. ●Please make sure you read and fully understand these safety rules and warning signs before installing and commissioning the AC drive.

9.2 Fault, Warning, Alert Code Types

● When the operation of the AC drive or motor is abnormal, please first confirm the code and prompt displayed on the keypad.

●If you cannot solve the problem even after reading the instruction manual, please contact our agent or call our customer service number (see back cover for contact information) after checking the following items again.

1. Model of AC drive
2. Software version
3. Date of purchase
4. Consultation content (the status of the failure)

Please refer to the following table for descriptions of faults, warnings, and prompts that occur during AC drive operation.

Table 5.2 Types of fault, warning, and alert codes

Category	The action of the AC drive when a fault occurs
Failure	When a fault is detected, the following conditions will occur, and until the AC drive is restored to its normal state by a fault reset, the AC drive will not operate. ●A fault indication will appear on the keyboard. ●AC drive cut off output, motor free stop. ●When a fault is detected, the terminal with F2.46 to F2.47 = 4 [Output terminal function selection = fault output] turns ON, and if it is not set, the terminal will not output a signal even if a fault is detected.
Warning	When a warning is detected, the following conditions will occur and there is no need to perform a fault reset operation. ●A warning prompt will appear on the keyboard. ●The AC drive can continue to run. ●When a fault is detected, the terminal with F2.46 to F2.47 = 29 [Output terminal function selection = warning output] turns ON, and if it is not set, the terminal will not output a signal even if a warning is detected.
Tips	●When restoring factory settings, "SAvE" is displayed. ●T-00" is displayed after the self-learning setting to indicate the self-learning status. ●Display "CoPy" when uploading parameters and "LoAd" when downloading parameters.

9.3 List of Fault, Warning and Alert Codes

Failure, warning and prompt codes as shown in Table 5.3.1, when the keyboard displays the characters in the table, you can check the detailed causes and countermeasures of the failure according to the reference source to the corresponding page.

Note: The numbers in the code column in parentheses are fault codes or warning codes (Dec means decimal).

Table 5.3.1 List of fault, warning and prompt codes

Code	Fault display	Fault name	Code	Fault display	Fault name
0	--	No fault	33	E.SPD	Flying speed protection
1	E.SC	Reserved	34	E.LD1	Load protection 1
2	E.SC	Reserved	35	E.LD2	Load protection 2
3	E.SC	Reserved	36	E.CPU	CPU timing timeout
4	E.OC1	Overcurrent in acceleration	37	E. lOC	FLASH not unlocked fault
5	E.OC2	Overcurrent in deceleration	38	Reserved	Reserved
6	E.OC3	Overcurrent in constant speed	39	E.039	Input contactor failure
7	E.OU1	Overpressure in acceleration	40	E.040	Output contactor fault
8	E.OU2	Overpressure in deceleration	41	E.CAN	CAN disconnect fault
9	E.OU3	Overpressure in constant speed	42	E.OLF	Rectifier side frequency anomaly
10	E.LU2	Busbar undervoltage	43	E.043	Product Failure
11	E. oL1	Motor overload	44	E.LU3	15V power supply undervoltage
12	E. oL2	AC drive overload	45	E.LFE	Midpoint voltage unbalance
13	E.ILF	Input out of phase	46	E.OL3	Rectifier side overload
14	E. oLF	Output out of phase	47	E.OC4	Rectifier side overcurrent protection
15	E. oH2	Rectifier overheating	48	E.OU5	AC measurement input overvoltage
16	E. oH1	AC drive overheating	49	E.SD1	Rectifier SD fault
17	E. EF	External fault	50	E.HL2	Rectifier HALL fault
18	E. CE	485 communication fault	51	E.051	Test mode abnormalities
19	E.HAL	Current detection fault	52	E.LU4	AC input undervoltage
20	E.TE1	Motor self-learning fault	53	E.SE	Slave failure or emergency stop
21	E.EEP	EEPROM failure	55	E.OH3	Motor over-temperature fault
22	Reserved	Reserved	56	E.CHR	Buffer contactor failure
23	E. bRU	Brake unit failure	57	E.BUS	Expansion card failure
24	Reserved	Reserved	58	E.SPI	SPI communication failure
25	Reserved	Reserved	59	E.FGA	FPGA failure
26	E.CPE	Parameter copy abnormality	60	E.LF1	Input unbalance

27	E.PG	Expansion card connection abnormality	61	E.PHA	Phase A unit failure
28	E.OU4	Overvoltage at shutdown	62	E.PHB	Phase B unit failure
29	E.PID	PID disconnection failure	63	E.PHC	C-phase unit fault
30	LIFE	Fault prompt not recognized by keyboard	-	-	-
31	E.IAE	Initial angle learning failure	-	-	-
32	E.DEF	Speed deviation is too large	-	-	-
Code	**Fault display**	**Fault name**	**Code**	**Fault display**	**Fault name**
64	LU1	Shutdown undervoltage	73	A.073	GPRS lock warning
65	A.LIF	Input phase loss warning	74	A.074	485 communication warning
66	A.PID	PID disconnection warning	75	A.075	Input contactor warning
67	A.LD1	Load protection 1 warning	76	A.076	Output contactor warning
68	A.LD2	Load protection 2 warning	77	A.077	CAN disconnection warning
69	A.EEP	Storage warning	78	A.SE	Slave failure warning
70	A.DEF	Speed deviation warning	79	A.RUN	Terminal start-up protection
71	A.SPD	Flying speed protection warning	80	Reserved	-
72	A.072	Lockout warning	81	A.BUS	Extension card disconnection warning

9.4 Motor Self-learning Fault Sub-code Description

Attachment: The detailed fault diagnosis information of self-learning fault is shown in the table below, where FA.39 fault sub-code shows "20xx" as self-learning fault sub-code.

FA.39 Fault subcode	**Troubleshooting information**	**Countermeasures**
2001	Current saturation, Hall detection problem or excessive output current	Check motor wiring for phase shorts
2002	Excessive current zero bias	Check Hall sensor for problems
2003	Current imbalance	Check the motor wiring, whether there is output phase loss
2004	Current oscillation	1. Check the motor connection, whether

		there is a short circuit between phases 2. Check whether the input motor nameplate parameters are correct
2005	Static learning current amplitude exceeds limit	1. Check the motor connection, whether there is a short circuit between phases 2. Check whether the input motor nameplate parameters are correct
2006	Static learning U-phase current over limit	Check the U-phase motor connection for phase-to-phase or ground shorts
2007	Static learning V phase current over limit	Check the V-phase motor connection for phase-to-phase or ground shorts
2008	Static learning W phase current over limit	Check the W-phase motor connection for phase-to-phase or ground shorts
2009	Continuous current overlimit during dynamic learning	1. Check the motor connection, whether there is a short circuit between phases 2. Check whether the input motor nameplate parameters are correct
2010	Voltage saturation	1. Check the motor connection, whether there is a short circuit between phases 2. Check whether the input motor nameplate parameters are correct
2011	Output voltage exceeds the limit	The output voltage has reached the maximum value, but the current output is small (motor impedance is large or the learning frequency is set too large)
2015	Rotor resistance is too large	Check if the input motor nameplate parameters are correct
2016	Inductance is too large	Check if the input motor nameplate parameters are correct
2040	Self-learning timeout	1. Check whether the input motor nameplate parameters are correct 2. Whether the motor control mode selection matches the motor
2041	Parameter error	Re-enter the motor nameplate parameters

2043	Carrier exceeds limit	Check whether the entered motor nameplate parameters are correct
2044	Rotor resistance is negative	1. Check the motor connection, whether there is a short circuit between phases 2. Check whether the input motor nameplate parameters are correct
2045	Synchronizer output voltage over limit	Check if the input motor nameplate parameters are correct
2046	Learning counter potential voltage is high	Check if the input motor rated voltage is correct
2047	Learning counter potential voltage is low	Check if the input motor rated voltage is correct
2048	Asynchronous motor no-load current learning value (rotation self-learning) is not within 90%~5% of rated current	--
2050	Wrong direction of motor rotation	1. Check whether the motor connection is correct 2. Check whether the PG card is connected correctly 3. Separate the motor from the machinery and relearn
2051	Synchronous motor encoder direction learning failed	Encoder broken wire or signal interference or motor blocking
2052	Z pulse not detected by synchronous machine	Check whether the PG card is connected correctly
2053	Synchronous machine Z pulse deviation is too large	Check whether the PG card is connected correctly Check whether the PG card parameters are set correctly
2060	Motor rated current deviates too much from AC drive current	Greater than 10 times the rated current of the AC drive or less than 1/15 the rated current of the AC drive
2061	Maximum frequency is limited	The maximum frequency of the AC drive

		set is less than the rated frequency of the motor, reset the maximum frequency of the AC drive and the upper limit frequency and then learn again
2062	Frequency converter and motor current deviation is too large	Check whether the difference between AC drive power level and motor power level is too large
2064	Motor no-load current learning value is too large or too small	1. Check whether the input motor nameplate parameters are correct 2. Whether the motor control mode selection matches the motor
2065	Motor mutual inductance learning value is too large or too small	1. Check whether the input motor nameplate parameters are correct 2. Whether the motor control mode selection matches the motor
2066	Motor rotor resistance learning value is too large or too small	1. Check whether the input motor nameplate parameters are correct 2. Whether the motor control mode selection matches the motor
2090	Stop command is given during learning	Failure to complete parameter learning, need to relearn
Other sub-codes	Multiple faults occur simultaneously while learning	1. Check whether the motor connection is correct 2. After rewiring learning still report the sub-code failure, seek technical support from the manufacturer

9.5 Fault Reset Method

When the AC drive stops operating due to a fault, please follow the steps below to identify the cause and restart the AC drive after taking appropriate countermeasures.

9.5.1 A Fault Occurred but the AC drive was not Powered ff

1. Confirm the fault code displayed on the keypad and the FA.39 fault subcode.
2. Please refer to the section on troubleshooting to troubleshoot the cause of the problem.
3. Perform a fault reset operation.

9.5.2 Fault Reset

After the occurrence of a fault, to restore the AC drive to normal, it is necessary to reset the fault after eliminating the cause of the fault. There are four types of fault reset methods, namely:

1. Press the display reset button when a fault occurs.
2. Functional input terminal function selects fault reset and makes the terminal valid.
3. Send the fault reset command through communication.
4. The AC drive is re-powered.

Chapter 10 Daily Maintenance

10.1 Daily Maintenance and Inspection

⚠ Caution
Inspection must be carried out by professional technicians, if necessary, the power of the AC drive should be cut off first

ACH200 high-voltage AC drive speed control system has the characteristics of high reliability and maintenance-free electrical system, but in daily use, influenced by ambient temperature, humidity, dust, vibration and aging of internal components of the AC drive, some potential problems may occur during the operation of the AC drive. In order for the AC drive to operate in a long-term and stable manner, a regular inspection must be conducted every 3 ~ 6 months. The inspection content is shown in the following table:

Frequency of inspection		**Inspection items**	**Inspection content**	**Discriminatory criteria**
Daily	**Regular**			
√	--	Operating Environment	1.Temperature, humidity 2.Dust, gas	1. Open the AC drive cover for temperatures > 40°C Humidity < 90% without frost 2. No odor, no flammable or explosive gases 2. No odour, no flammable or explosive gases
--	√	Cooling System	1. Installation environment 2. AC drive body fan	1. The installation environment is well ventilated and the air ducts are not blocked 2. Normal operation of the body fan, no abnormal noise
√	--	AC drive body	1. Vibration, temperature rise 2. Noise 3. Wires, terminals	1. Smooth vibration, normal air temperature at the outlet 2. No abnormal noise, no odor 3. No loose fastening screws

√	--	Motor	1. Vibration, temperature rise 2. Noise	1. Smooth operation, normal temperature 2. No abnormal, uneven noise
√	--	Input and output parameters	1. Input Voltage 2. Output current	1. Input voltage is within the specified range 2. The output current is below the rated value
√	--	Transformer	1. Transformer	1. The temperature of the
--	√	Insulation withstand voltage	1. The insulation resistance between the charged circuit and the ground (shell) 2. Each charged	1. At an ambient temperature of 20℃ and relative humidity of 90%, not less than 100MΩ 2. The test voltage is 1.25 times of the highest instantaneous

10.2 Inspection and Replacement of Wearable Parts

Some components in the AC drive will wear out or deteriorate in performance during use. To ensure stable and reliable operation of the AC drive, the AC drive should be subject to preventive maintenance and replacement of components when necessary.

1) Anti-dust filter

The dust filter is a filtering device out of the air inlet of the AC drive, used to filter dust and other particles, and it is recommended to replace and clean it once a month. Replacement method is as follows:

1. Push the square hole of the protective mesh cover upward.

2. When the bottom of the protective mesh cover can be titled over the square hole of the door plate, pull the protective mesh cover outward from the bottom; take out the anti-sheng Mu inside the protective mesh cover.

3. Replace the new anti-exit plate, and then put the shield assembly into the square hole of the door plate.

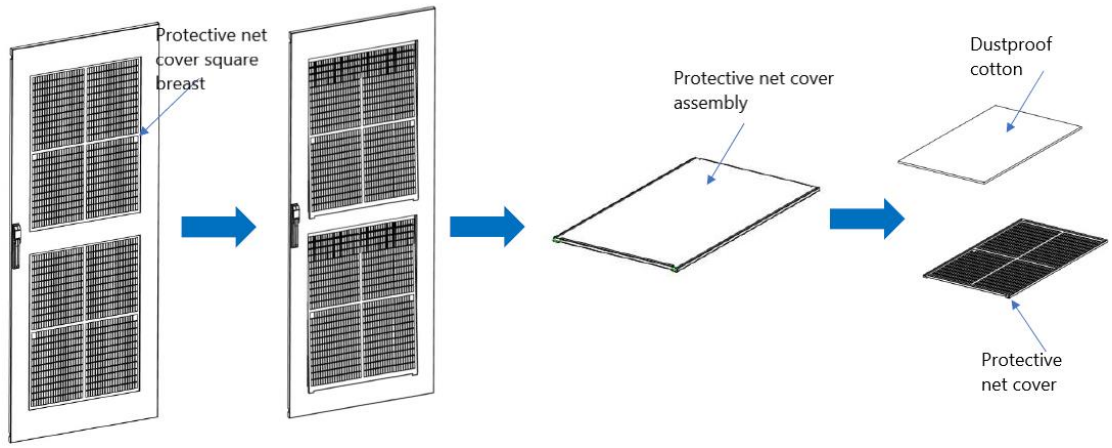


Figure 10-1

2) Cooling fan

All cooling fans inside the AC drive have a service life of about 15,000 hours (i.e., the AC drive is used continuously for about two years), and should be replaced immediately if abnormal sounds or vibrations occur in the fans.

Version Change Log

Date	Changed version	Change
2023.05	V1.0	First Edition Release