XINJE

VHL Series Frequency Converter

User Manual

WUXI XINJE ELECTRIC CO., LTD.

Data No.: INV C 09 20260423 1.4

XINJE

VHL Series Frequency Converter User Manual

Basic Description

- Thank you for purchasing XINJE VHL series frequency converter. Please read this product manual carefully before carrying out relevant operation.
- The manual mainly provides users with relevant guidance and instructions for the correct use and maintenance of the frequency converter. The manual involves the functions of the frequency converter capability, usage, installation and maintenance, etc.
- The contents in the manual are only applicable to the inverter products of Xinje company.

Notice to Users

This manual is applicable to the following personnel:

- The installation personnel of frequency converter
- Engineering and technical personnel (electrical engineer, electrical operator, etc.)
- The designer

Before the above personnel operate or debug the inverter, please carefully read the chapter of safety precautions in this manual.

Statement of Responsibility

- Although the contents of the manual have been carefully checked, errors are inevitable, and we can not guarantee the complete consistency.
- We will check the contents of the manual frequently and make corrections in subsequent versions. We welcome your valuable comments.
- The contents described in the manual are subject to change without prior notice.

Contact Way

If you have any questions about the use of this product, please contact the agent that purchased the product, or you can contact XINJE company directly.

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- Email: sales@xinje.com tech@xinje.com
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Catalog

Attention

Safety precautions

(1) Definition of safety information

	Notice	Steps taken to ensure proper operation.
	Danger	If you do not comply with the relevant requirements, it will cause serious personal injury, or even death.
	Warning	Failure to comply with the requirements may result in personal injury or equipment damage.

(2) Safety notice

- Unpacking check

 Notice
1. Before unpacking, please check whether the outer package of the product is in good condition, and whether there is damage, moisture, deformation, etc. 2. Before unpacking, please check whether the external model identification of the packing box is consistent with that of the ordered model. 3. When unpacking, please check the surface of products and accessories for damage, corrosion, bruise, etc. 4. After unpacking, please check whether the product name plate label is consistent with the external model label. 5. After unpacking, check whether the internal accessories are complete, including operation panel and manual. Note: If any of the above five points appear during unpacking, please contact us in time, and we will solve the problem for you as soon as possible.

- Installation

 Notice
1. When carrying, please hold the bottom of the machine. If you only hold the panel, there is a risk that the main body will fall and hurt your feet. 2. Please install it on the plate of metal and other non combustible materials. If it is installed on flammable materials, there is a risk of fire. 3. When more than two inverters are installed in the same control cabinet, please set the cooling fan and keep the air temperature at the air inlet below 40 ℃. Due to overheating, it can cause fire and other accidents.

- Wiring

Notice

1. Please confirm whether the rated voltage of AC main circuit power supply is consistent with that of frequency converter.
   Danger of injury and fire.
2. Do not do voltage withstand test on the inverter.
   Will cause damage to semiconductor components, etc.
3. Please connect the brake resistor or brake unit according to the wiring diagram.
   There is a risk of fire.
4. Please use the screw driver with specified torque to fasten the terminal.
   There is a risk of fire.
5. Do not connect the input power line to the output U, V and W terminals.
   If the voltage is applied to the output terminal, the inverter will be damaged internally.
6. Do not connect the phase-shifting capacitor and LC / RC noise filter to the output circuit.
   It will cause internal damage to the inverter.
7. Do not connect the electromagnetic switch and contactor to the output circuit.

When the frequency converter is running with load, the surge current generated by the action of electromagnetic switch and electromagnetic contactor will cause the over-current protection circuit of the frequency converter to act.

8. Do not remove the front panel cover.
   May cause internal damage to the inverter.

Danger

1. Before wiring, please make sure that the input power has been cut off.
   Danger of electric shock and fire.
2. Ask electrical engineering professionals to do wiring operation.
   Danger of electric shock and fire.
3. The grounding terminal must be reliably grounded.
   Danger of electric shock and fire.
4. After the emergency stop terminal is connected, be sure to check whether its action is effective.
   There is a risk of injury. (the responsibility for wiring shall be borne by the user)
5. Do not touch the output terminal directly, do not connect the output terminal of the inverter with the cover, and do not short circuit between the output terminals. There is danger of electric shock and short circuit.
6. After cutting off the AC power supply, before the indicator light of the AC motor driver goes out, it means that there is still high voltage inside the AC motor driver, which is very dangerous. Please do not touch the internal circuit and components.

- Maintenance and inspection

Notice

1. The keyboard, control circuit board and driver circuit board are equipped with CMOS integrated circuits. Please pay special attention when using.
   If you touch the circuit board directly with your fingers, static induction may damage the integrated chip on

the circuit board.

2. Do not change the wiring or remove the terminal wiring during power on. Do not check the signal during operation. It will damage the equipment.

Danger

1. Do not touch the terminal of the inverter, there is high voltage on the terminal. Danger of electric shock.
2. Before power on, be sure to install the terminal cover. When removing the cover, be sure to disconnect the power supply. Danger of electric shock.
3. Non professional technicians are not allowed to carry out maintenance and inspection. Danger of electric shock.

Precautions for Use

- Constant torque and low speed operation

When the inverter with ordinary motor runs at low speed for a long time, the motor life will be affected due to the poor heat dissipation effect. If low speed constant torque long-term operation is needed, special frequency converter motor must be selected.

- Confirmation of motor insulation

When using VHL series frequency converter, please confirm the insulation of the motor before connecting the motor, so as to avoid damaging the equipment. In addition, when the motor is in a bad environment, please check the insulation of the motor regularly to ensure the safe operation of the system.

- Negative torque load

For such occasions as lifting the load, there will often be negative torque, and the frequency converter will trip due to over-current or over-voltage fault. At this time, the selection of braking resistance should be considered.

- Mechanical resonance point of load device

In a certain output frequency range, the inverter may encounter the mechanical resonance point of the load device, which must be avoided by setting the jump frequency.

- Capacitors or varistors to improve power factor

Since the output voltage of the frequency converter is pulse wave type, if the output side is installed with a capacitor to improve the power factor or a varistor for lightning protection, it will cause the fault tripping of the frequency converter or damage to the components. Please remove it. In addition, it is recommended not to add switches such as air switches and contactors on the output side.

- Derating usage during fundamental frequency setting

When the fundamental frequency setting is lower than the rated frequency, please pay attention to the derating of the motor to avoid overheating and burning it out.

- Operating at frequencies above 50Hz

If operating above 50Hz, in addition to considering the increase in motor vibration and noise, it is also necessary to ensure the speed range of motor bearings and mechanical devices, and it is necessary to check in advance.

- Electronic thermal protection value of the motor

When selecting an adaptive motor, the frequency converter can provide thermal protection for the motor. If the rated capacity of the motor and frequency converter does not match, it is necessary to adjust the protection value or take other protective measures to ensure the safe operation of the motor.

- Altitude and Derating Usage

In areas with an altitude exceeding 1000 meters, the cooling effect of the frequency converter becomes worse due to the thin air, and it is necessary to reduce the rating for use.

- Protection level

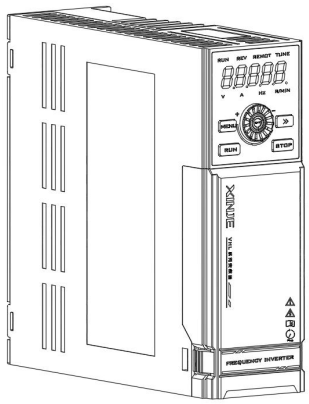
The protection level IP20 of VHL series frequency converters refers to the level achieved when using a status display unit or keyboard.

Scrapping Precautions

When scrapping the frequency converter, please note: The electrolytic capacitor of the main circuit and the electrolytic capacitor on the printed board may explode when burning. Plastic parts can produce toxic gases when burned. Please dispose of it as industrial.

1. Product Introduction

1-1.Product Overview



VHL series is a simple inverter developed by XINJE company. The product adopts vector control technology, which realizes asynchronous open-loop vector control, and strengthens the reliability and environmental adaptability of the product.

1-1-1.Naming Rule

VH L - 4 5P5 - B
① ② ③ ④ ⑤

Serial	Description	
①	Product identification	VH: General inverter
②	Product series	L: Book type open-loop vector frequency converter
③	Input voltage level	4: AC 380V 2: AC220V
④	Power level	1P5: 1.5kW 0P7: 0.75kW The decimal point is represented by “P”
⑤	Brake unit	B: Built-in brake unit

1-2. Specification

1-2-1.Technical specification

Model VHL-_ _ _ _-B	20P4	20P7	40P4	40P7	41P5
Adaptive motor (KW)	0.4	0.75	0.4	0.75	1.5
Input rated current (A)	5.4	5.6	1.9	3.4	5
Power supply capacity (KVA)	1	1.5	1	1.5	3
Output rated current (A)	2.3	4.0	1.5	2.1	3.8

Model VHL-_ _ _ _-B		40.4G/0.7P	40.7G/1.5P
Adaptive motor (KW)	G type	0.4	0.75
	P type	0.75	1.5
Input rated current (A)		1.9	3.4
Power supply capacity (KVA)		1	1.5
Output rated current (A)	G type	1.5	2.1
	P type	2.1	3.8

1-2-2. General specification

Item		Specification	
Input	Rated voltage, frequency	380V level: Three-phase 380V, 50Hz/60Hz	
		220V level: Single phase 220V, 50Hz/60Hz	
	Allowable voltage fluctuation range	-15%～+15％ Voltage imbalance rate: <3%	
Output	Voltage	0～Input voltage	
	Frequency	0～600Hz	
Control performance	Control motor type	Asynchronous motor	
	Control performance	Vector control without speed sensor (SVC)	V/F control (VF)
	Speed accuracy	±0.5%	±1%
	Speed fluctuations	±0.3%	±0.5%
	Speed range	1:100	1:50
	Startup torque	0.5Hz:150%	1.0Hz:150%
	Torque accuracy	±10% of rated torque	/
	Torque response	≤20ms	/
	Overload ability	SVC:150% rated current 53s; 180% rated current 1s; VF: 150% rated current 74s	
	Frequency accuracy	Low frequency operation mode: 0.01Hz High frequency operation mode: 0.1Hz	
	Frequency resolution	Digital setting: 0.01Hz; Analog setting: max frequency×0.025%	
Control terminal input	Input channel	Up to 5 channels digital input X, 2 channels analog output(0~10V/0~20mA), X4 terminal can support the maximum 50 KHz high-speed pulse input.	
Control terminal output	Output channel	Support 1 channel digital output, 1 channel analog output (0~10V/0~20mA), 1 channel relay output (1 pair of NO, 1 pair of NC) Y1 terminal can support the maximum 50 kHz high-speed pulse output.	

Item		Specification
Function	Startup command setting	Communication setting（Modbus）, operate panel setting, terminal setting
	Frequency setting mode	Communication setting (Modbus), operate panel setting, terminal setting, analog AI setting, multi-speed setting, simple PLC setting, PID setting, main and auxiliary setting
	Typical function	Frequency main and auxiliary operation, reverse inhibition, torque boost, nine kinds of V/F curve settings, five segments of AI curve settings, acceleration and deceleration curve settings, terminal delay and filtering, terminal multi-function input and output, DC braking, energy consumption braking, inching operation, 16 segments of speed, built-in two channels of PID, speed tracking restart, carrier modulation, fault recording, fault self reset, pre-excitation start, 30 groups of user defined parameters
	Important function	Carrier modulation, torque control, motor auto-tuning, current limiting control, over-voltage control, under voltage control, speed tracking, droop control, vibration suppression, over-voltage and over-current stall control, automatic voltage regulation (AVR), automatic energy-saving operation, etc
	Protection function	Power on motor short-circuit detection, input and output phase loss protection, over-current protection, over-voltage protection, under voltage protection, overheat protection, overload protection, under load protection, over-current and voltage stall protection, relay closing protection, terminal protection, instantaneous power failure non stop, etc
	Energy consumption braking	built-in braking unit as standard, can connect external brake resistor
	Common DC bus	When the frequency converter decelerates, it shares the regenerative energy, improves the braking ability, achieves the purpose of energy saving and saves the additional space and cost required by the resistance
Special functions	Multi-bus	Main unit Modbus
	LCD panel	LCD display, parameter setting, status monitoring, parameter copying, fault analysis and location, program download, and mass storage of parameters
	Non stop when instantaneous power failure	During an instantaneous power faliure, the load feedback energy compensates for the decrease in voltage, maintaining the frequency converter to continue operating for a short period of time
	Timing control	Timing control function: the time range is 0.1Min~6500.0Min
	Multi-motor switching	Two sets of motor parameters can realize the switching control of two motors.
	Flexible and diversified terminal functions	The multifunctional terminals X have 51 logical function options, Y has 42 logical function options, and AO has 19 logical function options, meeting the conventional control function requirements of general frequency converters
	Communication customization	It is convenient for users to continuously read and write frequency converter parameters

Item		Specification
	Parameters	
	Software	Rich backend monitoring functions, convenient for on-site data collection and debugging
Display and keyboard	Keyboard display	Can display various parameters such as set frequency, output frequency, output voltage, output current, input/output status, etc
	Button locking	Implement partial or complete locking of buttons to prevent accidental triggering
	Parameter copy	Standard LED single display numeric keyboard, optional LCD Chinese and English display keyboard (parameter download)
	Optional accessories	LCD keyboard
Environment	Place of use	Indoor, not exposed to direct sunlight, free from dust, corrosive gases, flammable gases, oil mist, water vapor, dripping water or salt, etc
	Altitude	Below 1000 meters. (When it is higher than 1000 meters, it needs to be derated for use, and the output current will be reduced by about 1% of the rated current for every increase of 100 meters in height)
	Ambient temperature	-10℃ ~ +40℃ (the ambient temperature is between 40℃ and 50℃. Please reduce the rating or enhance heat dissipation)
	Ambient humidity	Less than 95% RH, no condensation of water droplets
	Vibration	Less than 5.9m/s² (0.6G)
	Storage temperature	-40℃～+70℃
	Protection level	IP20
	Cooling method	Forced air cooling
Mounting method		Wall Mounting

2. Installation and wiring

2-1. Installation environment

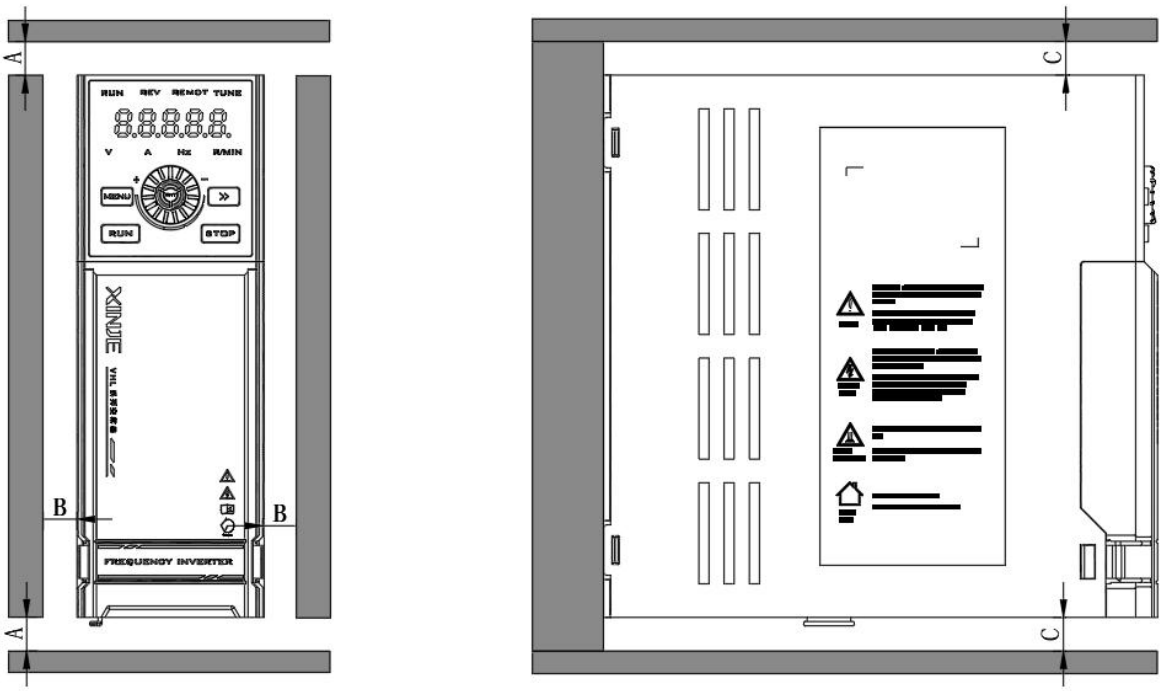
2-1-1. Environment requirements

- Installed in a well ventilated indoor environment, the ambient temperature is required to be within the range of -10 ºC to 40 ºC. If the temperature exceeds 40 ºC, external forced cooling or derating is required for use.
- Avoid installation in places with direct sunlight, dust, and floating fibers and metal powders.
- It is strictly prohibited to install in places with corrosive and explosive gases.
- The humidity requirement is below 95% RH, and there is no condensation of water droplets.
- Fixed vibration less than 5.9m/s²(0.6G) when installed on a flat surface.
- Try to stay away from electromagnetic interference sources and other electronic instruments and equipment sensitive to electromagnetic interference.

2-1-2. Installation direction and space

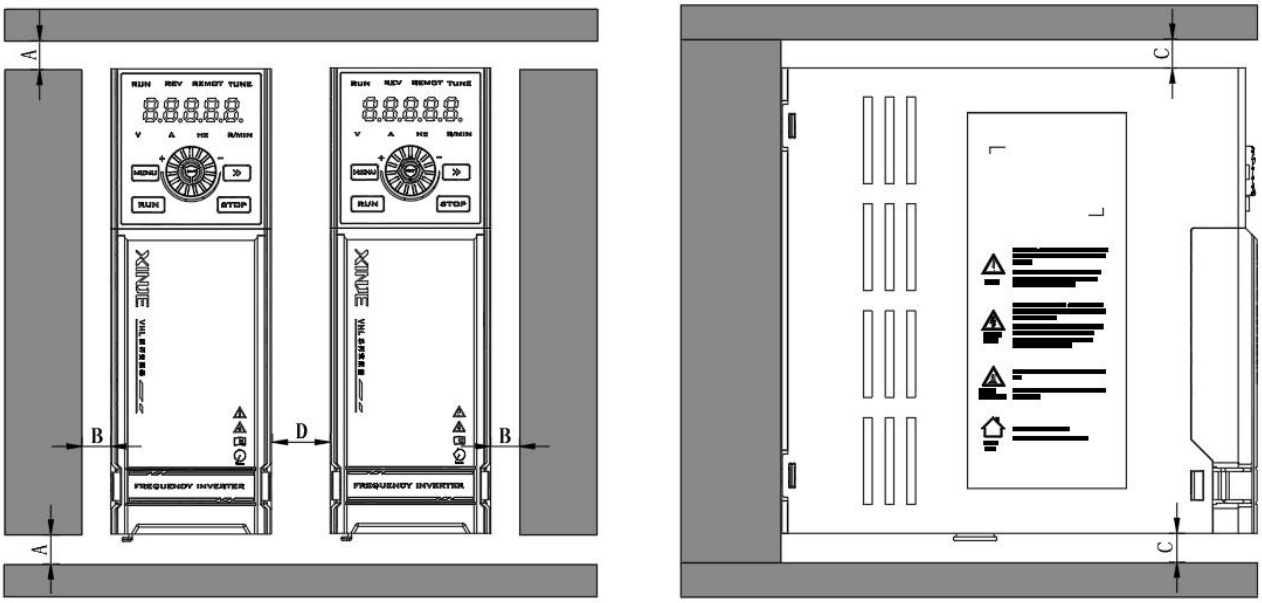
- Generally, it should be installed vertically.
- Minimum requirements for installation spacing and distance.
- When multiple frequency converters are installed up and down, a guide baffle should be used in the middle.
- When the room temperature is lower than 25ºC, VHL-20P7-B, VHL-20P4-B, VHL-40P7-B and VHL-40P4-B can be installed without space.

2-1-3. Single installation



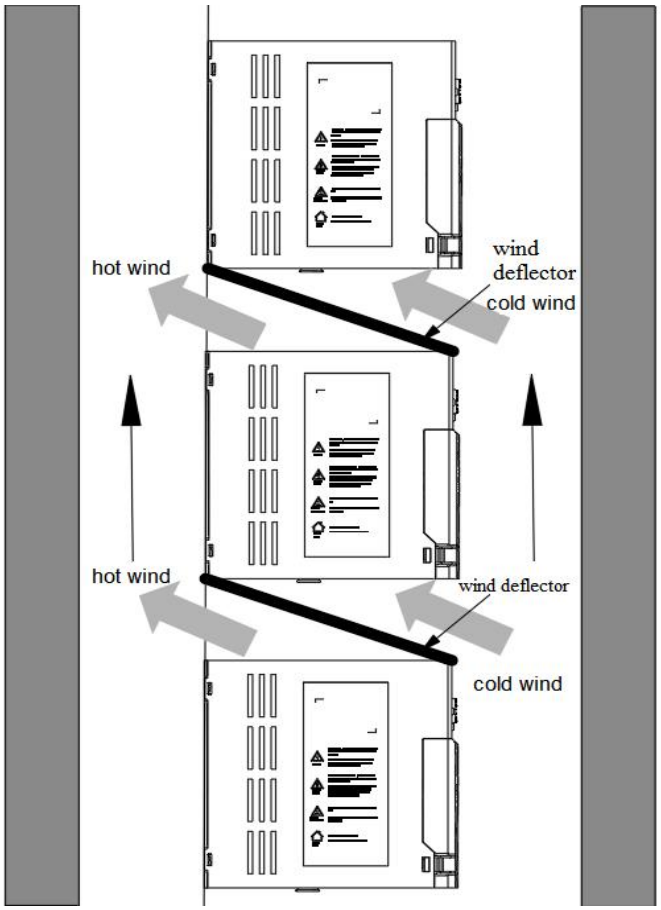
Note: The dimensions of A and B are above 50mm, while the dimensions of C are above 100mm.

2-1-4. Multiple installations



Note: The dimensions of A and B are above 50mm, while the minimum dimensions of C and D are 100mm.

2-1-5. Vertical installation



When installing vertically, it is necessary to add a wind deflector, otherwise it may cause mutual influence between multiple frequency converters and cause poor heat dissipation.

2-1-6. Extend the operate panel

The model of the panel external bracket and related accessories is VH6-DPANEL, and the dimensions of the panel installation bracket are shown in chapter 6-2.

Panel extension cable models: JC-RD-30 (3 meters), only available in lengths of 3 meters. If other lengths of extension cables are needed, ordinary network cables can be used instead.

2-2. Precautions for wiring

Notice

- Before wiring, ensure that the power supply has been completely cut off for more than 15 minutes, otherwise there is a risk of electric shock.
- It is strictly prohibited to connect the power cord to the output terminals U, V, and W of the frequency converter.

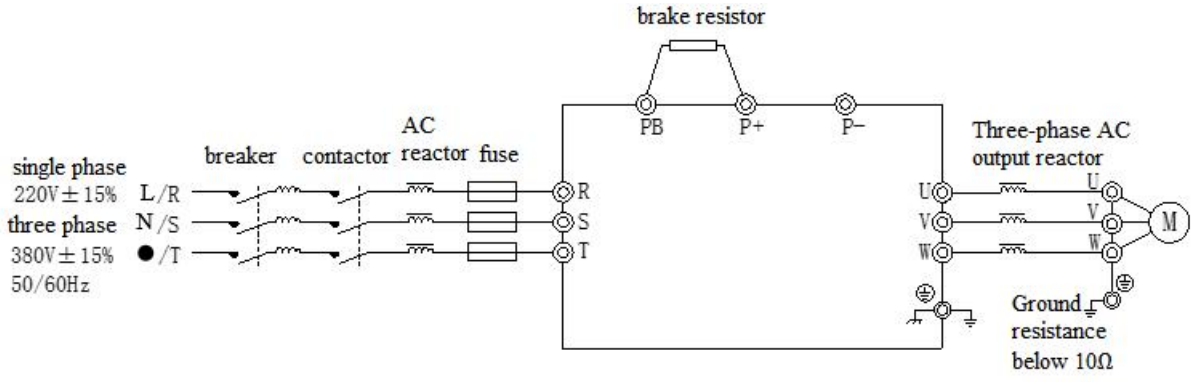
- There is leakage current inside the frequency converter itself. To ensure safety, the frequency converter and motor must be safely grounded, and the grounding wire is generally 3.5mm² and above copper wire in diameter. The grounding resistance is less than 10Ω.
- The frequency converter has passed the voltage withstand test before leaving the factory, and users are no longer allowed to conduct voltage withstand tests on the frequency converter.
- Electromagnetic contactors, absorption capacitors, or other resistance capacitance absorption devices cannot be installed between the frequency converter and the motor.
- To provide input side overcurrent protection and facilitate power outage maintenance, the frequency converter should be connected to the power supply through a circuit breaker.
- The wiring for the input and output circuits of the control terminal should be 0.75mm² and above twisted or shielded wires, with one end of the shielding layer suspended and the other end connected to the grounding terminal PE of the frequency converter, have a wiring length of less than 50m.

Danger

- Ensure that the power supply to the frequency converter has been completely cut off, all LED indicators on the operating keyboard are turned off, and wait for more than 15 minutes before proceeding with wiring operations.
- Confirm that the DC voltage between P＋ and P－ poles of the internal electrolytic capacitor of the frequency converter has dropped below DC36V before starting the internal wiring work.
- Wiring operations can only be carried out by trained and authorized qualified professionals.
- Before powering on, pay attention to checking whether the voltage level of the frequency converter is consistent with the power supply voltage, otherwise it may cause casualties and equipment damage.

2-3. Main circuit terminal and wiring

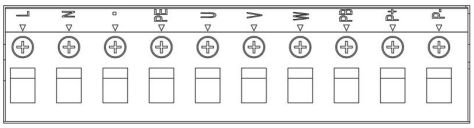
2-3-1. Wiring diagram



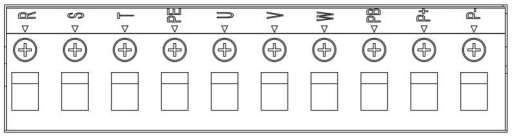
Circuit breakers, contactors, AC reactors, fuses, braking resistors, and output reactors are all optional accessories. Please refer to chapter 6 for detailed guidance on peripheral accessory selection.

2-3-2. Main circuit terminal arrangement and description

- VHL-20P4-B-H and VHL-20P7-B-H main circuit terminal



- VHL-40.4G/0.7P-B and VHL-40.7G/1.5P-B main circuit terminal



- Main circuit terminal explanation

Terminal	Name	Function
R, S, T	Three-phase power input terminal	AC input three-phase power connection point
L, N	Single phase power input terminal	AC input single-phase power connection point
U, V, W	Frequency converter output terminal	Connecting three-phase motors
PE	Grounding terminal	protective earthing
P+, PB	Brake resistor connection terminal	Brake resistor connection terminal
P+, P-	DC bus terminal +, -	Common DC bus input point

1. Input power R, S, T or L, N

(1) The input side wiring of the frequency converter has no phase sequence requirements; When the frequency converter supplies single-phase 220V power, connect L and N terminals; When the frequency converter supplies three-phase 380V power, connect R, S, and T; Please refer to chapter 2-3-2. Main circuit terminal arrangement and instructions for terminal locations.

(2) Circuit breakers, contactors, AC reactors, fuses, braking resistors, and output reactors are all optional accessories. For details, please refer to chapter 6.

2. P+, P-

(1) After a power outage, there is residual voltage between P+ and P-, and all LED indicators on the operating keyboard turn off. Wait for more than 15 minutes before proceeding with wiring operations.

(2) Do not directly connect the braking resistor to the busbar, otherwise it may cause damage to the frequency converter or even fire.

3. P+, PB

(1) The recommended value for selection of braking resistor should be referred to, and the wiring distance should be less than 5m, otherwise it may cause damage to the frequency converter.

4. Output side U, V, W

(1) Please refer to chapter 6 for selection and size of output side cables.

(2) Capacitors or surge absorbers cannot be connected to the output side of the frequency converter, otherwise it may cause damage to the frequency converter.

(3) When the length of the motor cable is greater than 100m, it is easy to generate electrical resonance due to the influence of distributed capacitance. Therefore, it is necessary to install an AC output reactor near the frequency converter.

5. Grounding terminal PE

(1) The terminal must be reliably grounded, and the grounding wire resistance must be less than 10Ω. Otherwise, it may cause abnormal operation or even damage to the equipment.

(2) Do not share the grounding terminal PE with the power zero line N terminal.

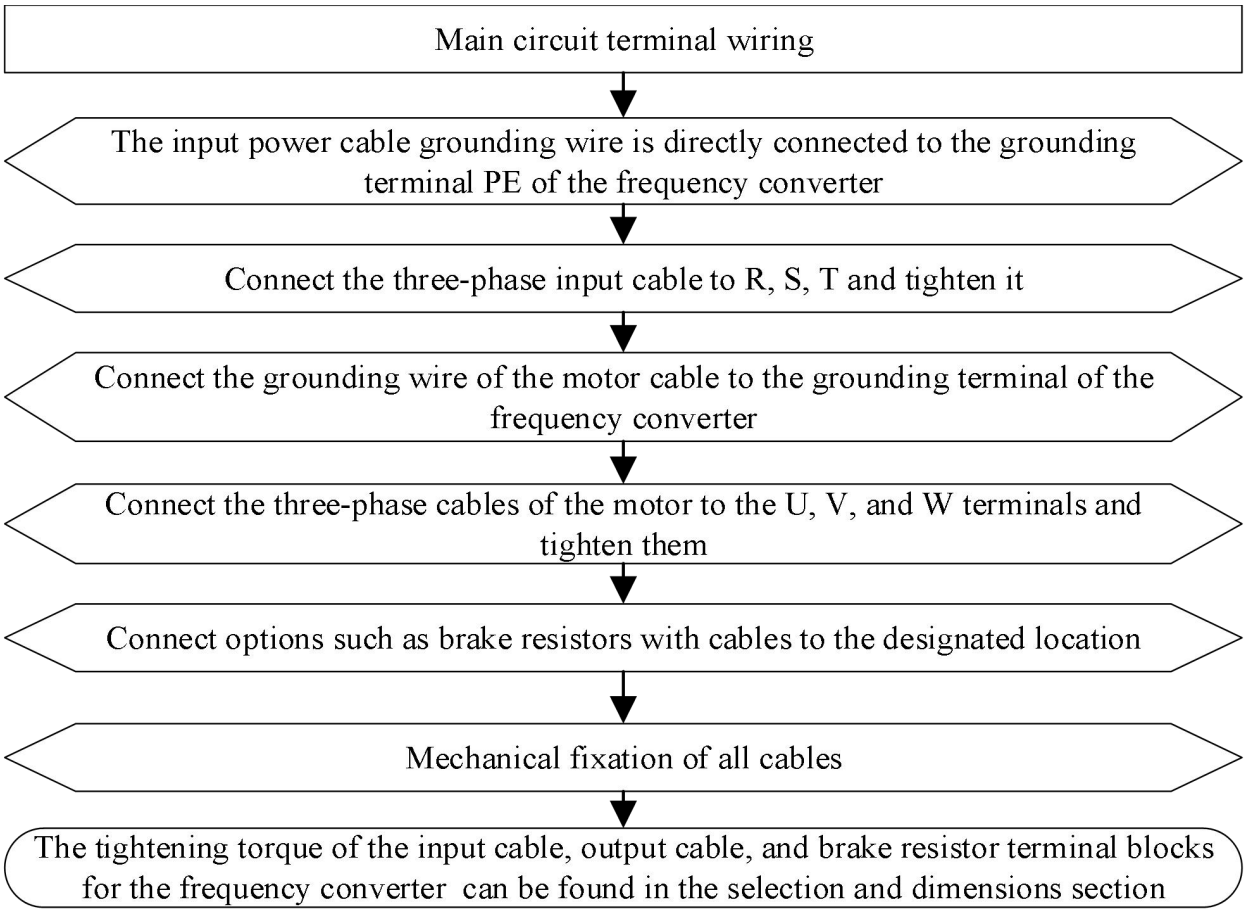
(3) The impedance of the protective grounding conductor must meet the requirement of being able to withstand the possible large short-circuit current in the event of a fault.

(4) The size of the protective grounding conductor shall be selected according to the following table.

The cross-sectional area of a single phase line (S)	Minimum cross-sectional area of protective conductor (S_p)
$S \leq 16mm^2$	S
$16mm^2 < S \leq 35mm^2$	$16mm^2$
$35mm^2 < S$	S/2

(5) Protective grounding must use yellow and green cables.

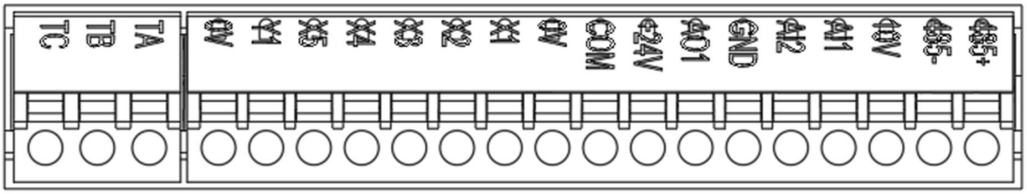
2-3-3. Main circuit terminal wiring process



2-4. Control circuit configuration and wiring

2-4-1. Description and function of control circuit terminals

1. VHL series frequency inverter control terminals



2. Control circuit terminal description

type	terminal	name	terminal functions
communication	485+, 485-	RS485 interface	Standard RS485 communication interface, using twisted pair or shielded wire
power supply	10V-GND	+10V power supply	Provide +10V power supply, maximum output current: 20mA. It is generally used for external potentiometer speed regulation.
	24V-0V	DC 24V power supply	Provide +24V power supply to terminals, maximum output current: 100mA. Generally used as a working power supply for digital input and output terminals. Do not connect external loads.
common terminal	COM	common terminal for X input	When using an internal power supply to drive the X terminal: COM and 24V short circuited to form an NPN input, Short circuit COM and 0V to form PNP input. When using an external power source to drive the X terminal: NPN type input connection method, COM connected to 24V+ of power supply, and disconnected from the 24V terminal of the variable frequency body, PNP type input connection method, COM is connected to the 0V of power supply and disconnected from the 0V terminal of the variable frequency body.
analog input	AI1-GND	analog input AI1	Select voltage/current input by DIP switch, Input voltage range: 0-10V (input impedance: 22kΩ), Input current range: 0-20mA (input impedance: 500Ω).
	AI2-GND	analog input AI2	
analog output	AO1-GND	analog output AO1	Select voltage/current output by the DIP switch, Voltage output range: 0-10V; External load 2kΩ -1MΩ Current output range: 0-20mA; External load less than 500Ω
digital input terminals	X1	digital input terminal 1	Optocoupler isolation input, Input impedance: R=2kΩ, Input voltage range: 9-30V,
	X2	digital input terminal 2	
	X3	digital input terminal 3	

type	terminal	name	terminal functions
	X4	digital input terminal 4	Compatible with bipolar input, In addition to the characteristics of X1-X5, X4 can also serve as a high-speed pulse input channel, the highest frequency is 50kHz.
	X5	digital input terminal 5	
digital output terminals	Y1	digital output terminal 1	Open collector output, Output voltage range: 0-24V, Output current range: 0-50mA.
relay output terminal	TA TB TC	output relay	Programmable defined as multiple electrical output terminals TA-TB: normally open TA-TC: normally close contactor capacity: AC250V/2A (COSΦ=1) AC250V/1A (COSΦ=0.4) DC30V/1A

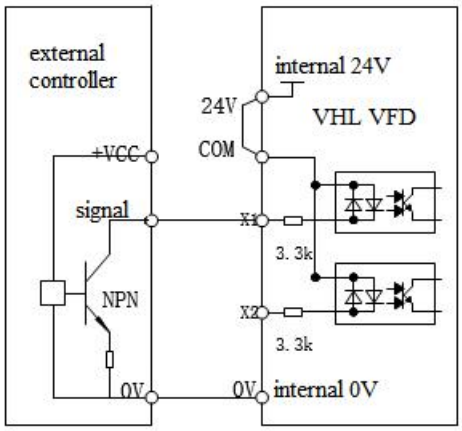
Before putting the frequency converter into use, the terminal wiring and all jumper switches on the control board should be correctly set.

2-4-2. Digital I/O terminal wiring

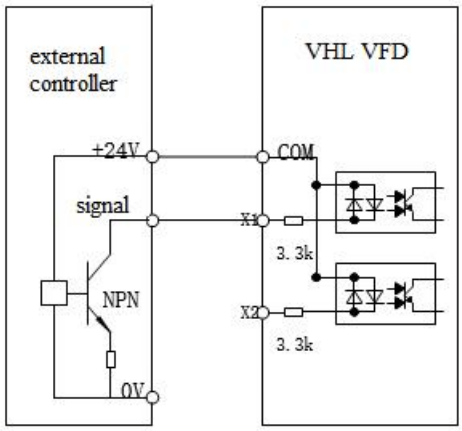
1. Digital input terminal

Generally, shielded cables are required, and the wiring distance should be as short as possible, not exceeding 20m. When using active driving mode, necessary filtering measures need to be taken for the crosstalk of the power supply. It is recommended to use contact control method, and the specific wiring diagram is as follows:

- Single frequency conversion leakage wiring method



Leakage wiring method using 24V power supply on expansion card

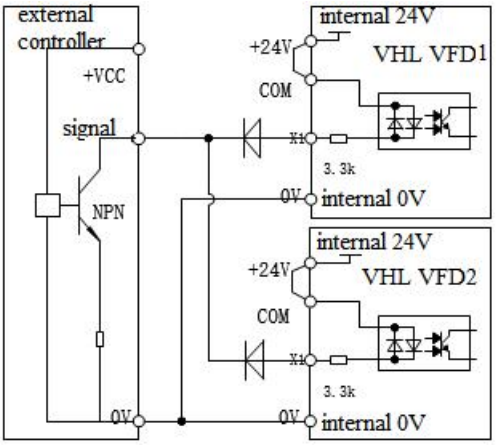


Leakage wiring method using external 24V power supply

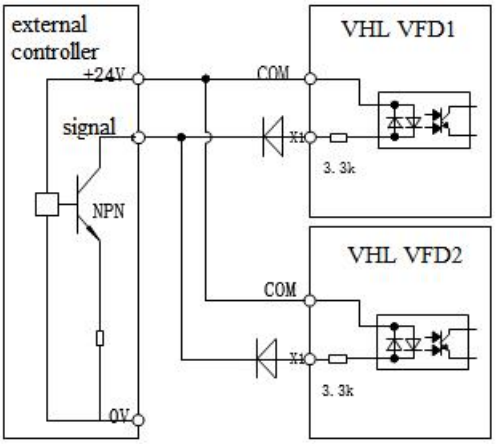
The use of internal 24V power supply from the frequency converter is the most common wiring method. Short circuit the COM of the frequency converter to 24V, connect the 0V of the frequency converter to the 0V of the external controller, connect the X terminal to the signal terminal of the external controller, and control the frequency

converter through the on-off of the circuit.
If using external 24V, it is necessary to connect the COM terminal of the frequency converter to the external 24V, and the external power supply 0V is connected to the corresponding X terminal through the external controller control contact.

- Multiple frequency conversion leakage wiring methods



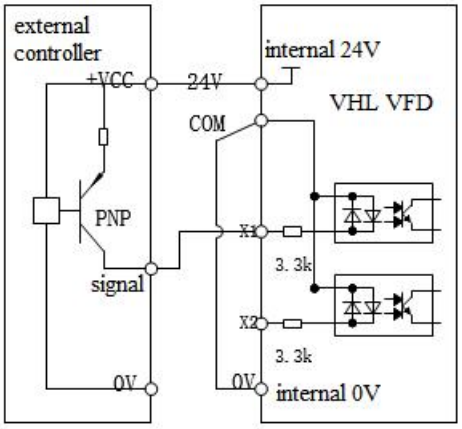
Leakage wiring method for using 24V power supply on expansion cards for multiple frequency converters



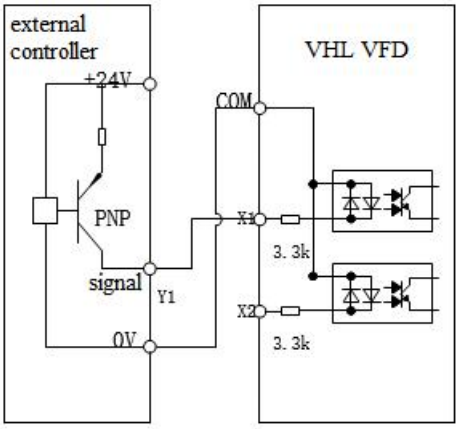
Leakage wiring method for multiple frequency converters using external 24V power supply

In this wiring method, the X terminals of different inverters cannot be connected in parallel, otherwise it may cause X malfunction. If X terminals need to be connected in parallel (between different inverters), a diode (anode connected to X) needs to be connected in series at the X terminal for use. The diode must meet the requirements of IF>40mA and VR>40V.

- Single variable frequency source wiring method



Source wiring method using 24V power supply on expansion card



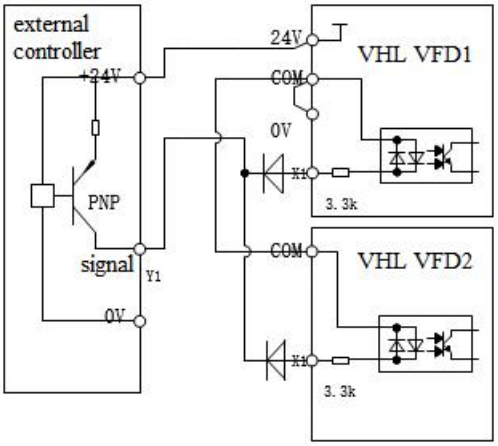
Source wiring method using external 24V power supply

If using the internal 24V power supply of the frequency converter, it is necessary to short circuit the 0V of the frequency converter to COM, connect the 24V of the frequency converter to the common terminal of the external

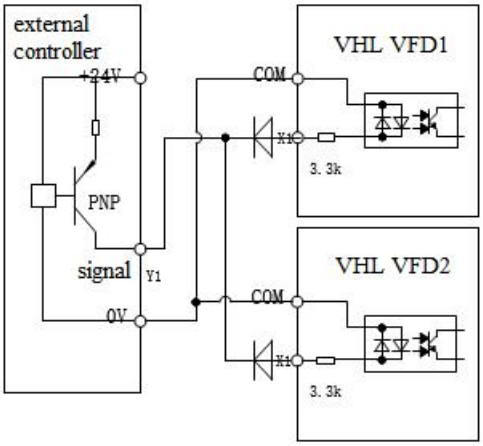
controller, and connect the X terminal to the signal terminal of the external controller. The frequency converter is controlled through the on-off of the circuit.

If external 24V is used, it is necessary to connect the COM terminal of the frequency converter to the external 0V, and the external power 24V is connected to the corresponding X terminal through the control contact of the external controller.

- Multiple variable frequency source wiring methods



Source wiring method for multiple frequency converters using 24V power supply on expansion cards



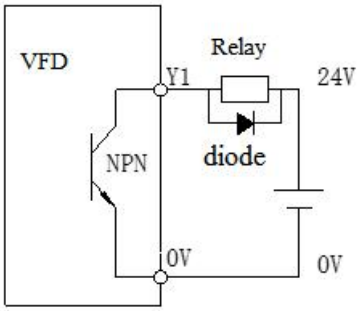
Source wiring method for multiple frequency converters using external 24V power supply

In this wiring method, the X terminals of different inverters cannot be connected in parallel, otherwise it may cause X malfunction. If X terminals need to be connected in parallel (between different inverters), a diode (anode connected to X) needs to be connected in series at the X terminal for use. The diode must meet the requirements of IF>40mA and VR>40V.

2. Digital output terminal

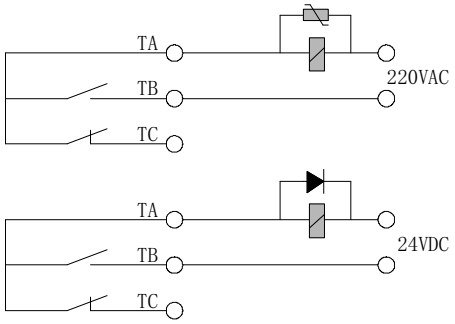
When the digital output terminal needs to drive a DC inductive load, a continuous current diode should be installed. Otherwise, it may cause damage to the DC 24V power supply. The driving capacity shall not exceed 50mA.

It is necessary to correctly install the polarity of the freewheeling diode. As shown in the following figure. Otherwise, when the digital output terminal has output, it will immediately burn out the DC 24V power supply. The selection criteria for freewheeling diodes: the reverse withstand voltage is 5-10 times greater than the load voltage, and the current is greater than the load current.

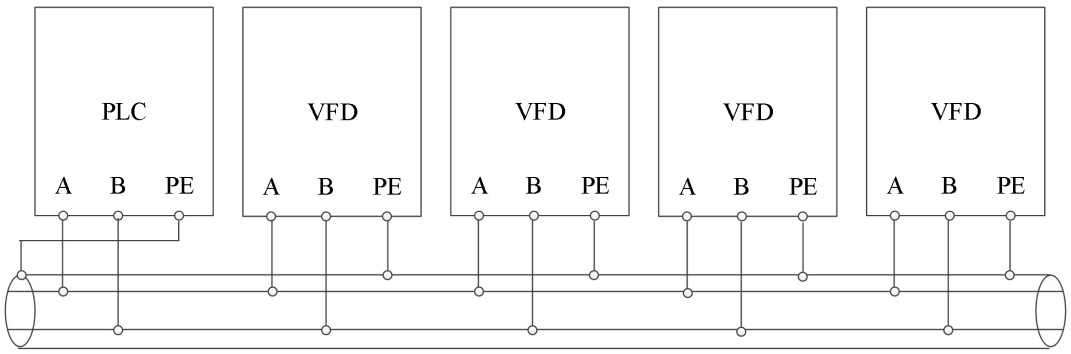


3. Relay output terminal

Inductive loads (relays, motors, indicator lights) can cause voltage spikes when the current is cut off. The relay contact is protected by varistor, and the inductive load is added with absorption circuit, such as varistor, RC absorption circuit, diode, etc., to ensure the minimum interference current when turning off.



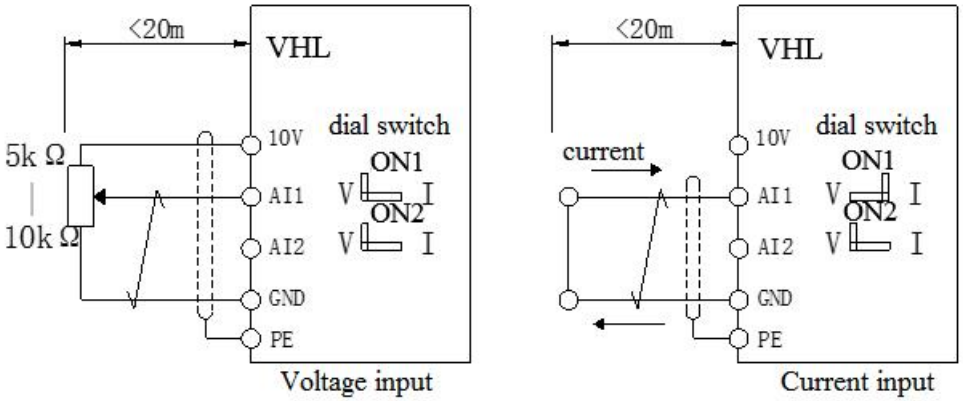
4. Multiple frequency converters can be connected together through RS485 and controlled by a PLC (or upper computer) as the host, as shown in the figure. As the number of connections increases, the communication system becomes more susceptible to interference. It is recommended to wire as follows:



2-4-3. Analog IO terminal wiring

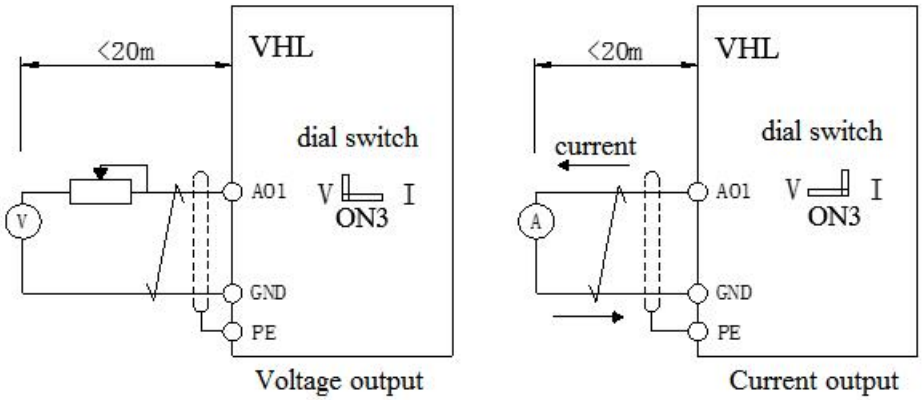
1. Analog input terminal AI wiring

The AI1/AI2 terminal accepts analog signal input, and the AI1/AI2 dial switch selects input voltage (0-10V) or current (0-20mA). The specific wiring is shown in the following figure:



2. Analog output terminal AO wiring

The AO1 connects to external analog meter to indicate various physical quantities. AO1 dial switch selects output voltage (0-10V, external load 2k Ω -1MΩ) or current (0-20mA, external load less than 500Ω). The terminal wiring method is shown in the following figure.



- When using analog input, install filter capacitors or common mode inductors between AI and GND.
- The resistance range of the potentiometer connected between the control terminal 10V and GND is 5~10K.
- Analog input and output signals are prone to external interference. Shielded cables must be used for wiring and well grounded. The wiring length should be as short as possible, not greater than 20m.

  Description of dial switch:

  ON1: AI1 OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

  ON2: AI2 OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

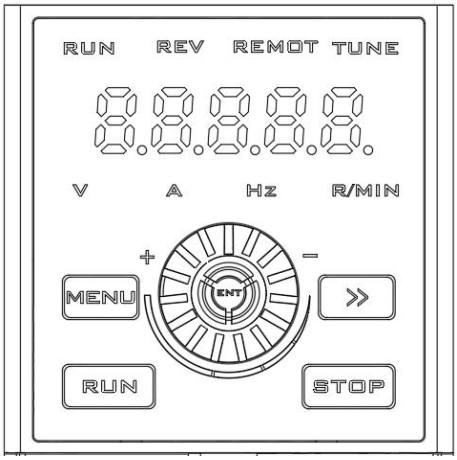
  ON3: AO1 OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

3. Operating instructions and application examples

3-1. Keyboard operation and use

3-1-1. Keyboard layout

The operation panel and control terminals of the frequency converter can control the starting, speed regulation, shutdown, braking, operation parameter setting, and peripheral equipment of the motor. The appearance of the operation panel is shown in the following figure.



3-1-2. Keyboard function

There are 8 buttons on the frequency converter operation keyboard, and their functions are defined as follows:

Key	Name	Function
MENU	Programming/ Exit	Entering or exiting the programming state
+ ENT −	Storage/ switching	In programming mode, used to enter the next level menu or store parameter data
RUN	Forward running	In the command mode of operating the keyboard, press this key to run in the forward direction
STOP	Stop/reset	Shutdown/fault reset
+ ENT −	Increase	Incremental of data and parameters or pause the frequency when operation
	Decrease	Decrement of data and parameters or pause the frequency when operation
»	Shift/monitor	When in editing status, you can choose to set the modification bit of the data; In other states, the display of status monitoring parameters can be switched

3-1-3. LED light

There are five digit 7-segment LED display, four status indicators and four unit indicators on the inverter operation panel.

The four status indicators are located above the LED display, and from left to right are RUN, REV, REMOT, and TUNE. The following table provides an explanation of the indicator lights.

LED light	Meaning	Function
RUN	Operation indicator	Light on: running status; Light off: shutdown status.
REV	Forward/reverse run indicator	Light on: reverse operation status; Light off: forward running state; Flashing light: switching states.
REMOT	Command source indicator	Off: panel start stop; Always on: Terminal start stop; Flashing: Communication start and stop.
TUNE	Tuning indicator	Slow flashing light: tuning state; Flashing light: fault status; Constant light on: torque state.

The four unit indicators are located below the LED display, which are V, A, Hz and R/MIN from left to right. The following table provides an explanation of the unit indicator lights.

LED light	Meaning	Function
V	Voltage	Always on: Display voltage
A	Current	Always on: Display current
Hz	Frequency	Always on: Display frequency
R/MIN	Speed /%	Always on: Display motor speed Blinking: Display %

3-1-4. Operation panel operation method

Various operations can be performed on the frequency converter through the operation panel, for example:

(1) Switching the display of status parameters

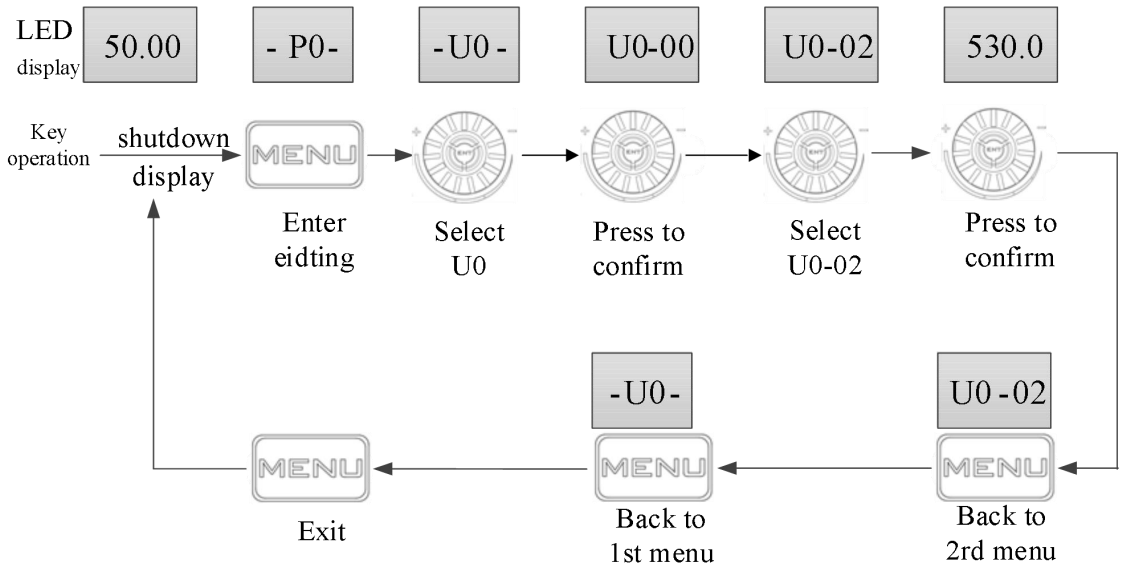
Method 1:

After pressing  , switch the LED display parameters, set the running display parameters P8-07 and P8-08, and set the shutdown display parameters P8-09.

When querying status monitoring parameters, you can directly switch back to the default monitoring parameter display status by pressing  . The default monitoring parameter for shutdown status is the set frequency, while the default monitoring parameter for operation status is the output frequency.

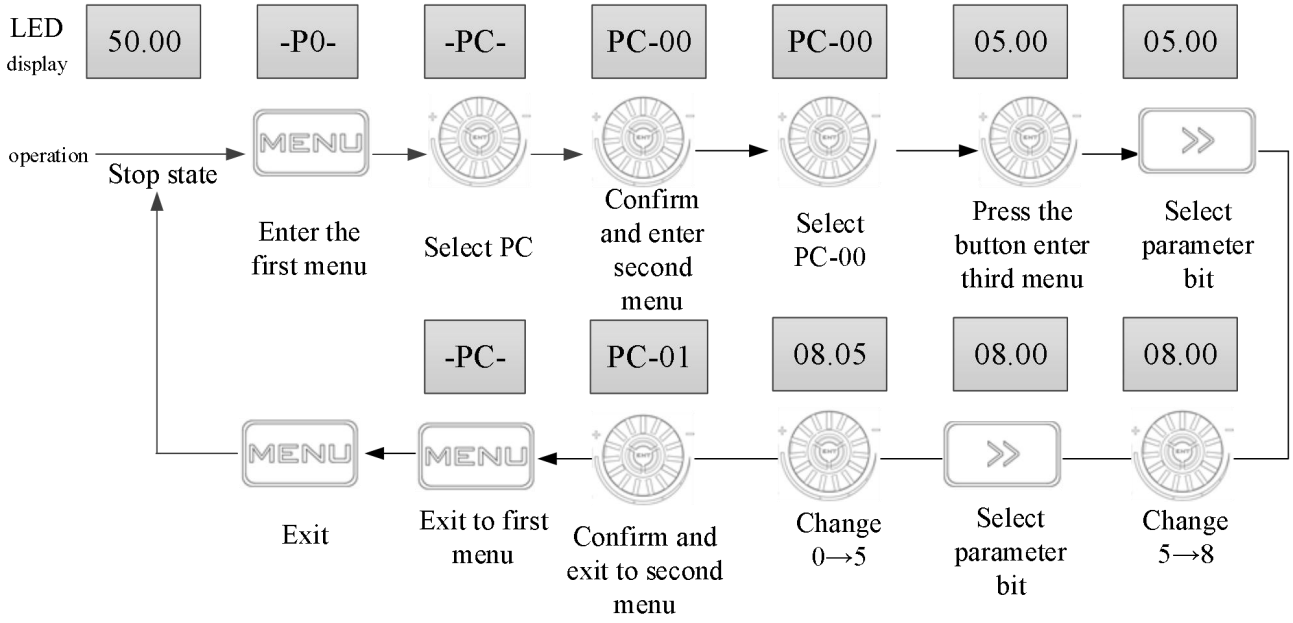
Method 2:

View the U0 group parameters, assuming you are viewing U0-02.



(2) Parameter setting

① Assuming parameter PC-00 (jog frequency) is changed from 5.00Hz to 8.05Hz as an example for explanation.



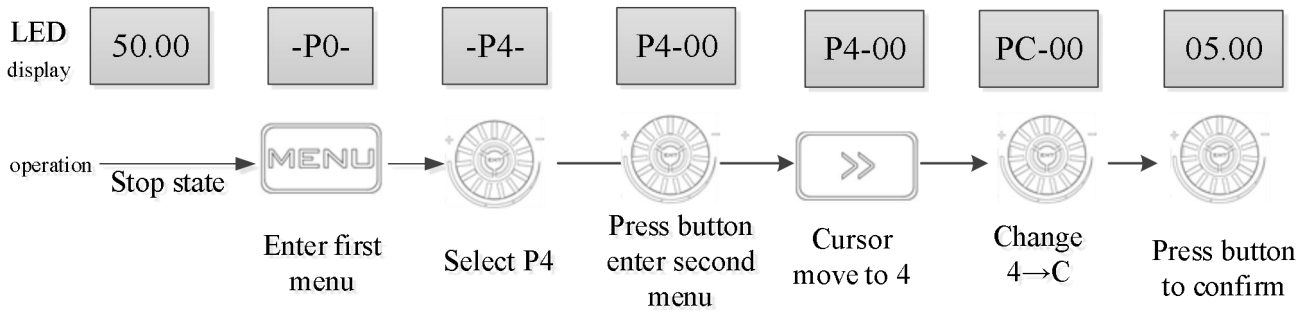
In the third level menu state, if the parameter does not have a flashing bit, it indicates that the parameter cannot be modified. Possible reasons include:

(1) This parameter is non modifiable, such as the actual detection status parameter, operation record parameter, etc.

(2) This parameter cannot be modified while in operation and can only be modified after shutdown.

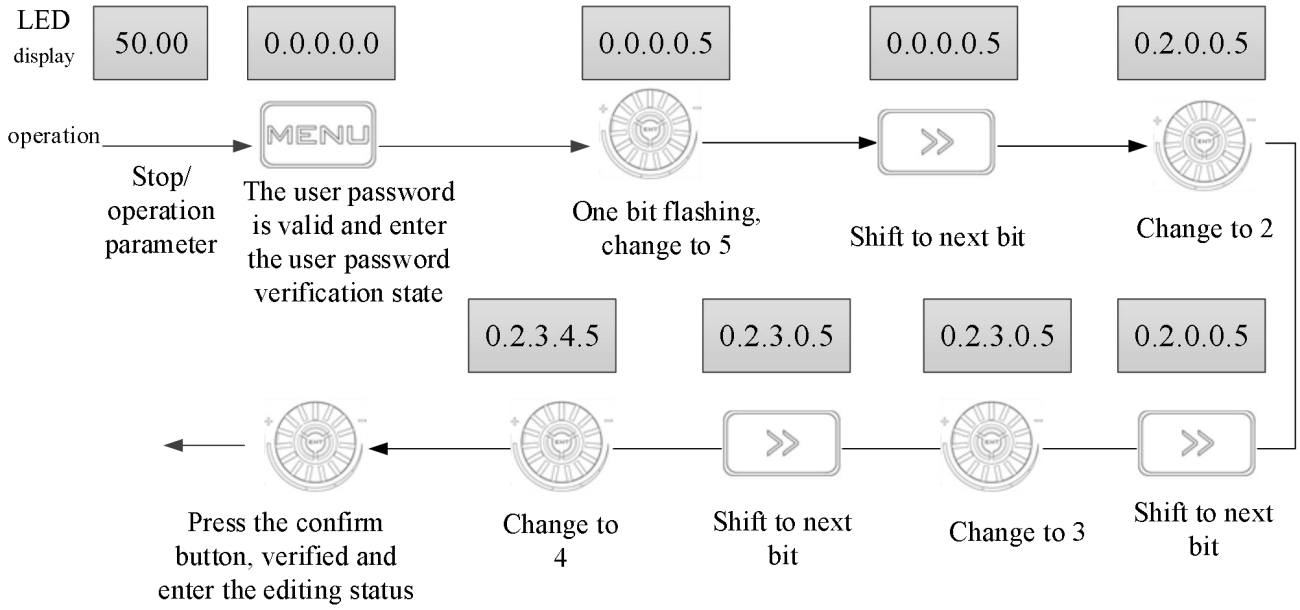
② The function of modifying function code group numbers in the first level menu can be achieved under the second level menu.

For example, in the P4-00 interface, to adjust the value of PC-00, you can press the left button to move the cursor to the position of ""4"" for adjustment. The specific operation is shown in the following figure:



(3) Verifying and unlocking user passwords

Assuming that the 'User Password' P8-03 has been set to '02345'. The bold numbers in the figure below indicate the flashing position.



(4) Fault status query fault parameters

The method for querying fault status is the same as the U0 group monitoring parameters.

- Users can query P6 group parameters by pressing the » button while the fault code is displayed.
- When users query fault parameters, they can directly switch back to the fault code display status by pressing the button. MENU

3-1-5. Quick parameter lookup

There are many function codes in the VHL series, and for the convenience of users to quickly search, the frequency converter also provides a method for quickly searching function codes:

Users can select and customize commonly used function codes, up to 32 of which can be customized to form a user-defined function code set. Users can determine the required display parameters through the PE group.

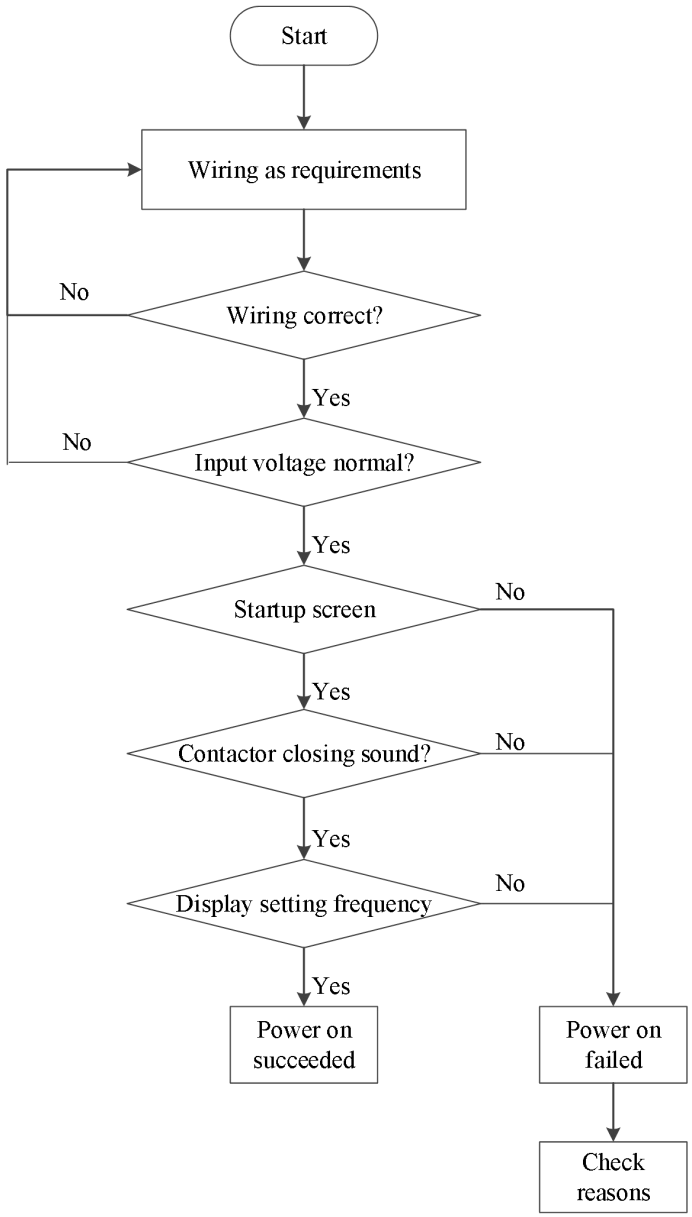
3-2. VFD power on

3-2-1. Inspection after power on

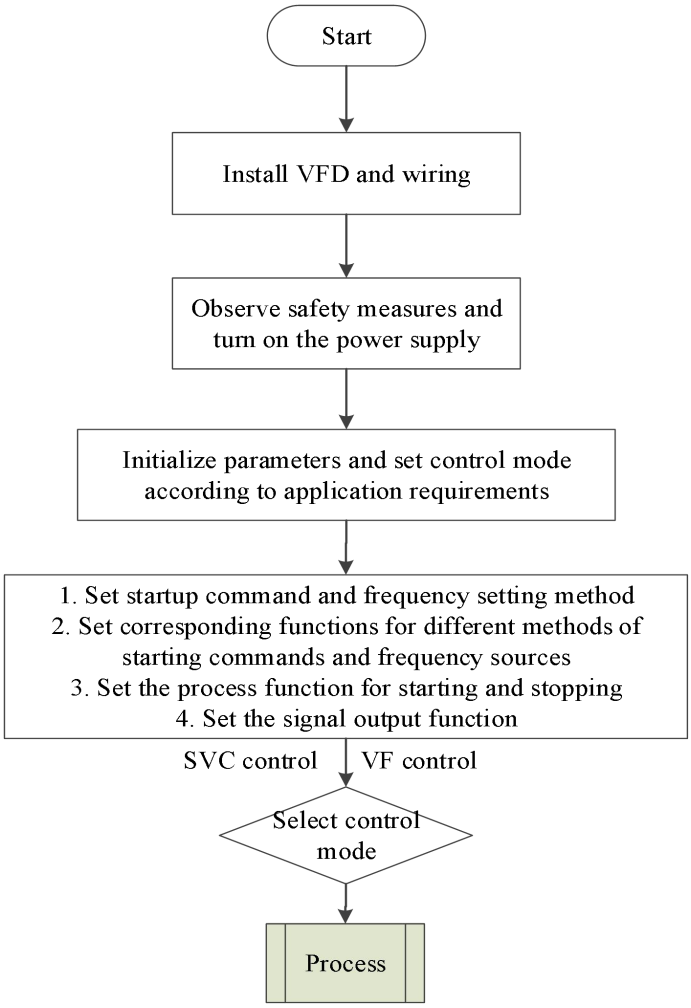
Please follow the operation requirements provided in the ""EMC (Electromagnetic Compatibility)"" section of this manual for wiring connections.

3-2-2. Initial power on operation

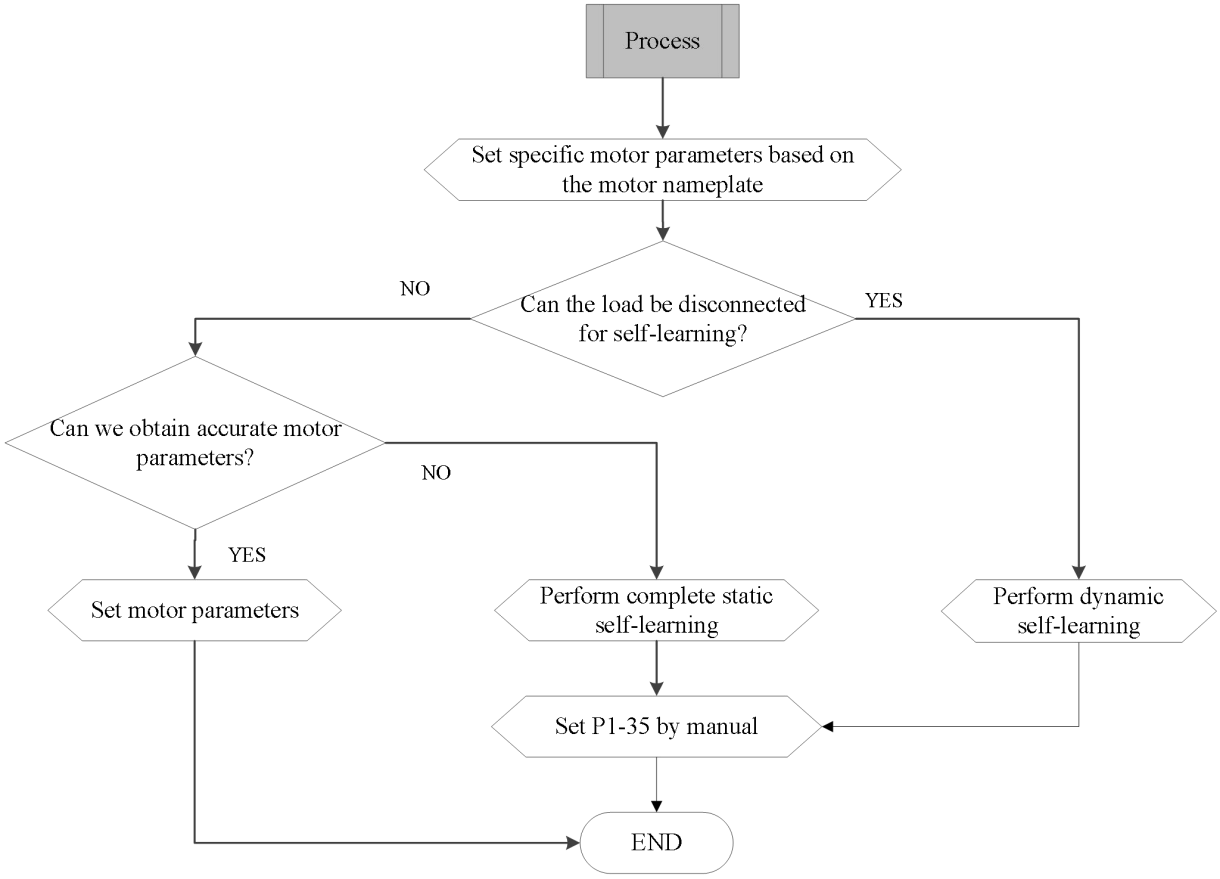
After the wiring and power supply are checked and confirmed to be correct, close the AC power switch on the input side of the inverter and power on the inverter. The LED on the inverter operation keyboard displays the dynamic picture of startup, and the contactor is pulled in normally. When the display display character changes to the set frequency, it indicates that the inverter has been initialized. The initial power on operation process is shown in the following figure:



3-2-3. Start to debug



3-2-4. Debugging process



3-3. VFD start stop control

3-3-1. Source selection of start stop signals

There are three sources of start stop signals for frequency converters, namely panel start stop, terminal start stop, and communication start stop, which are selected through the functional parameter P0-02.

3-3-1-1. Panel start stop control

Command control is carried out by the buttons on the panel. Press the RUN key on the keyboard, and the frequency converter will start running. When the frequency converter is running, press the STOP key on the keyboard to stop the operation of the frequency converter.

parameter	name	set value	note
P0-02	run command channel selection	0	panel command

3-3-1-2. Terminal start stop control

The VHL frequency converter provides multiple terminal control methods, with function codes P2-10 determining the switch signal mode and P2-00 to P2-09 determining the input port for the start stop control signal.

Example 1: Two wire control, with forward signal connected to X1 and reverse signal connected to X2.

parameter	name	set value	note
P0-02	run command channel selection	1	terminal command
P2-10	XI terminal command method	0	two wire mode 1
P2-00	X1 function selection	1	forward run
P2-01	X2 function selection	2	reverse run

Example 2: Three wire control, with forward signal connected to X1, reverse signal connected to X2, and stop signal connected to X3.

parameter	name	set value	note
P0-02	run command channel selection	1	terminal command
P2-10	XI terminal command method	2	three wire mode 1
P2-00	X1 function selection	1	forward run
P2-01	X2 function selection	2	reverse run
P2-02	X3 function selection	3	stop

3-3-1-3. Communication start stop control

VHL supports Modbus-RTU mode for communication with the upper computer. The communication port of the frequency converter is built-in with the Modbus-RTU slave protocol, and the upper computer must communicate with it using the Modbus-RTU master protocol. The communication address can be found in Appendix B-3-3. Communication Protocol Parameter Address.

Example of setting communication parameters:

parameter	name	set value	note
P0-02	run command channel selection	2	communication command
P9-00	communication protocol selection	0	Modbus-RTU
P9-01	local address	1	station no.1
P9-02	baud rate	6	19200BPS
P9-03	data format	1	8-E-1

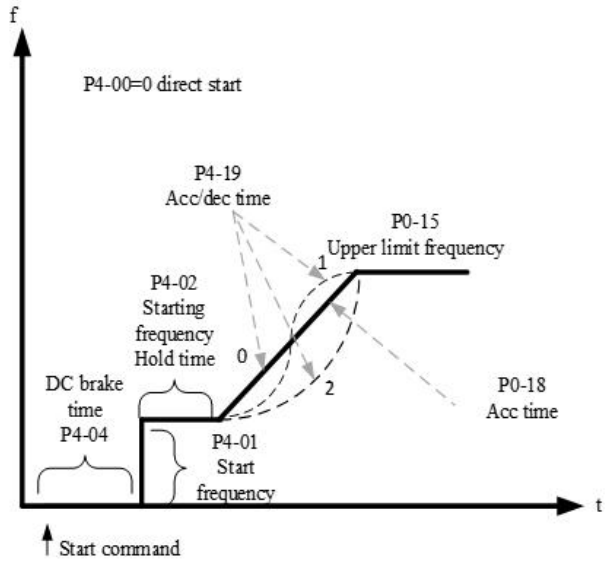
3-3-2. Startup mode

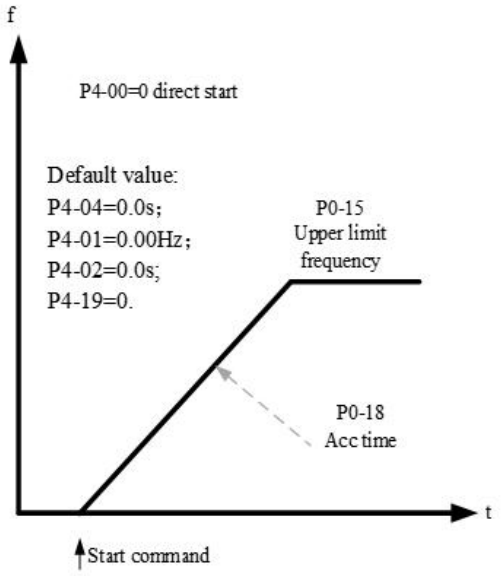
There are three startup modes for frequency converters, namely direct startup, speed tracking restart, and asynchronous machine preexcitation startup, which are selected through functional parameter P4-00.

3-3-2-1. Direct startup

parameter	name	set value	note
P4-00	startup mode	0	The direct start method is suitable for most small inertia loads, and the frequency curve of the start process is shown in the following figure. The ""DC braking"" function before startup is suitable for driving elevators and heavy lifting loads. The ""startup frequency"" is applicable to

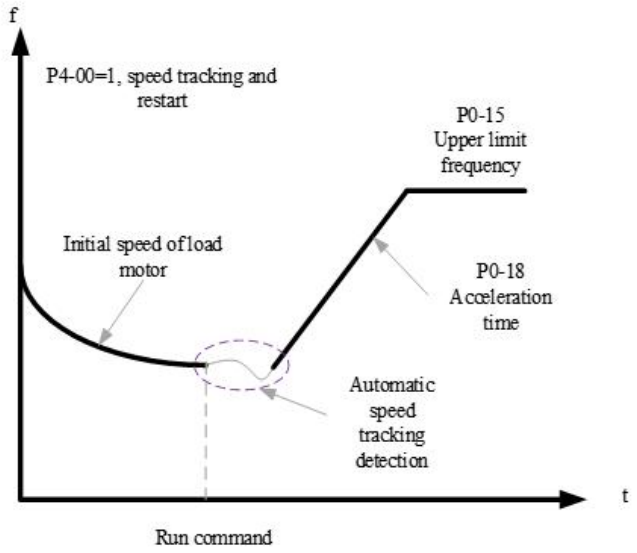
			equipment that require torque impact starting, such as cement mixer equipment.

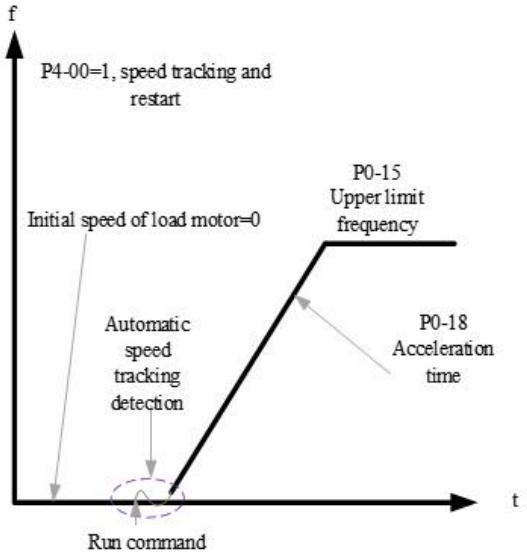




3-3-2-2. Speed tracking restart

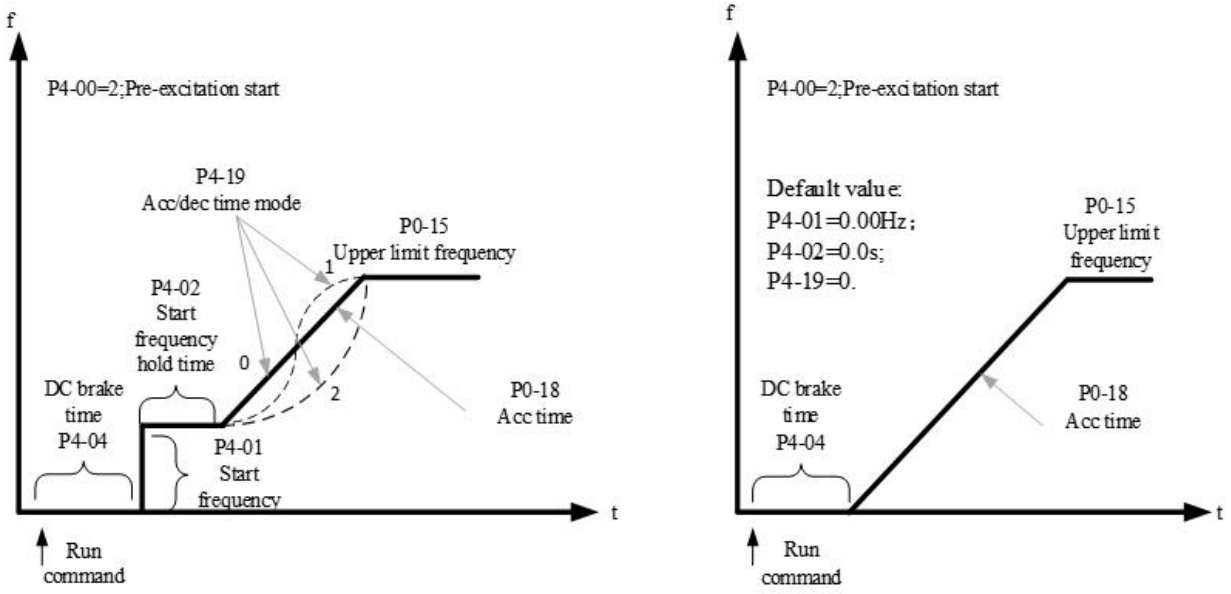
Parameter	Name	Setting value	Note
P4-00	Start mode	1	Speed tracking restart mode is applicable to the large inertia mechanical load. The frequency curve of starting process is shown in the following figure. If the load motor is still running on inertia when the frequency converter is started, the speed tracking and restart can avoid the over-current.





3-3-2-3. Pre-excitation start

Parameter	Name	Setting value	Note
P4-00	Start mode	2	Pre-excitation starting mode is only suitable for asynchronous motor load. Pre-excitation before starting can improve the fast response characteristics of induction motor and meet the application requirements of short acceleration time.



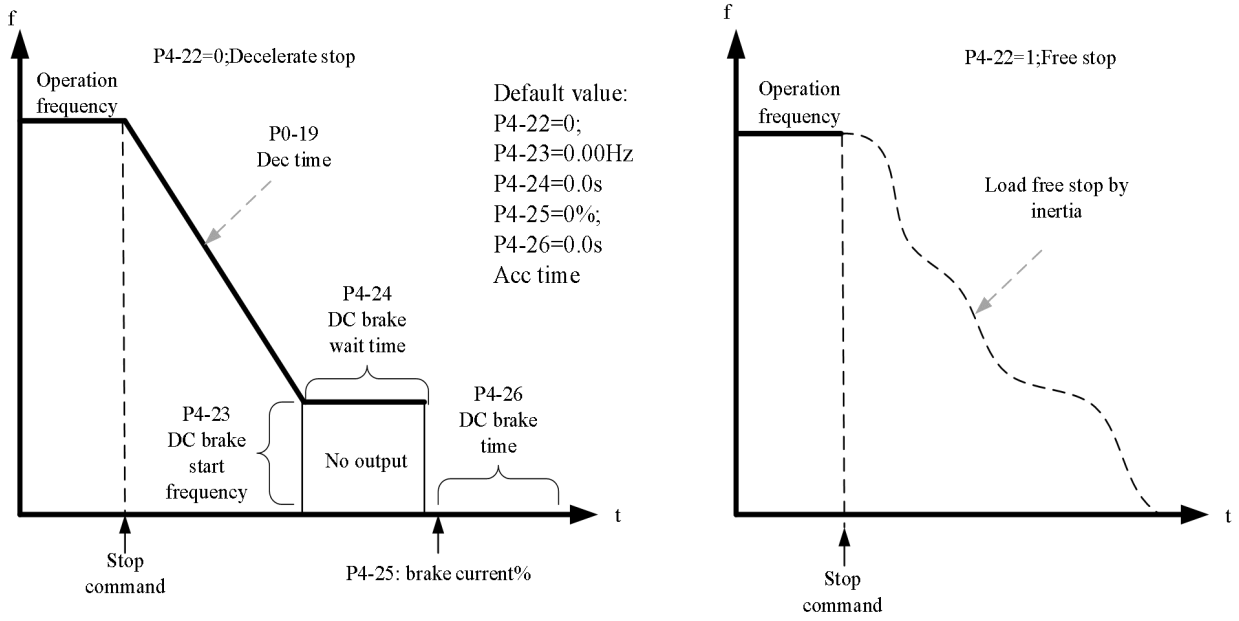
If the actual acceleration time of the motor is found to be much greater than the set acceleration time under V/F control mode, the following measures can be taken:

Frequency setting	Measurement
The target frequency is less than 2 times the rated frequency	Increase the over current stall action current of P5-19 by 10% each time. If the set value of P5-19 exceeds 170%, it can easily cause the frequency converter to alarm ERR10 (frequency converter overload fault)
The target frequency is 3 or 4 times the rated frequency or above	During rapid acceleration, there is a high possibility of motor stall. This can be achieved by adjusting the P5-22 overcurrent stall action current compensation coefficient to a set value of 100%.

3-3-3. Stop mode

There are two stop modes of frequency converter, namely deceleration stop and free stop, which are selected by function code P4-22.

Parameter	Name	Setting value	Note
P4-22	Stop mode	0	The frequency converter stops according to the deceleration time
		1	Free stop, inverter stop output immediately, motor stop freely by inertia



Under the VF control mode, if the actual deceleration time of the motor is much longer than the set deceleration time, the following measures can be taken:

Braking resistor / Energy feedback unit	Measures
none	The set value of P5-16 (VF over excitation gain) can be increased by ± 20 each time. After increasing the over excitation gain, if the motor oscillation overvoltage fault is caused, please reduce the set value of P5-26(Over voltage stall suppression voltage gain).
Yes (input voltage of frequency converter is 323~437V)	Adjust P7-52 to 690V and P5-16 (Overexcitation gain) to 0.
	Using Shutdown DC braking, the recommended setting values: P4-23 =0.5Hz, P4-25=50%, P4-24= 1s

When using braking resistor: P5-16 (Overexcitation gain) is set to 0, otherwise it is easy to cause excessive current during operation. P5-24 (Overvoltage stall enable) is set to 0, otherwise the deceleration time may be too long.

3-4. VFD operation frequency

The frequency converter is equipped with two frequency setting channels, named as main frequency source A and auxiliary frequency source B, which can work in a single channel or switch at any time, or even set calculation method for combination, so as to meet the different control requirements of the application site.
Set through function code P0-05

Parameter	Range	Note
P0-05	Ones place (0~2)	0: main frequency source A 1: main frequency source operation result 2: switch between main frequency source A and auxiliary frequency source B
	Tens place (0~3)	0: A+B

Parameter	Range	Note
		1: A-B 2: larger one of A and B 3: smaller one of A and B

3-5. Swing frequency function

The swing frequency function refers to the frequency output of the frequency converter, which swings up and down with the set frequency as the center. In the textile and chemical fiber processing equipment, the frequency swing function can improve the evenness of the spindle winding. The relevant parameters are as follows:

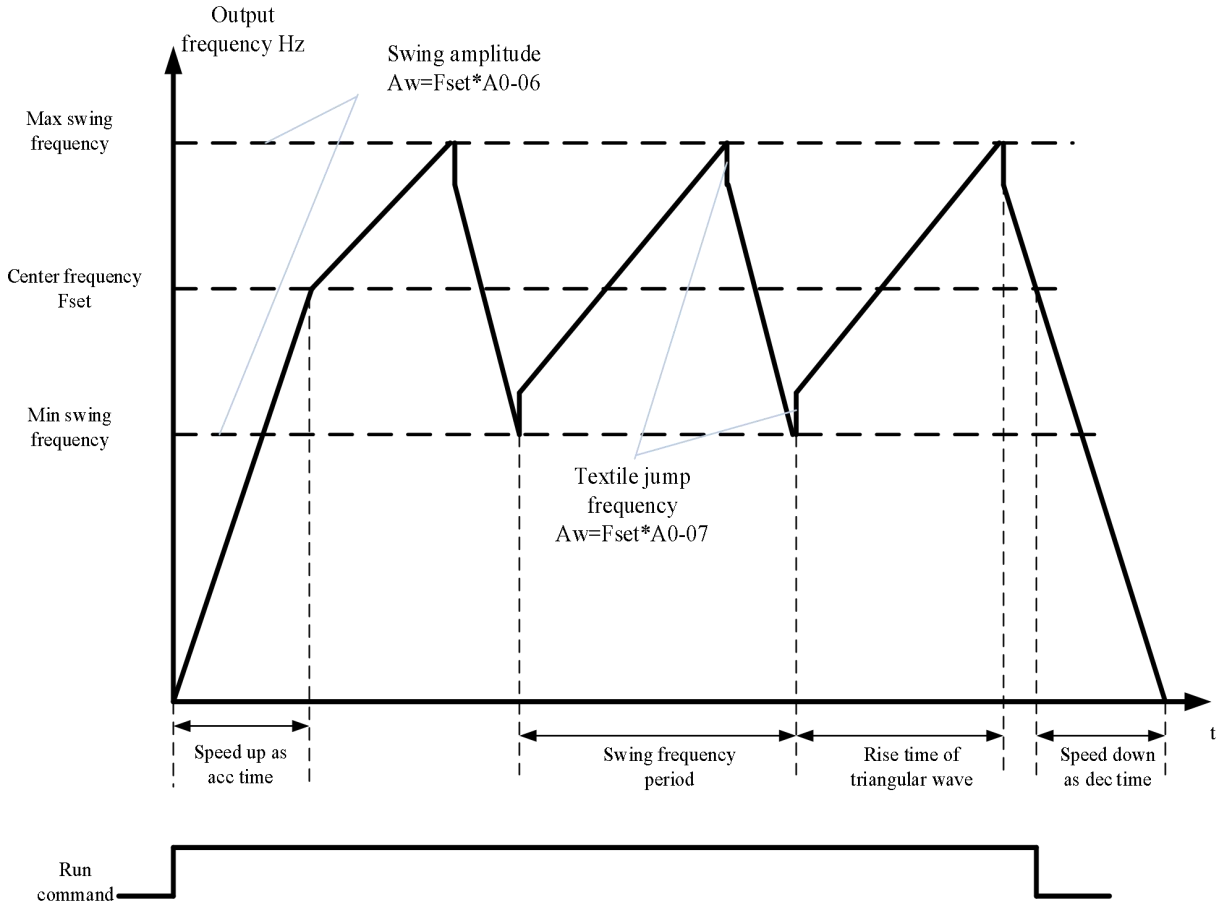
Parameter	Name	Range
A0-05	Swing frequency setting mode	0: relative to center frequency 1: relative to the max frequency
A0-06	Swing frequency amplitude	0.0%～100.0%
A0-07	Jump frequency amplitude	0.0%～50.0%
A0-08	Swing frequency period	0.1s～3600.0s
A0-09	Triangular rise time of swing frequency	0.1%～100.0%

The reference value of swing amplitude is determined by parameter A0-05.

0: relative to the center frequency (P0-03 frequency source), variable swing system. The swing varies with the center frequency (set frequency).

1: relative to the maximum frequency (P0-13) is a fixed swing amplitude system.

When the swing frequency is relative to the center frequency (A0-05 = 0), the trajectory on the time axis is shown as follows:



A0-06 swing amplitude AW:
When swing amplitude is relative to the center frequency (A0-05=0), AW＝frequency source P0-05×A0-06;
When swing amplitude is relative to the max frequency (A0-05=1), AW＝max frequency P0-06×A0-06.
A0-08 swing frequency period: time value of a complete frequency swing period.
A0-07 Jump frequency amplitude:
The jump frequency amplitude is the percentage of the jump frequency relative to the swing amplitude when the swing frequency is running, that is, the jump frequency = swing amplitude AW × jump frequency amplitude A0-07.
If the swing is relative to the center frequency (A0-05=0), the jump frequency is the variable value. If the swing is relative to the maximum frequency (A0-05=1), the jump frequency is a fixed value. The swing operating frequency is constrained by the upper and lower limit frequencies.
A0-09 triangle wave rise time coefficient: it is the time percentage of triangle wave rise time relative to frequency swing period A0-08.

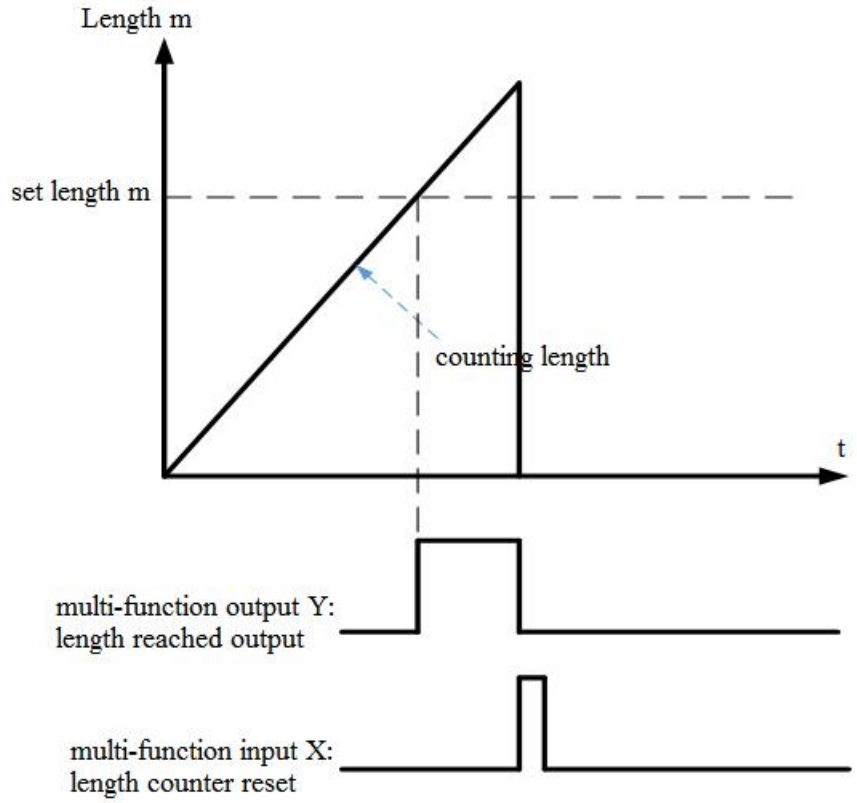
triangle wave rise time (s) ＝swing frequency period A0-08× A0-09;

triangle wave fall time (s) ＝swing frequency period A0-08× (1- A0-09).

3-6. Fixed length control

Parameter	Name	Range
A0-00	set length	0m～65535m
A0-01	Actual length (incremental value)	0m～65535m
A0-02	Pulses per meter	0.1～6553.5

The above parameters are used for fixed length control.
In the application, the corresponding input terminal function needs to be set to ""length counting input"" (function 22). When the pulse frequency is high, the X4 port must be used. The actual length A0-01 can be calculated by dividing the number of pulses sampled by the terminal by the number of pulses per meter A0-02. When the actual length is greater than the set length A0-00, the multi-functional digital output ""length reaches"" ON signal. During the fixed length control process, the length reset operation (function 23) can be performed through the multifunctional X terminal, and the function sequence diagram is shown in the following figure:

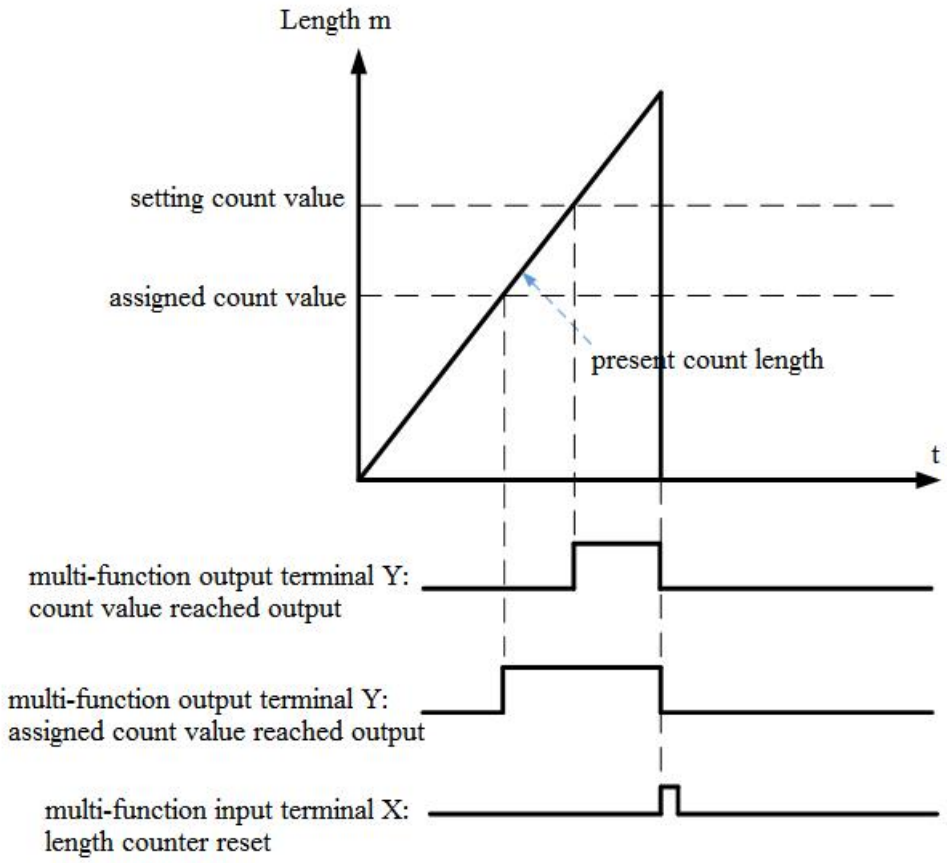


3-7. VFD counting function

parameter	name	range
A0-03	setting counting value	1～65535
A0-04	assigned counting value	1～65535

In the application, the corresponding input terminal function needs to be set to ""counter input"" (function 20). When the pulse frequency is high, the X4 port must be used.

When the count value reaches the specified count value A0-04, the multi-functional digital Y outputs the ""specified count value reaches"" ON signal, and the counter continues to count. When the count value reaches the set count value A0-03, the multi-functional output Y outputs the ""set count value reaches"" ON signal, which can be reset through the multi-functional X terminal (function 21). The function sequence diagram is shown in the following figure:



3-8. Motor parameters and tuning

3-8-1. Motor parameter setting

When the inverter operates in vector control (P0-01 = 1 or 2) mode, it is required to set correct motor parameters, which is different from VF (P0-01 = 0) mode.

Motor parameters 1	Description	Note
P1-01~P1-05	Motor rated power / voltage / current / frequency / speed	Model parameters, manual input
P1-06~P1-10	Equivalent stator resistance, inductance and rotor inductance of the motor	Tuning parameters, tuning obtained

Motor parameters 2 for multi-motor system:

Motor parameters 1	Description	Note
PA-01~PA-05	Motor rated power / voltage / current / frequency / speed	Model parameters, manual input
PA-06~PA-10	Equivalent stator resistance, inductance and rotor inductance of the motor	Tuning parameters, tuning obtained

3-8-2. Motor tuning

The methods to get the internal electrical parameters of the controlled motor are: dynamic tuning, static tuning, manual input of motor parameters and so on.

Tuning mode	Suitable condition	Effect
No load dynamic tuning	It is suitable for asynchronous motor. The situation where the motor and application system are easy to separate.	Best
With load dynamic tuning	It is suitable for asynchronous motor. The situation where the motor and application system are not easy to separate	General
Static tuning 1	It is suitable for motor, where motor and load are difficult to separate and dynamic tuning operation is not allowed, P1-09 and P1-10 are not tuned.	General
Static tuning 2	It is only suitable for asynchronous motor, where motor and load are difficult to separate and dynamic tuning operation is not allowed. Compared with static tuning 1, the tuning time is relatively long and the tuning effect is good. This mode is recommended for static tuning.	Better
Manual input parameters	When it is difficult to separate the motor from the application system, copy the motor parameters of the same model that have been successfully tuned by the frequency converter to the corresponding function codes. Asynchronous motor: input P1-00 ~ P1-10 corresponding parameters	General

The automatic tuning procedure of motor parameters is as follows:

The following is an example of parameter tuning method of default motor 1. The tuning method of motor 2 is the same as that, but the function code number should be changed accordingly.

Step 1: if the motor can be completely disconnected from the load, in case of power failure, the motor is separated from the load part mechanically, so that the motor can rotate freely without load.

Step 2: after power on, select the first motor control mode (P0-01) as open-loop vector, and then select the command source of inverter (P0-02) as the operation panel.

Step 3: input the nameplate parameters of the motor accurately (for example P1-00 ~ P1-05), please input the following parameters according to the actual parameters of the motor (select according to the current motor):

Motor selection	Parameter
Motor 1	P1-00: motor type P1-01: motor rated power P1-02: motor rated voltage P1-03: motor rated current P1-04: motor rated frequency P1-05: motor rated speed
Motor 2	A2-00～A2-05: same to above definitions

Step 4:

Parameter	Name	Explanation
P1-35	Motor parameter self-learning	Ones place: 0: no operation 1: Static tuning 1 (some parameters) 2: Dynamic tuning 3: Static tuning 2

If it is an asynchronous motor:

P1-35 (tuning selection, motor 2 corresponds to A2-35) please select 2 (motor rotation self-learning), press ENT to confirm, at this time, the keyboard displays TUNE.

Then press the RUN key on the keyboard panel, the frequency converter will drive the motor to accelerate and decelerate, forward and reverse operation, the operation indicator will light up, and the tuning operation lasts for about 2 minutes. When the above display information disappears, it will return to the normal parameter display state, indicating that the tuning is completed.

After the dynamic tuning, the inverter will automatically calculate the following parameters of the motor:

Motor selection	Parameter
Motor 1	P1-06: Asynchronous motor stator resistance P1-07: Asynchronous motor rotor resistance P1-08: Asynchronous motor leakage inductance P1-09: Asynchronous motor interaction inductive reactance P1-10: Asynchronous motor no load current
Motor 2	A2-06～A2-10: same to above definition

If the motor cannot be completely disconnected from the load, select 1 (static tuning of the asynchronous machine) in P1-35 (motor 2 is PA-35), and then press run on the keyboard panel to start the tuning operation of motor parameters.

3-9. Using method of terminal X

In the factory value state, P2-16=0000, P2-17=0000, and when X port is short circuited, it is a valid (logic 1) signal; When port X is suspended, it is an invalid (logic 0) signal.

Users can also change the effective mode of Port X, which means that when Port X is short circuited, it is an invalid (logic 0) signal; When port X is suspended, it is a valid (logic 1) signal. At this time, it is necessary to modify the corresponding bits of P2-16 and P2-17 to 1.

The frequency converter also sets a software filtering time (P2-12) for the input signal of port X, which can improve the anti-interference level.

For the X1-X3 input port, there is also port signal delay function, which is convenient for some applications that require delay processing:

The functions of the four X ports mentioned above can be defined in the P2-00~P2-03 function codes, and each X can be selected from 51 functions as needed. Please refer to the detailed description of P2-00~P2-03 function codes for details.

As the design of hardware features, only X4 can accept high-frequency pulse signals. For applications that require high-speed pulse counting, please arrange it on the X4 port.

3-10. Using method of terminal Y

The VHL series frequency converter can use two channels output, namely Y1 and TA/TB/TC. Y1 is a transistor output that can drive a 24VDC low-voltage signal circuit, and TA/TB/TC is a relay output that can drive a 220VAC control circuit or a DC24 control circuit.

By setting the values of functional parameters P3-01 to P3-05, various output functions can be defined, which can be used to indicate various working states and alarms of the frequency converter. There are about 40 functional settings in total, so that users can achieve specific automatic control requirements. Please refer to the detailed description of P3 group function code parameters for specific settings.

3-11. Using method of terminal AI

Standard IO supports 2 channels of AI.

Terminal	Input signal
AI1-GND	Voltage 0～10V Current 0～20mA

AI2-GND	Voltage 0～10V Current 0～20mA

AI can be used when using external voltage and current signal to set frequency, torque, voltage of VF separated, PID or feedback. The voltage or current value corresponding to the actual given or feedback physical quantity relationship is set through P2-18 ~ P2-45.

The sampling value of AI can be read in U group function code; the converted calculation value is used for internal subsequent calculation, and users cannot read it directly.

3-12. Using method of terminal AO

Terminal	Output signal
AO1-GND	Voltage 0～10V Current 0～20mA

AO1 can be used to indicate the internal operation parameters in analog mode. The indicated parameter attributes can be modified through P3-13 and P3-14 before output. The modified characteristic curve Y = kX + b, where x is the operation parameter to be output, and the k and b of AO1 can be set by function codes P3-15 and P3-16.

4. Function parameters

4-1. Function code list

‘○’: Parameters can be modified during operation.
‘×’: Parameters cannot be modified during operation.
‘—‘: Read only, user cannot change.

Group P0: Basic operation parameters

Group P0: Basic operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P0-01	First motor control mode	0: VF control mode 1: No speed sensor vector control (SVC)	0001H	0	×
P0-02	Operation command channel selection	0: Operation panel 1: Terminal operation 2: Communication port	0002H	0	○
P0-03	Main frequency source A channel selection	0: Digital setting (Power-off no memory) 1: Digital setting (Power-off memory) 2: AI1 3: AI2 5: Terminal pulse X4 setting 6: Communication setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation 10:Specific mode for wire drawing and winding 11:Panel knob setting(supported by LED panel with knob)	0003H	0	×
P0-04	Auxiliary frequency source B channel selection	0: Digital setting (Power-off no memory) 1: Digital setting (Power-off memory) 2: AI1 3: AI2 5: Terminal pulse X4 setting 6: Communication setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation 10:Specific mode for wire drawing and winding (3742 and above can support) 11:Panel knob setting (supported by LED panel with knob) (3742 and above can support)	0004H	0	×
P0-05	Frequency source superposition selection	Ones place: Frequency source selection 0: Main frequency source A 1: Calculation results of main and auxiliary frequency sources	0005H	00	○

Group P0: Basic operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
		2: Switching between main frequency source A and auxiliary frequency source B Tens place: the operation relationship of main and auxiliary frequency sources 0: A+B 1: A-B 2: max (A, B) 3: min (A, B)			
P0-06	Auxiliary frequency source B range selection	0: Relative to the maximum frequency 1: Relative to the main frequency source A	0006H	0	○
P0-07	Auxiliary frequency source B range	0%～150%	0007H	100%	○
P0-09	Digital setting of auxiliary frequency source offset	0.00Hz～max output frequency P0-13	0009H	0.00Hz	○
P0-10	Preset frequency	0.00Hz～max output frequency P0-13	000AH	50Hz	○
P0-11	Frequency instruction decimal point	1: 1 decimal place 2: 2 decimal place	000BH	2	×
P0-12	Frequency shutdown memory selection for digital setting	0: No memory 1: Memory	000CH	1	○
P0-13	Maximum output frequency	50.00Hz～600.00Hz	000DH	50.00Hz	×
P0-14	Upper limit frequency source	0: Set by P0-15 1: AI1 setting 2: AI2 setting 4: Pulse setting 5: Communication setting	000EH	0	×
P0-15	Upper limit frequency	Lower limit frequency P0-17~Max output frequency P0-13	000FH	50.00Hz	○
P0-16	Upper limit frequency offset	0.00Hz～Max output frequency（P0-13）	0010H	0.00Hz	○
P0-17	Lower limit frequency	0.00Hz～Upper limit frequency P0-15	0011H	0.00Hz	○
P0-18	Acceleration time 1	0～65000s（PC-09=0） 0.0～6500.0s（PC-09=1） 0.00～650.00s（PC-09=2）	0012H	Model setting	○
P0-19	Deceleration time	0～65000s（PC-09=0）	0013H	Model	○

Group P0: Basic operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	1	0.0～6500.0s（PC-09=1） 0.00～650.00s（PC-09=2）		setting	
P0-20	Operation direction	Ones place: running direction 0: Run in the default direction 1: Run in the opposite direction to the default direction Tens place: Reverse inhibit 0: Invalid 1: Valid	0014H	00	○
P0-21	Reverse frequency Prohibition	0: valid 1: invalid	0015H	0	○
P0-22	Dead time of forward and reverse rotation	0.0s～3600.0s	0016H	0.0s	○
P0-23	Run time frequency command up/down reference	0: Operating frequency 1: Set frequency	0017H	0	×
P0-25	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0019H	0	×

Group P1: First motor parameters

Group P1: First motor parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P1-00	Motor type selection	0: Common asynchronous motor 1: Permanent magnet synchronous motor	0100H	0	×
P1-01	Motor rated power	0.1kW～650.0kW	0101H	Model setting	×
P1-02	Motor rated voltage	1V～1200V	0102H	Model setting	×
P1-03	Motor rated current	0.01A～655.35A	0103H	Model setting	×
P1-04	Motor rated frequency	0.01Hz～max output frequency	0104H	Model setting	×
P1-05	Motor rated speed	1rpm～65535rpm	0105H	Model setting	×
P1-06	Asynchronous motor stator resistance	0.001Ω～65.535Ω	0106H	Tuning parameter	×
P1-07	Asynchronous motor rotor	0.001Ω～65.535Ω	0107H	Tuning parameter	×

Group P1: First motor parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	resistance				
P1-08	Asynchronous motor leakage inductance	0.01mH～655.35mH	0108H	Tuning parameter	×
P1-09	Asynchronous motor mutual inductance	0.01mH～655.35mH	0109H	Tuning parameter	×
P1-10	Asynchronous motor no load current	0.01A～P1-03	010AH	Tuning parameter	×
P1-15	Synchronous Motor Stator Phase Resistance	0.001Ω～65.535Ω	010FH	Tuning parameter	×
P1-16	Synchronous Motor D-axis Inductance	0.01mH～655.35mH	0110H	Tuning parameter	×
P1-17	Synchronous Motor Q-axis Inductance	0.01mH～655.35mH	0111H	Tuning parameter	×
P1-19	Synchronous Motor Back EMF	0～6000.0V	0113H	Tuning parameter	×
P1-35	Self learning of motor parameters	Ones place: Tuning Method 0: No operation 1: Static tuning 1 2: Dynamic tuning 3: Static tuning 2 (Applicable to asynchronous motors only) Tens place: Motor Type 0: Asynchronous Motor 1: Synchronous Motor	0123H	00	×

Group P2: Input terminal function parameters

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P2-00	Input terminal X1 function selection	0: no function 1: FWD or run command 2: REV or FWD/REV direction (Note: when it is set to 1 or 2, it should be used with P2-10. See the parameter for details) 3: three wire mode operation 4: forward jog (FJOG) 5: reverse jog (RJOG) 6: terminal UP	0200H	01	×
P2-01	Input terminal X2 function selection		0201H	02	×
P2-02	Input terminal X3 function selection		0202H	10	×
P2-03	Input terminal X4 function selection		0203H	00	×
P2-04			0204H	00	×

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	Input terminal X5 function selection	7: terminal DOWN 8: UP/DOWN setting clear 9: free stop 10: fault reset 11: frequency source switching 12: multi-segment command terminal 1 13: multi-segment command terminal 2 14: multi-segment command terminal 3 15: multi-segment command terminal 4 16: acc/dec time terminal 1 17: acc/dec time terminal 2 18: acc/dec prohibited 19: pulse input 20: counter input 21: counter reset 22: length counter input 23: length counter reset 24: swing frequency pause 25: operation pause 26: PLC status reset 27: run command switch to keyboard 28: run command switch to communication 29: torque control prohibited 30: switch between speed control and torque control 32: PID pause 33: PID reverse direction of action 34: PID integral pause 35: PID parameter switching 36: external fault normally open input 37: external fault normally close input 38: user-defined fault 1 39: user-defined fault 2 40: motor parameter selection 41: switch between main frequency X and preset frequency 42: switch between auxiliary frequency Y and preset frequency 43: frequency setting effective terminal 44: DC braking 45: deceleration DC braking			

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
		46: emergency stop 47: external stop terminal (only valid for panel control) 48: external terminal stop (according to deceleration time 4) 49: reverse run prohibited 50: the running time is cleared 51: two wire / three wire switching			
P2-10	XI terminal command mode	0: two wire mode 1 1: two wire mode 2 2: three wire mode 1 3: three wire mode 2	020AH	0	×
P2-11	XI terminal UP/DOWN changing rate	0.001Hz/s～50.000Hz/s	020BH	1.000Hz/s	○
P2-12	XI terminal filtering time	0.000s～1.000s	020CH	0.010s	○
P2-13	X1 delay time	0.0s～3600.0s	020DH	0.0s	×
P2-14	X2 delay time	0.0s～3600.0s	020EH	0.0s	×
P2-15	X3 delay time	0.0s～3600.0s	020FH	0.0s	×
P2-16	XI terminal effective state selection 1	0: Low level valid 1: High level valid Ones place: X1 Tens place: X2 Hundreds place: X3 Thousands place: X4 Ten Thousands place: X5	0210H	00000	×
P2-18	AI curve 1 min setting	0.00V～P2-20	0212H	0.00V	○
P2-19	AI curve 1 min setting corresponding frequency percentage	-100.0%～+100.0%	0213H	0.0%	○
P2-20	AI curve 1 max setting	P2-18～+10.00V	0214H	10.00V	○
P2-21	AI curve 1 max setting corresponding frequency percentage	-100.0%～+100.0%	0215H	100.0%	○
P2-22	AI curve 2 min setting	0.00V～P2-24	0216H	0.00V	○
P2-23	AI curve 2 min setting corresponding frequency percentage	-100.0%～+100.0%	0217H	0.0%	○
P2-24	AI curve 2 max setting	P2-22～+10.00V	0218H	10.00V	○
P2-25	AI curve 2 max setting corresponding frequency percentage	-100.0%～+100.0%	0219H	100.0%	○
P2-26	AI curve 3 min setting	0.00V～P2-28	021AH	-10V	○

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P2-27	AI curve 3 min setting corresponding frequency percentage	-100.0%～+100.0%	021BH	0.0%	○
P2-28	AI curve 3 max setting	P2-26～+10.00V	021CH	10.00V	○
P2-29	AI curve 3 max setting corresponding frequency percentage	-100.0%～+100.0%	021DH	100.0%	○
P2-30	AI curve 4 min setting	0.00V～P2-32	021EH	0.00V	○
P2-31	AI curve 4 min setting corresponding frequency percentage	-100.0%～+100.0%	021FH	0.0%	○
P2-32	AI curve 4 inflection point 1 setting	P2-30～P2-34	0220H	3.00V	○
P2-33	AI curve 4 inflection point 1 setting corresponding frequency percentage	-100.0%～+100.0%	0221H	100.0%	○
P2-34	AI curve 4 inflection point 2 setting	P2-32～P2-36	0222H	6.00V	○
P2-35	AI curve 4 inflection point 2 setting corresponding frequency percentage	-100.0%～+100.0%	0223H	0.0%	○
P2-36	AI curve 4 max setting	P2-34～+10.00V	0224H	10.00V	○
P2-37	AI curve 4 max setting corresponding frequency percentage	-100.0%～+100.0%	0225H	100.0%	○
P2-38	AI curve 5 min setting	-10.00V～P2-40	0226H	-10V	○
P2-39	AI curve 5 min setting corresponding frequency percentage	-100.0%～+100.0%	0227H	0.0%	○
P2-40	AI curve 5 inflection point 1 setting	P2-38～P2-42	0228H	-3.00V	○
P2-41	AI curve 5 inflection point 1 setting corresponding frequency percentage	-100.0%～+100.0%	0229H	100.0%	○
P2-42	AI curve 5 inflection point 2 setting	P2-40～P2-44	022AH	3.00V	○
P2-43	AI curve 5 inflection point 2 setting corresponding frequency percentage	-100.0%～+100.0%	022BH	0.0%	○
P2-44	AI curve 5 max setting	P2-42～+10.00V	022CH	10.00V	○
P2-45	AI curve 5 max setting	-100.0%～+100.0%	022DH	100.0%	○

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	corresponding frequency percentage				
P2-54	AI curve selection	Ones place: AI1 curve selection 1: Curve 1 (2 points, see P2-18 ~ P2-21) 2: Curve 2 (2 points, see P2-22 ~ P2-25) 3: Curve 3 (2 points, see P2-26 ~ P2-29) 4: Curve 4 (4 points, see P2-30 ~ P2-37) 5: Curve 5 (4 points, see P2-38 ~ P2-45) Tens place: AI2 curve selection, ditto	0236H	321	○
P2-55	AI below minimum input setting selection	Ones place: AI1 below minimum input setting selection 0: Corresponding minimum input setting 1: 0.0% Tens place: AI2 below minimum input setting selection 0: Corresponding minimum input setting 1: 0.0%	0237H	000	○
P2-56	AI1 filter time constant	0.00s～10.00s	0238H	0.10s	○
P2-57	AI2 filter time constant	0.00s～10.00s	0239H	0.10s	○
P2-60	AI1 jump point	-100.0%～+100.0%	023CH	0.0%	○
P2-61	AI1 jump range	0.0%～100.0%	023DH	0.5%	○
P2-62	AI2 jump point	-100.0%～+100.0%	023EH	0.0%	○
P2-63	AI2 jump range	0.0%～100.0%	023FH	0.5%	○
P2-66	PULSE min setting	0.00kHz～P2-68	0242H	0.00kHz	○
P2-67	PULSE min setting corresponding frequency percentage	-100.0%～+100.0%	0243H	0.0%	○
P2-68	PULSE max setting	P2-66～50.0kHz	0244H	50.00kHz	○
P2-69	PULSE max setting corresponding frequency percentage	-100.0%～+100.0%	0245H	100.0%	○
P2-70	PULSE filter time constant	0.00s～10.00s	0246H	0.10s	○
P2-71	X1 Terminal Active Delay	0.0s～3600.0s	0247H	0.0s	○

Group P2: Input terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	(Supported in version 3743 and above)				
P2-72	X1 Terminal Inactive Delay (Supported in version 3743 and above)	0.0s～3600.0s	0248H	0.0s	○
P2-73	X2 Terminal Active Delay (Supported in version 3743 and above)	0.0s～3600.0s	0249H	0.0s	○
P2-74	X2 Terminal Inactive Delay (Supported in version 3743 and above)	0.0s～3600.0s	024AH	0.0s	○
P2-75	X3 Terminal Active Delay (Supported in version 3743 and above)	0.0s～3600.0s	024BH	0.0s	○
P2-76	X3 Terminal Inactive Delay (Supported in version 3743 and above)	0.0s～3600.0s	024CH	0.0s	○
P2-77	X4 Terminal Active Delay (Supported in version 3743 and above)	0.0s～3600.0s	024DH	0.0s	○
P2-78	X4 Terminal Inactive Delay (Supported in version 3743 and above)	0.0s～3600.0s	024EH	0.0s	○
P2-79	X5 Terminal Active Delay (Supported in version 3743 and above)	0.0s～3600.0s	024FH	0.0s	○
P2-80	X5 Terminal Inactive Delay (Supported in version 3743 and above)	0.0s～3600.0s	0250H	0.0s	○

Group P3: Output terminal function parameters

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P3-00	Y1 output format	0: High speed pulse output 1: Common terminal output	0300H	0	○

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P3-01	Y1 output function selection	0: No output 1: Inverter in operation 2: Fault output (free stop fault) 3: Frequency level detection FDT1 output 4: Frequency level detection FDT2 output 5: Frequency arrival 6: Zero speed operation (no output during shutdown) 7: Zero speed operation 2 (output when shutdown) 8: Upper limit frequency arrival 9:Lower limit frequency arrival (operation related) 10: Motor overload alarm 11: Frequency converter overload alarm 12: Communication settings 13: In torque limit 15: Frequency 1 reached output 16: Frequency 2 reached output 17: Current 1 reached output 18: Current 2 reached output 19: Set counting value reached 20: Specified counting value reached 21: Ready for operation 23: AI1 input overrange 24: Under voltage state output 25: Cumulative power on time reached 26: Timing arrival output 27: Length arrived 28: Simple PLC cycle completed 29: Cumulative running time arrival 32: Lower limit frequency reached (output when shutdown) 33: Fault output (free stop fault and no output under voltage) 34: Module temperature reached 35: Warning output (all faults) 37: In reverse operation 39: Output current overrange 40: Zero current state 41: This time of running time arrived 42: Bus voltage reaches	0301H	01	○
P3-04	Relay 1 output function selection		0304H	02	○
P3-06	Y1 output delay time	0.0s～3600.0s	0306H	0.0s	○
P3-09	Relay 1 output delay time	0.0s～3600.0s	0309H	0.0s	○
P3-11	Y terminal effective	0: positive logic	030BH	00000	○

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	state selection	1: negative logic Ones place: Y1 Thousands place: relay 1			
P3-12	Y1 (high speed pulse) output selection	0: Operating frequency 1: Set frequency 2: Output current 3: Motor output torque (absolute value, percentage relative to motor) 4: Output power 5: Output voltage 6: AI1 7: AI2 9: PULSE input (100.0% corresponding to 100.0KHz) 10: Output speed 11: Communication control output 12: Count value 13: Length	030CH	00	○
P3-13	AO1 output selection		030DH	00	○
P3-15	AO1 zero bias coefficient	-100.0%～+100.0%	030FH	0.0%	○
P3-16	AO1 gain	-10.00～+10.00	0310H	1.00	○
P3-23	Y1 (high speed pulse) max output pulse frequency	0.01kHz～50.0kHz	0317H	50.0kHz	○
P3-24	Y1 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	0318H	0.0s	○
P3-25	Y1 Output Inactive Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	0319H	0.0s	○
P3-30	Relay Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	031EH	0.0s	○
P3-31	Relay Output Inactive Delay Time (Supported in	0.0s～3600.0s	031FH	0.0s	○

Group P3: Output terminal function parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	version 3743 and above)				

Group P4: Start stop mode

Group P4: Start stop mode					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P4-00	Start mode	0: Direct start 1: Speed tracking restart (AC asynchronous motor) 2:Pre-excitation start (AC asynchronous motor)	0400H	0	○
P4-01	Starting frequency	0.00Hz～10.00Hz	0401H	0.00Hz	○
P4-02	Start frequency duration	0.0s～100.0s	0402H	0.0s	×
P4-03	Percentage of starting DC braking current and pre-excitation current	0%～100%	0403H	0%	×
P4-04	DC braking time / pre-excitation time at start-up	0.0s～100.0s	0404H	0.0s	×
P4-05	Start protection selection	0: No protection 1: Protection	0405H	0	×
P4-06	Speed tracking mode	0: Start from shutdown frequency 1: Starting from power frequency 2: Start at maximum output frequency	0406H	0	×
P4-07	Speed tracking speed	1～100	0407H	20	○
P4-10	Speed tracking closed loop current	30%~200%	040AH	Model confirmed	×
P4-19	Acceleration and deceleration mode	0: linear acceleration and deceleration 1: Continuous S-curve acceleration and deceleration 2: Intermittent S-curve acceleration and deceleration	0413H	0	×
P4-20	Proportion at the beginning of the S curve	0.0%~（100.0% - P4-21）	0414H	30.0%	×
P4-21	Proportion at the end of the S curve	0.0%~（100.0% - P4-20）	0415H	30.0%	×
P4-22	Stop mode	0: Deceleration stop 1: Free stop	0416H	0	○
P4-23	Starting frequency of DC braking during shutdown	0.00Hz～P0-13	0417H	0.00Hz	○
P4-24	DC braking wait time during	0.0s～100.0s	0418H	0.0s	○

Group P4: Start stop mode					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	shutdown				
P4-25	Percentage of DC braking current when shutdown	0%～100%	0419H	0%	○
P4-26	DC braking time during shutdown	0.0s～100.0s	041AH	0.0s	○

Group P5: VF parameters

Group P5: VF parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P5-00	VF curve selection	0: Linear VF 1: Multipoint VF 2: Square VF 3: the 1.2nd power VF 4: the 1.4th power VF 6: the 1.6th power VF 8: the 1.8th power VF 10: VF complete separation mode 11: VF semi separation mode	0500H	00	×
P5-01	Multipoint VF frequency point F1	0.00Hz～P5-03	0501H	0.00Hz	×
P5-02	Multipoint VF voltage point V1	0.0～100.0%	0502H	0.0%	×
P5-03	Multipoint VF frequency point F2	P5-01～P5-05	0503H	0.00Hz	×
P5-04	Multipoint VF voltage point V2	0.0～100.0%	0504H	0.0%	×
P5-05	Multipoint VF frequency point F3	P5-05～P1-04(motor rated frequency)	0505H	0.00Hz	×
P5-06	Multipoint VF voltage point V3	0.0～100.0%	0506H	0.0%	×
P5-07	Torque boost	0.0% (automatical torque boost) 0.1%～30.0%	0507H	model setting	○
P5-08	Cut-off frequency of torque boost	0.00Hz～P0-13	0508H	50.00Hz	×
P5-09	VF separated voltage source	0: Digital setting 1:AI1 2:AI2 4: PULSE setting (X4) 5: Communication setting 6: Multi-speed command 7: PID setting 8: Simple PLC operation	0509H	0	○

Group P5: VF parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P5-10	VF separated voltage source digital setting	0~ motor rated voltage	050AH	0V	○
P5-11	VF separated voltage acceleration time	0.0s~1000.0s	050BH	0.0s	○
P5-12	VF separated voltage deceleration time	0.0s~1000.0s	050CH	0.0s	○
P5-13	VF separated stop mode selection	0:The frequency voltage reduced to 0 independently 1: When the voltage decreases to zero, the frequency begins to decrease again	050DH	0	○
P5-14	VF slip compensation gain	0.0%～200.0%	050EH	0.0%	○
P5-15	Slip compensation time constant	0.1~10.0s	050FH	0.1s	○
P5-16	VF over excitation gain	0～200	0510H	64	○
P5-17	VF oscillation suppression gain	0～100	0511H	model setting	○
P5-18	VF oscillation suppression mode selection	0: Oscillation Suppression Disabled 1: Phase Modulation Oscillation Suppression 1 2: Phase Modulation Oscillation Suppression 2 3: Frequency Modulation Oscillation Suppression 1 4: Frequency Modulation Oscillation Suppression 2	0512H	3	×
P5-19	VF over current stall action current	50~200%	0513H	150%	×
P5-20	VF over current stall suppression enable	0: invalid 1: valid	0514H	1	×
P5-21	VF over current stall suppression gain	0~100	0515H	20	○
P5-22	VF over current stall action current compensation coefficient	50%~200%	0516H	50	×
P5-23	Overvoltage stall action voltage	200.0V~2000.0V	0517H	model setting	×
P5-24	Overvoltage stall enable	0: Invalid 1: Valid	0518H	1	×
P5-25	Over voltage stall suppression frequency gain	0~100	0519H	30	○
P5-26	Over voltage stall	0~100	051AH	30	○

Group P5: VF parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	suppression voltage gain				
P5-27	Limit of maximum rise frequency of over voltage stall	0~50Hz	051BH	5Hz	×
P5-34	PID Stop Reference Voltage (Supported in version 3742 and above)	0.0～1000.0V	0522H	780V	○
P5-35	PID Stop Proportional Gain (Supported in version 3742 and above)	0～65535	0523H	500	○
P5-36	PID Stop Integral Gain (Supported in version 3742 and above)	0～65535	0524H	200	○
P5-37	PID Stop Derivative Gain (Supported in version 3742 and above)	0～65535	0525H	100	○
P5-38	Parabolic Stop Reference Time (Supported in version 3742 and above)	0.0～4200.0S	0526H	20.0S	○
P5-39	Stop Deceleration Method Selection (Supported in version 3742 and above)	0：Linear Deceleration Stop 1：Parabolic Deceleration Stop 2：PID Deceleration Stop	0527H	0	○

Group P6: Vector control parameters

Group P6: Vector control parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P6-00	Speed loop proportional gain 1	1～100	0600H	V3742 and below: 30 V3742 and above: 20	○
P6-01	Speed loop integration time 1	0.01s～10.00s	0601H	0.50s	○
P6-02	Speed loop proportional gain 2	1～100	0602H	V3742 and below: 30 V3742 and above: 20	○
P6-03	Speed loop integration time 2	0.01s～10.00s	0603H	1.00s	○
P6-04	Switching frequency 1	0.00～P6-05	0604H	5.00Hz	○
P6-05	Switching frequency 2	P6-04～P0-13	0605H	10.00Hz	○
P6-06	Integral attribute of speed loop	Ones place: integral separation 0: invalid 1: valid	0606H	0	○
P6-07	Vector slip compensation coefficient	50%～200%	0607H	V3742 and below: 30 V3742 and above: 20	○

Group P6: Vector control parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P6-08	SVC speed feedback filter time	0.000s～0.100s	0608H	0.015s	○
P6-10	Speed control (drive) torque upper limit source	0: Set by P6-11 1:AI1 2:AI2 4: PULSE setting 5:Communication setting 6:min(AI1,AI2) 7:max(AI1,AI2)	060AH	0	○
P6-11	Speed control (drive) torque upper limit digital setting	0.0%～200.0%	060BH	150.0%	○
P6-14	Proportional gain of excitation regulation	0 ~ 60000	060EH	Tuning Parameters	○
P6-15	Integral gain of excitation regulation	0 ~ 60000	060FH	Tuning Parameters	○
P6-16	Torque regulated proportional gain	0 ~ 60000	0610H	Tuning Parameters	○
P6-17	Integral gain of torque regulation	0 ~ 60000	0611H	Tuning Parameters	○

Group P7: Fault parameters

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-00	Third time (latest) fault type	0: No fault 1: Accelerated over current 2: Deceleration over current 3: Constant speed over current 4: Acceleration overvoltage 5: Deceleration overvoltage 6: Constant speed overvoltage 7: Buffer resistance overload fault 8: Under voltage fault 9: Inverter overload 10: Motor overload	0700H	-	-

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-01	Second time fault type	11: Input phase loss 12: Output phase loss 13: Radiator overheating 14: Contactor fault 15: Current detection fault 16: Motor tuning fault 17: Code disk failure 18: Short circuit fault of motor to ground 19: Load drop 20: Wave by wave current limiting fault 22: UVW signal feedback error 23: Brake resistance short circuit 24: Brake pipe overload 25: Brake pipe straight through 26: SVC stall fault 43: External fault 44: Communication failure 45: EEPROM read / write failure 46: Operation time arrival 47: Power on time arrival 48: User defined fault 1 49: User defined fault 2 50: PID feedback loss during operation 51: Running switch motor 52: Speed feedback deviation too large 53: Motor over speed 54: Motor over temperature fault 55: Point to point slave failure 56: Power on lock time reached	0701H	-	-
P7-02	First time fault type		0702H	-	-
P7-03	Third time (last time) fault frequency	-	0703H	-	-
P7-04	Third time (last time) fault current	-	0704H	-	-
P7-05	Third time (last time) fault bus voltage	-	0705H	-	-
P7-06	Third time (last time) fault input terminal status	-	0706H	-	-
P7-07	Third time (last time) fault output terminal status	-	0707H	-	-
P7-08	Third time (last time) fault VFD status	-	0708H	-	-
P7-09	Third time (last time) fault power on time	Unit:minute	0709H	-	-

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-10	Third time (last time) fault operation time	Unit:minute	070AH	-	-
P7-11	Location information of the third (latest) fault	-	070BH	-	-
P7-13	Second time fault frequency	-	070DH	-	-
P7-14	Second time fault current	-	070EH	-	-
P7-15	Second time fault bus voltage	-	070FH	-	-
P7-16	Second time fault input terminal status	-	0710H	-	-
P7-17	Second time fault output terminal status	-	0711H	-	-
P7-18	Second time fault VFD status	-	0712H	-	-
P7-19	Second time fault power on time	Unit:minute	0713H	-	-
P7-20	Second time fault operation time	Unit:minute	0714H	-	-
P7-21	Location information of the second fault	-	0715H	-	-
P7-23	First time fault frequency	-	0717H	-	-
P7-24	First time fault current	-	0718H	-	-
P7-25	First time fault bus voltage	-	0719H	-	-
P7-26	First time fault input terminal status	-	071AH	-	-
P7-27	First time fault output terminal status	-	071BH	-	-
P7-28	First time fault VFD status	-	071CH	-	-
P7-29	First time fault power on time	Unit:minute	071DH	-	-
P7-30	First time fault operation time	Unit:minute	071EH	-	-
P7-31	Location information of the first fault	-	071FH	-	-
P7-33	Motor overload protection mode selection	0: Forbidden 1: Allow	0721H	1	○
P7-34	Motor overload protection gain	0.20～10.00	0722H	1.00	○

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-35	Motor overload warning coefficient	50%～100%	0723H	80%	○
P7-39	Input phase lacking/contactor closing protection selection	Ones place: input phase lacking protection Tens place: Contactor closing protection selection 0: Forbidden 1: Allow	0727H	11	○
P7-40	Output phase lacking protection selection	0: Forbidden 1: Allow	0728H	1	○
P7-41	Power on short circuit protection towards the ground function	0: Invalid 1: Valid	0729H	1	○
P7-42	Action selection of fault relay during automatic fault reset	0: No action 1: Action	072AH	0	○
P7-43	Interval time of automatic fault reset	0.1s～60.0s	072BH	1.0s	○
P7-44	Number of automatic reset of faults	0～20	072CH	0	○
P7-45	Protection action option 1 when fault	Ones place: motor overload (Err 10) 0: Free stop 1: Stop as stop mode Tens place: input phase lacking (Err11) 0: Free stop 1: Stop as stop mode Hundreds place: output phase lacking (Err12) 0: Free stop 1: Stop as stop mode Thousands place: output load drop (Err19) 0: Free stop 1: Stop as stop mode Ten thousand bit: pole position detection failed (Err21) 0: Free stop 1: Stop as stop mode	072DH	00000	○
P7-46	Protection action option 2 when fault	Ones place: external fault 1 (Err43) 0: Free stop 1: Stop as stop mode	072EH	00000	○

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
		Tens place: communication error (Err44) 0: Free stop 1: Stop as stop mode Hundreds place: EEPROM read write error (Err45) 0: Free stop 1: Stop as stop mode Thousands place: operation time reached (Err46) 0: Free stop 1: Stop as stop mode Ten thousand bit: power on time reached (Err47) 0: Free stop 1: Stop as stop mode			
P7-47	Protection action option 3 when fault	Ones place: user defined fault 1 (Err48) 0: Free stop 1: Stop as stop mode Tens place: user defined fault 2 (Err49) 0: Free stop 1: Stop as stop mode Hundreds place: PID feedback lost in operation (Err50) 0: Free stop 1: Stop as stop mode Thousands place: speed deviation too large (Err52) 0: Free stop 1: Stop as stop mode Ten thousand bit: motor over speed (Err53) 0: Free stop 1: Stop as stop mode	072FH	00000	○
P7-48	Protection action option 4 when fault	Ones place: motor overheat (Err54) 0: Free stop 1: Stop as stop mode	0730H	00000	○
P7-52	Brake starting voltage	200.0V ~ 2000.0V Default value: 380V power supply model: 690V 220Vpower supply model: 360V	0734H	Model setting	○
P7-53	Utilization rate of brake resistor	0 ~ 100%	0735H	100%	○

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-55	Over voltage stall gain	0 ~ 100	0737H	30	○
P7-56	Over voltage stall protection voltage	200.0V ~ 2000.0V	0738H	Model setting	○
P7-61	Load drop detection level	0.0%~100.0%	073DH	10.0%	○
P7-62	Load drop detection time	0.0~60.0s	073EH	1.0s	○
P7-63	Over speed detection value	0.0% ~ 50.0% (unit is max frequency P0-13)	073FH	20.0%	○
P7-64	Over speed detection time	0.0s～60.0s	0740H	1.0s	○
P7-65	Detection value of excessive speed deviation	0.0% ~ 50.0% (unit is max frequency P0-13)	0741H	20.0%	○
P7-66	Excessive speed deviation detection time	0.0s ～ 60.0s	0742H	5.0s	○
P7-67	Selection of instantaneous stop non-stop function	0:Instantaneous power failure invalid 1:Deceleration in case of instantaneous power failure 2:Deceleration stop in case of instantaneous power failure 3: Automatic deceleration and shutdown upon undervoltage (supported in 3740 and above)	0743H	0	×
P7-68	Pause judgement voltage of transient stop action	80%～100%	0744H	85%	×
P7-69	Judgment time of instantaneous stop non-stop voltage rising	0.0s～30.0s	0745H	0.5s	×
P7-70	Judgement voltage of instantaneous stop non-stop action	60%～100% (bus voltage)	0746H	80%	○
P7-71	Proportional gain of instantaneous stop non-stop	0 ~ 100	0747H	40	○
P7-72	Integral coefficient of instantaneous stop non-stop	0 ~ 100	0748H	30	○
P7-73	Deceleration time of instantaneous stop non-stop	0 ~ 300.0s	0749H	20.0	×
P7-74	DC Bus Voltage Detection Level for Under-voltage Auto	0～500.0V	074AH	300.0V	×

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	Deceleration Stop (Supported in version 3740 and above)				
P7-75	Terminal Protection Mode for Under-voltage Auto Deceleration Stop (Supported in version 3740 and above)	0: Terminal retrigger required 1: No terminal retrigger required; restart when the DC bus voltage exceeds P7-76 2: No terminal retrigger required; restart when the DC bus voltage exceeds P7-76 and remains for the duration of P7-77	074BH	0	○
P7-76	Restart Judgment Voltage for Under-voltage Auto Deceleration Stop (Supported in version 3740 and above)	P7-74～500.0V	074CH	310.0V	×
P7-77	Restart Waiting Time for Under-voltage Auto Deceleration Stop (Supported in version 3740 and above)	0～30.0s	074DH	0.0s	×
P7-78	Frequency Judgment Level for Free Stop During Instantaneous Power Failure (Supported in version 3743 and above)	0.00Hz～20.00Hz	074EH	0.20Hz	
P7-83	Historical Maximum DC Bus Voltage (Supported in version 3743 and above)	-	0753H	-	-
P7-84	Output Current at the Time of Historical Maximum DC Bus Voltage Record (Supported in version 3743 and above)	-	0754H	-	-
P7-85	Accumulated Power-on Time at the Time of Historical Maximum DC Bus Voltage Record (Supported in version 3743 and above)	-	0755H	-	-

Group P7: Fault parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P7-86	Historical Maximum Inverter Temperature (Supported in version 3743 and above)	-	0756H	-	-
P7-87	Output Current at the Time of Historical Maximum Inverter Temperature Record (Supported in version 3743 and above)	-	0757H	-	-
P7-88	Accumulated Power-on Time at the Time of Historical Maximum Inverter Temperature Record (Supported in version 3743 and above)	-	0758H	-	-
P7-89	Historical Maximum Output Current (Supported in version 3743 and above)	-	0759H	-	-
P7-90	Accumulated Power-on Time at the Time of Historical Maximum Output Current Record (Supported in version 3743 and above)	-	075AH	-	-

Group P8: Keyboard and display

Group P8: Keyboard and display					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P8-01	STOP/REST function	0: Only in keyboard operation mode, STOP/REST key shutdown function is effective 1: In any operation mode, STOP/REST key is effective	0801H	1	○
P8-02	Parameter initialization	0: No operation 1: Restore factory parameters, excluding motor parameters P0-13 and P0-15 2: Clear record information 3: Restore factory parameters (including motor parameters) 4: Backup current user parameters (only	0802H	0	×

Group P8: Keyboard and display						
Parameter	Name	Setting range		Modbus address	Default value	Modify
		supported by LCD panel) 5: Restore user backup parameters (only supported by LCD panel)				
P8-03	User password	0～65535		-	00000	○
P8-06	Parameter modification attribute	0: Modifiable 1: Not modifiable		-	0	○
P8-07	LED operation display parameter 1 (Low 16-bit)	Display bit	Explanation	0807H	001F	○
P8-08	LED operation display parameter 2 (High 16-bit)	Bit0	Operating frequency	0808H	0000	○
		Bit1	Setting frequency			
		Bit2	Bus voltage			
		Bit3	Output current			
		Bit4	Output voltage			
		Bit5	Output torque			
		Bit6	Output power			
		Bit7	X input state			
		Bit8	Y output state			
		Bit9	AI1 voltage			
		Bit10	AI2 voltage			
		Bit12	PULSE input pulse frequency, the unit is 0.01KHz			
		Bit13	PULSE input pulse frequency, the unit is 1Hz			
		Bit14	PID setting			
		Bit15	PID feedback			
		Bit16	Load speed display			
		Bit17	Feedback speed, the unit is 0.1Hz			
		Bit18	Actual feedback speed			
		Bit19	Line speed			
		Bit20	PLC stage			
		Bit21	Counting value			
		Bit22	Length value			
		Bit23	Main frequency A display			
		Bit24	Auxiliary frequency B display			
		Bit25	Communication setting value			
		Bit26	Voltage before AI1 correction			
		Bit27	Voltage before AI2 correction			
		Bit29	Remaining running time			
		Bit30	Current power on time			
		Bit31	Current running time			
P8-09	LED stop display parameters	Display bit	Explanation	0809H	0033	○
		Bit0	Setting frequency			
		Bit1	Bus voltage			
		Bit2	X input status			
		Bit3	Y input status			
		Bit4	AI1 voltage			

Group P8: Keyboard and display						
Parameter	Name	Setting range		Modbus address	Default value	Modify
		Bit5	AI2 voltage			
		Bit7	PULSE input pulse frequency			
		Bit8	PID setting			
		Bit9	Load speed display			
		Bit10	PLC Step			
		Bit11	Counting value			
		Bit12	Length value			
P8-10	Accumulated running time	0h～65535h		080AH	-	-
P8-11	Cumulative power on time	0h～65535h		080BH	-	-
P8-12	Cumulative power consumption	0～65535 degree		080CH	-	-
P8-14	Product number	-		080EH	-	-
P8-15	Software version	-		080FH	-	-
P8-16	Firmware version	-		0810H	-	-
P8-19	Inverter module radiator temperature	0.0℃～100.0℃		0813H	-	-
P8-20	Output power factor	0.0% ~ 200.0%		0814H	100.0	○
P8-21	Load speed display factor	0.0001~6.5000		0815H	1.0000	○
P8-22	Number of decimal points for load speed display	Ones place:number of decimal points of U0-16 0: 0 decimal places 1: 1 decimal place 2: 2 decimal places Tens place:number of decimal points of U0-17 1: 1 decimal place 2: 2 decimal places		0816H	11	○

Group P9: Communication parameters

Group P9: Communication parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
P9-00	Serial communication protocol selection	0:Modbus-RTU protocol 2: ASCII mode (supported in version 3742 and above)	0900H	0	×
P9-01	Local address	0: Broadcast address 1 ~ 247 (Modbus valid)	0901H	1	○
P9-02	Communication baud rate	Ones place:MODBUS 0:300BPS 1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS	0902H	06	○

Group P9: Communication parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
		6:19200BPS 7:38400BPS 8: 57200BPS (supported in version 3742 and above) 9: 115200BPS (supported in version 3742 and above)			
P9-03	MODBUS data format	0: No parity (8-N-2) 1: Even parity (8-E-1) 2: Odd parity (8-O-1) 3: No parity (8-N-1) (Modbus valid) 4: Even parity (7-E-1) (ASCII)	0903H	1	○
P9-04	MODBUS Communication timeout	0.0:invalid 0.1～60.0s	0904H	0.0	○
P9-05	MODBUS response delay	0～20ms (Modbus valid)	0905H	2	○
P9-07	Replace VB3/VB5/V5 Communication Control Word (Supported in version 3742 and above)	Tens place： 0：Disabled 1：Enabled	0907H	0	○

Group PA: Process control closed-loop parameters

Group PA: Process control closed-loop parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PA-01	Setting channel selection	0:PA-05 setting 1:AI1 2:AI2 4: PULSE pulse setting (X4) 5: Communication setting 6: Multi-segment command setting	0A01H	0	○
PA-02	Feedback channel selection	0:AI1 1:AI2 3:AI1-AI2 4:AI1+AI2 5: PULSE pulse setting (X4) 6: Communication setting	0A02H	0	○
PA-03	PID feedback filter time	0.00s～30.00s	0A03H	0.00s	○
PA-04	PID output filter time	0.00s～30.00s	0A04H	0.00s	○

Group PA: Process control closed-loop parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PA-05	PID value setting	0.0%～100.0%	0A05H	50.0%	○
PA-06	PID setting change time	0.00s～300.00s	0A06H	0.00s	○
PA-07	PID reverse cut-off frequency	0.00Hz～Max output frequency	0A07H	0.00Hz	○
PA-08	PID deviation limit	0.0%～100.0%	0A08H	0.0%	○
PA-09	PID differential limit	0.00%～100.00%	0A09H	0.10%	○
PA-10	Proportional gain P	0.0～100.0	0A0AH	20.0	○
PA-11	Integral time I	0.01s～10.00s	0A0BH	2.00s	○
PA-12	Differential time D	0.000s～10.000s	0A0CH	0.000s	○
PA-13	PID parameter switching condition	0: Do not switch 1: Switch through X terminal 2: Switch automatically according to deviation 3: Switch automatically according to the operation frequency	0A0DH	0	○
PA-14	PID parameter switching deviation 1	0.0%～PA-15	0A0EH	20.0%	○
PA-15	PID parameter switching deviation 2	PA-14～100.0%	0A0FH	80.0%	○
PA-16	PID proportional gain P2	0.0～100.0	0A10H	20.0	○
PA-17	PID integral time I2	0.01s～10.00s	0A11H	2.00s	○
PA-18	PID differential time D2	0.000s～10.000s	0A12H	0.000s	○
PA-19	PID action direction	0: Positive action 1: Negative action	0A13H	0	○
PA-20	PID given feedback range	0～65535	0A14H	1000	○
PA-21	PID maximum deviation between two outputs	0.00%～100.00%	0A15H	1.00%	○
PA-22	PID minimum deviation between two outputs	0.00%～100.00%	0A16H	1.00%	○
PA-23	PID initial value	0.0%～100.0%	0A17H	0.0%	○
PA-24	PID initial value holding time	0.00s～600.00s	0A18H	0.00s	○
PA-25	PID operation mode (whether to operate when stop)	0: Not operation when stop 1: Operation during shutdown	0A19H	0	○
PA-26	PID integral attribute	Ones place: Integral separation 0: Invalid 1: Valid Tens place: Whether to stop integration after output to limit value 0: Continue to integral 1: Stop integral	0A1AH	00	○
PA-27	PID feedback lost detection value	0.0%: not judge the feedback lost 0.1%～100.0%	0A1BH	0.0%	○
PA-28	PID feedback lost detection time	0.0s～30.0s	0A1CH	0.0s	○

Group PB: Multi-speed and simple PLC operation parameters

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PB-00	Multi-segment frequency 0	-100.0%～+100.0%（P0-13）	0B00H	0.0%	○
PB-01	Multi-segment frequency 1	-100.0%～+100.0%（P0-13）	0B01H	0.0%	○
PB-02	Multi-segment frequency 2	-100.0%～+100.0%（P0-13）	0B02H	0.0%	○
PB-03	Multi-segment frequency 3	-100.0%～+100.0%（P0-13）	0B03H	0.0%	○
PB-04	Multi-segment frequency 4	-100.0%～+100.0%（P0-13）	0B04H	0.0%	○
PB-05	Multi-segment frequency 5	-100.0%～+100.0%（P0-13）	0B05H	0.0%	○
PB-06	Multi-segment frequency 6	-100.0%～+100.0%（P0-13）	0B06H	0.0%	○
PB-07	Multi-segment frequency 7	-100.0%～+100.0%（P0-13）	0B07H	0.0%	○
PB-08	Multi-segment frequency 8	-100.0%～+100.0%（P0-13）	0B08H	0.0%	○
PB-09	Multi-segment frequency 9	-100.0%～+100.0%（P0-13）	0B09H	0.0%	○
PB-10	Multi-segment frequency 10	-100.0%～+100.0%（P0-13）	0B0AH	0.0%	○
PB-11	Multi-segment frequency 11	-100.0%～+100.0%（P0-13）	0B0BH	0.0%	○
PB-12	Multi-segment frequency 12	-100.0%～+100.0%（P0-13）	0B0CH	0.0%	○
PB-13	Multi-segment frequency 13	-100.0%～+100.0%（P0-13）	0B0DH	0.0%	○
PB-14	Multi-segment frequency 14	-100.0%～+100.0%（P0-13）	0B0EH	0.0%	○
PB-15	Multi-segment frequency 15	-100.0%～+100.0%（P0-13）	0B0FH	0.0%	○
PB-16	Multi-segment frequency 0 setting mode	0:PB-00 setting 2:AI 4: PULSE 5:PID setting 6: Preset frequency P0-10	0B10H	0	○
PB-17	Simple PLC segment 0 operation time	0.0～6500.0s(h)	0B11H	0.0s(h)	○
PB-18	Simple PLC segment 0 acc/dec time	0～3	0B12H	0	○
PB-19	Simple PLC segment 1 operation time	0.0～6500.0s(h)	0B13H	0.0s(h)	○
PB-20	Simple PLC segment 1 acc/dec time	0～3	0B14H	0	○
PB-21	Simple PLC segment 2 operation time	0.0～6500.0s(h)	0B15H	0.0s(h)	○
PB-22	Simple PLC segment 2 acc/dec time	0～3	0B16H	0	○
PB-23	Simple PLC segment 3 operation time	0.0～6500.0s(h)	0B17H	0.0s(h)	○
PB-24	Simple PLC segment 3 acc/dec time	0～3	0B18H	0	○
PB-25	Simple PLC segment 4 operation time	0.0～6500.0s(h)	0B19H	0.0s(h)	○
PB-26	Simple PLC segment 4 acc/dec	0～3	0B1AH	0	○

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	time				
PB-27	Simple PLC segment 5 operation time	0.0～6500.0s(h)	0B1BH	0.0s(h)	○
PB-28	Simple PLC segment 5 acc/dec time	0～3	0B1CH	0	○
PB-29	Simple PLC segment 6 operation time	0.0～6500.0s(h)	0B1DH	0.0s(h)	○
PB-30	Simple PLC segment 6 acc/dec time	0～3	0B1EH	0	○
PB-31	Simple PLC segment 7 operation time	0.0～6500.0s(h)	0B1FH	0.0s(h)	○
PB-32	Simple PLC segment 7 acc/dec time	0～3	0B20H	0	○
PB-33	Simple PLC segment 8 operation time	0.0～6500.0s(h)	0B21H	0.0s(h)	○
PB-34	Simple PLC segment 8 acc/dec time	0～3	0B22H	0	○
PB-35	Simple PLC segment 9 operation time	0.0～6500.0s(h)	0B23H	0.0s(h)	○
PB-36	Simple PLC segment 9 acc/dec time	0～3	0B24H	0	○
PB-37	Simple PLC segment 10 operation time	0.0～6500.0s(h)	0B25H	0.0s(h)	○
PB-38	Simple PLC segment 10 acc/dec time	0～3	0B26H	0	○
PB-39	Simple PLC segment 11 operation time	0.0～6500.0s(h)	0B27H	0.0s(h)	○
PB-40	Simple PLC segment 11 acc/dec time	0～3	0B28H	0	○
PB-41	Simple PLC segment 12 operation time	0.0～6500.0s(h)	0B29H	0.0s(h)	○
PB-42	Simple PLC segment 12 acc/dec time	0～3	0B2AH	0	○
PB-43	Simple PLC segment 13 operation time	0.0～6500.0s(h)	0B2BH	0.0s(h)	○
PB-44	Simple PLC segment 13 acc/dec time	0～3	0B2CH	0	○
PB-45	Simple PLC segment 14 operation time	0.0～6500.0s(h)	0B2DH	0.0s(h)	○
PB-46	Simple PLC segment 14 acc/dec time	0～3	0B2EH	0	○

Group PB: multi-speed and simple PLC operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PB-47	Simple PLC segment 15 operation time	0.0～6500.0s(h)	0B2FH	0.0s(h)	○
PB-48	Simple PLC segment 15 acc/dec time	0～3	0B30H	0	○
PB-49	Simple PLC operation mode	0:Stop at the end of single operation 1: Keep the final value at the end of single operation 2: Cycle all the time	0B31H	0	○
PB-50	Simple PLC operation time unit	0: second 1: hour	0B32H	0	○
PB-51	Simple PLC power-off memory selection	Ones place: power-off memory 0: not memory 1: memory Tens place: stop memory 0: not memory 1: memory	0B33H	00	○

Group PC: Auxiliary operation parameters

Group PC: auxiliary operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PC-00	Jog frequency	0.00Hz～P0-13	0C00H	2.00Hz	○
PC-01	Jog acceleration time	0.0s～6500.0s	0C01H	20.0s	○
PC-02	Jog deceleration time	0.0s～6500.0s	0C02H	20.0s	○
PC-03	acceleration time 2	0.1s～6500.0s	0C03H	Model setting	○
PC-04	deceleration time 2	0.1s～6500.0s	0C04H	Model setting	○
PC-05	acceleration time 3	0.1s～6500.0s	0C05H	Model setting	○
PC-06	deceleration time 3	0.1s～6500.0s	0C06H	Model setting	○
PC-07	acceleration time 4	0.1s～6500.0s	0C07H	Model setting	○
PC-08	deceleration time 4	0.1s～6500.0s	0C08H	Model setting	○
PC-09	The unit of acc/dec time	0:1s 1:0.1s 2:0.01s	0C09H	1	×
PC-10	The base frequency of acc/dec time	0: max frequency 1: setting frequency 2:100Hz	0C0AH	0	×

Group PC: auxiliary operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PC-11	Switching frequency point between acceleration time 1 and acceleration time 2	0.00Hz~max output frequency	0C0BH	0.00Hz	○
PC-12	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz~max output frequency	0C0CH	0.00Hz	○
PC-13	Jump frequency 1	0.00Hz~max output frequency	0C0DH	0.00Hz	○
PC-14	Jump frequency 2	0.00Hz~max output frequency	0C0EH	0.00Hz	○
PC-15	Jump frequency range	0.00Hz~max output frequency	0C0FH	0.00Hz	○
PC-16	Whether the jump frequency is effective during acceleration and deceleration	0: invalid 1: valid	0C10H	0	○
PC-17	Frequency reaching detection range	0.0%~100.0%	0C11H	0.0%	○
PC-18	Frequency detection value (FDT1 voltage level)	0.00Hz～max output frequency	0C12H	50.00Hz	○
PC-19	Frequency detection hysteresis value (FDT1 voltage level)	0.0%～100.0% (PC-18)	0C13H	5.0%	○
PC-20	Frequency detection value (FDT2 voltage level)	0.00Hz～max frequency	0C14H	50.00Hz	○
PC-21	Frequency detection hysteresis value (FDT2 voltage level)	0.0%～100.0% (PC-20)	0C15H	5.0%	○
PC-22	Frequency reached detection value 1	0.00Hz～max frequency	0C16H	50.00Hz	○
PC-23	Frequency reached detection 1 range	0.0%～100.0%（max frequency）	0C17H	0.0%	○
PC-24	Frequency reached detection value 2	0.00Hz～max frequency	0C18H	50.00Hz	○
PC-25	Frequency reached detection 2 range	0.0%～100.0%（max frequency）	0C19H	0.0%	○
PC-26	Timing function selection	0: invalid 1: valid	0C1AH	0	×
PC-28	Setting operation time	0.0Min～6500.0Min	0C1CH	0.0Min	×
PC-29	Present operation reached time	0.0Min～6500.0Min	0C1DH	0.0Min	×
PC-30	Setting power on reached time	0 ~ 65000h	0C1EH	0	×
PC-32	Setting operation reached	0 ~ 65000h	0C20H	0	×

Group PC: auxiliary operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	time				
PC-34	Current reached detection value 1	0.0% ～ 300.0% (motor rated current)	0C22H	100.0%	○
PC-35	Current reached detection 1 range	0.0% ～ 300.0% (motor rated current)	0C23H	0.0%	○
PC-36	Current reached detection value 2	0.0% ～ 300.0% (motor rated current)	0C24H	100.0%	○
PC-37	Current reached detection 2 range	0.0% ～ 300.0% (motor rated current)	0C25H	0.0%	○
PC-38	Zero current detection value	0.0% ～ 300.0% (motor rated current)	0C26H	5.0%	○
PC-39	Zero current detection delay time	0.01s～600.00s	0C27H	0.10s	○
PC-40	Software overcurrent point	0:0.0% (not detect) 1:0.1% ～ 300.0% (motor rated current)	0C28H	200.0%	○
PC-41	Software overcurrent detection delay time	0.00s～600.00s	0C1CH	0.00s	○
PC-42	AI1 input voltage lower limit	0.00V～PC-43	0C1DH	3.10V	○
PC-43	AI1 input voltage upper limit	PC-42～10.50V	0C2BH	6.80V	○
PC-44	Overvoltage point	220V models: 200～400V 380V models: 540～810V	0C2CH	220V models:400V 380V models:810V	×
PC-45	Undervoltage point	Versions below 3740: 220V models: 200～400V 380V models: 200～537V Version 3740 and above: 220V models: 50~400V 380V models: 50~537V	0C2DH	220V models:200V 380V models:350V	×
PC-46	Operation action when the frequency is lower than lower limit frequency	0: Run at lower limit frequency 1: Stop 2: Run at zero speed	0C2EH	0	○
PC-47	Module temperature reached	0℃～100℃	0C2FH	75	○
PC-48	Fan control	0: The fan runs during operation 1: The fan is running all the time	0C30H	0	○
PC-49	Droop control	0.00Hz～10.00Hz	0C31H	0.00Hz	○
PC-50	Terminal jog run priority	0: Invalid 1: Valid	0C32H	0	○
PC-51	SVC optimization selection	1: Optimization mode 1	0C33H	2	○

Group PC: auxiliary operation parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
		2: Optimization mode 2			
PC-52	Dead area compensation mode	0: No compensation 1: Compensation mode 1	0C34H	1	○
PC-54	Modulation mode	0: Asynchronous Modulation 1: Synchronous modulation	0C36H	0	○
PC-55	DPWM switching upper limit frequency	5.00Hz~max output frequency	0C37H	8.00Hz	○
PC-56	Random PWM depth	0: Random PWM invalid 1~10: PWM carrier frequency random depth	0C38H	0	○
PC-57	Wake up frequency	Dormancy frequency PC-59~max output frequency P0-13	0C39H	0.00Hz	○
PC-58	Wake up delay time	0.0s～6500.0s	0C3AH	0.0s	○
PC-59	Dormancy frequency	0.00Hz ～ wake up frequency PC-57	0C3BH	0.00Hz	○
PC-60	Dormancy delay time	0.0s～6500.0s	0C3CH	0.0s	○
PC-61	Wave by wave current limiting enable	0: Not enable 1: Enable	0C3DH	1	○
PC-62	Current detection compensation	0～100	0C3EH	000	○
PC-65	Bus voltage reached value	Unit is 0.1V	0C41H	500.0	○
PC-66	The bus voltage reached hysteresis value	Unit is 0.1V	0C42H	50.0	○
PC-67	Carrier frequency	0.5K～16.0K	0C43H	Model setting	○
PC-68	The carrier frequency is adjusted with temperature	0: Invalid 1: Valid	0C44H	1	○
PC-69	Frequency converter temperature protection alarm threshold	reserved	0C45H	-	-
PC-72	External linear speed given source	0:Do not use external linear 1:AI1 2:AI2 4: Pulse terminal X4 5: Communication setting	0C48H	0	○
PC-73	Maximum allowable update deviation of main frequency	0.00%～10.00%	0C49H	0.10%	○
PC-74	Allowed update interval of main frequency	0.00s~200.00s	0C4AH	3.00s	○
PC-75	Differential time of external linear speed change	0.00s~50.00s	0C4BH	1.00s	○
PC-76	External linear speed change	0.00Hz~50.00Hz	0C4CH	1.00Hz	○

Group PE: User optional parameters

Group PE: user optional parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PE-00	User optional parameters 0	P0.00 ~ PF.xx A0.00 ~ A2.xx A9.00 ~ Ad.xx U0.00 ~ U0.xx U4.00 ~ U5.xx	0E00H	U4-00	○
PE-01	User optional parameters 1	Same to PE-00	0E01H	U4-01	○
PE-02	User optional parameters 2	Same to PE-00	0E02H	U4-08	○
PE-03	User optional parameters 3	Same to PE-00	0E03H	U4-09	○
PE-04	User optional parameters 4	Same to PE-00	0E04H	U4-10	○
PE-05	User optional parameters 5	Same to PE-00	0E05H	U4-03	○
PE-06	User optional parameters 6	Same to PE-00	0E06H	U4-06	○
PE-07	User optional parameters 7	Same to PE-00	0E07H	P0.00	○
PE-08	User optional parameters 8	Same to PE-00	0E08H	P0.00	○
PE-09	User optional parameters 9	Same to PE-00	0E09H	P0.00	○
PE-10	User optional parameters 10	Same to PE-00	0E0AH	P0.00	○
PE-11	User optional parameters 11	Same to PE-00	0E0BH	P0.00	○
PE-12	User optional parameters 12	Same to PE-00	0E0CH	P0.00	○
PE-13	User optional parameters 13	Same to PE-00	0E0DH	P0.00	○
PE-14	User optional parameters 14	Same to PE-00	0E0EH	P0.00	○
PE-15	User optional parameters 15	Same to PE-00	0E0FH	P0.00	○
PE-16	User optional parameters 16	Same to PE-00	0E10H	P0.00	○
PE-17	User optional parameters 17	Same to PE-00	0E11H	P0.00	○
PE-18	User optional parameters 18	Same to PE-00	0E12H	P0.00	○
PE-19	User optional parameters 19	Same to PE-00	0E13H	P0.00	○
PE-20	User optional parameters 20	Same to PE-00	0E14H	U0-67	○
PE-21	User optional parameters 21	Same to PE-00	0E15H	U0-68	○
PE-22	User optional parameters 22	Same to PE-00	0E16H	U0-69	○
PE-23	User optional parameters 23	Same to PE-00	0E17H	U0-70	○
PE-24	User optional parameters 24	Same to PE-00	0E18H	U0-74	○
PE-25	User optional parameters 25	Same to PE-00	0E19H	U0-00	○
PE-26	User optional parameters 26	Same to PE-00	0E1AH	U0-55	○
PE-27	User optional parameters 27	Same to PE-00	0E1BH	U0-56	○
PE-28	User optional parameters 28	Same to PE-00	0E1CH	P0.00	○
PE-29	User optional parameters 29	Same to PE-00	0E1DH	P0.00	○
PE-30	User optional parameters 30	Same to PE-00	0E1EH	P0.00	○
PE-31	User optional parameters 31	Same to PE-00	0E1FH	P0.00	○

Group PF: Torque control

Group PF: Torque control					
Parameter	Name	Setting range	Modbus address	Default value	Modify
PF-00	Torque control	0: Speed control 1: Torque control	0F00H	0	×
PF-01	Upper limit source of driver torque	0: Digital setting 1:AI1 2:AI2 4:PULSE 5: Communication setting 6:min(AI1,AI2) 7:max(AI1,AI2) (the full scale of option 1~7 correspond to PF-02 digital setting)	0F01H	0	×
PF-02	Driver torque upper limit	-200.0%～200.0%	0F02H	150.0%	○
PF-03	Torque control forward direction max frequency source	0: Digital setting 1:AI1 2:AI2 4:PULSE 5: Communication setting 6:min(AI1,AI2) 7:max(AI1,AI2) (the full scale of option 1~7 correspond to P0-13)	0F03H	0	○
PF-04	Torque control forward direction max frequency	0.00Hz～max output frequency	0F04H	50.00Hz	○
PF-05	Torque control reverse direction max frequency source	0: Digital setting 1:AI1 2:AI2 4:PULSE 5: Communication setting 6:min(AI1,AI2) 7:max(AI1,AI2) (the full scale of option 1~7 correspond to P0-13)	0F05H	0	○
PF-06	Torque control reverse direction max frequency	0.00Hz～max output frequency	0F06H	50.00Hz	○
PF-07	Torque acceleration time	0.00s～650.00s	0F07H	0.00s	○
PF-08	Torque deceleration time	0.00s～650.00s	0F08H	0.00s	○

Group A0: Textile

Group A0: textile					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A0-00	Setting length	0m~65535m	A000H	1000m	○
A0-01	Actual length	0m~65535m	A001H	0m	○
A0-02	Pulse number per meter	0.1~6553.5	A002H	100.0	○

Group A0: textile					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A0-03	Setting count value	1~65535	A003H	1000	○
A0-04	Specified count value	1~65535	A004H	1000	○
A0-05	Swing frequency setting mode	0: Relative to center frequency 1: Relative to the maximum frequency	A006H	0	○
A0-06	Swing frequency range	0.0%～100.0%	A007H	0.0%	○
A0-07	Jump frequency amplitude	0.0%～50.0%	A008H	0.0%	○
A0-08	Swing frequency period	0.1s～3600.0s	A009H	10.0s	○
A0-09	Triangular wave rise time of swing frequency	0.1%～100.0%	A006H	50.0%	○

Group A1: Virtual IO

Group A1: Virtual IO					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A1-00	Function selection of virtual X1 terminal	0~51: See group P2 physical X input selection	A100H	00	×
A1-01	Function selection of virtual X2 terminal		A101H	00	×
A1-02	Function selection of virtual X3 terminal		A102H	00	×
A1-03	Function selection of virtual X4 terminal		A103H	00	×
A1-04	Function selection of virtual X5 terminal		A104H	00	×
A1-05	Virtual X terminal effective state source	Ones place: virtual X1 0: The state of virtual Y1 determines whether virtual X1 is valid 1: Function code A1-06 sets whether virtual X1 is valid Tens place: virtual X2 Hundreds place: virtual X3 Thousands place: virtual X4 Ten Thousands place: virtual X5	A105H	00000	×
A1-06	Virtual X terminal status setting	0: Invalid 1: Valid Tens place: virtual X1 Tens place: virtual X2 Hundreds place: virtual X3 Thousands place: virtual X4 Ten Thousands place: virtual X5	A106H	00000	×
A1-07	Function selection of	0～51	A107H	00	×

Group A1: Virtual IO					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	AI1 terminal as X terminal				
A1-08	Function selection of AI2 terminal as X terminal	0～51	A108H	00	×
A1-10	Selection of effective level when AI is used as X terminal	Ones place:AI1 0: Low level valid 1: High level valid Tens place:AI2	A10AH	000	×
A1-11	Virtual Y1 output function selection	0: connect with physical X1 inside 1~42: See group P3 physical Y output selection	A10BH	00	○
A1-12	Virtual Y2 output function selection	0: connect with physical X2 inside 1~42: See group P3 physical Y output selection	A10CH	00	○
A1-13	Virtual Y3 output function selection	0: connect with physical X3 inside 1~42: See group P3 physical Y output selection	A10DH	00	○
A1-14	Virtual Y4 output function selection	0: connect with physical X4 inside 1~42:See group P3 physical Y output selection	A10EH	00	○
A1-15	Virtual Y5 output function selection	0: connect with physical X5 inside 1~42:See group P3 physical Y output selection	A10FH	00	○
A1-16	Virtual Y1 output delay time	0.0s ~ 3600.0s	A110H	0.0s	○
A1-17	Virtual Y2 output delay time	0.0s ~ 3600.0s	A111H	0.0s	○
A1-18	Virtual Y3 output delay time	0.0s ~ 3600.0s	A112H	0.0s	○
A1-19	Virtual Y4 output delay time	0.0s ~ 3600.0s	A113H	0.0s	○
A1-20	Virtual Y5 output delay time	0.0s ~ 3600.0s	A114H	0.0s	○
A1-21	Virtual Y terminal effective state selection	Ones place: virtual Y1 0: Positive logic 1: Negative logic Tens place: virtual Y2 Hundreds place: virtual Y3 Thousands place: virtual Y4 Ten Thousands place: virtual Y5	A115H	00000	○
A1-22	Virtual Y1 Output Active Delay Time (Supported in version	0.0s～3600.0s	A116H	0.0s	○

Group A1: Virtual IO					
Parameter	Name	Setting range	Modbus address	Default value	Modify
	3743 and above)				
A1-23	Virtual Y1 Output Inactive Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A117H	0.0s	○
A1-24	Virtual Y2 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A118H	0.0s	○
A1-25	Virtual Y2 Output Inactive Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A119H	0.0s	○
A1-26	Virtual Y3 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11AH	0.0s	○
A1-27	Virtual Y3 Output Inactive Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11BH	0.0s	○
A1-28	Virtual Y4 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11CH	0.0s	○
A1-29	Virtual Y4 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11DH	0.0s	○
A1-30	Virtual Y5 Output Active Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11EH	0.0s	○
A1-31	Virtual Y5 Output Inactive Delay Time (Supported in version 3743 and above)	0.0s～3600.0s	A11FH	0.0s	○

、Group A2: Second motor parameters

Group A2: Second motor parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A2-00	Motor type selection	0: Common asynchronous motor 1: Permanent magnet synchronous motor	A200H	0	×
A2-01	Motor rated power	0.1kW～650.0kW	A201H	Model setting	×
A2-02	Motor rated voltage	1V～1200V	A202H	Model setting	×
A2-03	Motor rated current	0.01A～655.35A (VFD power ≤55kW) 0.1A～6553.5A (VFD power >55kW)	A203H	Model setting	×
A2-04	Motor rated frequency	0.01Hz～max output frequency	A204H	Model setting	×
A2-05	Motor rated speed	1rpm～65535rpm	A205H	Model setting	×
A2-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	A206H	Tuning parameters	×
A2-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	A207H	Tuning parameters	×
A2-08	Leakage inductance of asynchronous motor	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	A208H	Tuning parameters	×
A2-09	Asynchronous motor mutual inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	A209H	Tuning parameters	×
A2-10	Asynchronous motor current without load	0.01A～A2-03 (VFD power ≤55kW) 0.1A～A2-03 (VFD power >55kW)	A20AH	Tuning parameters	×
A2-15	Synchronous motor stator phase resistance	0.001Ω～65.535Ω	A20FH	Tuning parameters	×
A2-16	Synchronous motor D-axis inductance	0.01mH～655.35mH	A210H	Tuning parameters	×
A2-17	Synchronous motor Q-axis inductance	0.01mH～655.35mH	A211H	Tuning parameters	×
A2-19	Synchronous motor back EMF	0～6000.0V	A213H	Tuning parameters	×
A2-35	Motor 2 parameter self-learning	Ones place: Tuning Method 0: No action 1: Static tuning 1 2: Dynamic tuning 3: Static tuning 2 (Applicable to asynchronous motors only) Tens place: Motor Type 0: Asynchronous Motor 1: Synchronous Motor	A223H	00	×
A2-36	Motor 2 control mode	0: VF control 1: no speed sensor vector control (SVC)	A224H	0	×

Group A2: Second motor parameters					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A2-37	Motor 2 acc/dec time selection	0: same to first motor 1: acceleration and deceleration time 1 2: acceleration and deceleration time 2 3: acceleration and deceleration time 3 4: acceleration and deceleration time 4	A225H	0	○
A2-38	Motor 2 torque boost	0.0%: Automatic torque boost 0.1%～30.0%	A226H	Model setting	○
A2-40	Motor 2 oscillation suppression gain	0～100	A228H	Model setting	○
A2-41	Speed loop proportion gain 1	1～100	A229H	30	○
A2-42	Speed loop integral time 1	0.01s～10.00s	A22AH	0.50	○
A2-43	Speed loop proportion gain 2	1～100	A22BH	20	○
A2-44	Speed loop integral time 2	0.01s～10.00s	A22CH	1.00	○
A2-45	Switching frequency 1	0.00～A2-46	A22DH	5.00	○
A2-46	Switching frequency 2	A2-45～max output frequency (P0-13)	A22EH	10.00	○
A2-47	Speed loop integral property	Ones place: integral separation 0: invalid 1: valid	A22FH	0	○
A2-48	Slip gain of vector control	50%～200%	A230H	100%	○
A2-49	SVC speed feedback filter time	0.000s～0.100s	A231H	0.015	○
A2-51	Torque upper limit source under speed control mode	0: Parameter setting（A2-52） 1:AI1 2:AI2 4: PULSE setting 5: communication setting 6:min(AI1,AI2) 7:max(AI1,AI2) The full range of options 1-7 corresponds to the A2-53 digital setting	A233H	0	○
A2-52	Digital setting of torque upper limit in speed control mode	0.0%～200.0%	A234H	150.0%	○
A2-55	Proportional gain of excitation regulation	0 ~ 60000	A237H	Tuning Parameters	○
A2-56	Integral gain of excitation regulation	0 ~ 60000	A238H	Tuning Parameters	○
A2-57	Torque regulation proportional gain	0 ~ 60000	A239H	Tuning Parameters	○
A2-58	Integral gain of torque regulation	0 ~ 60000	A23AH	Tuning Parameters	○

Group A4: Password countdown lock

Group A4: Password countdown lock					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A4-00	Parameter group access verification	0～65000	-	0	○

Group A4: Password countdown lock					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A4-01	Parameter group lock password	0～65000	-	0	○
A4-02	Total power on time before locking	0～7200	-	0h	○
A4-03	Remaining time of power on locking	0～7200	-	0h	○

Group A9: Communication address mapping

Group A9: Communication address mapping					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A9-00	Communication address mapping selection	0:disable mapping function 1:enable mapping function	A900H	0	○
A9-01	Communication address mapping primitive 1	0x0000~0xFFFF	A901H	0x0000	○
A9-02	Communication address mapping primitive 2	0x0000~0xFFFF	A902H	0x0000	○
A9-03	Communication address mapping primitive 3	0x0000~0xFFFF	A903H	0x0000	○
A9-04	Communication address mapping primitive 4	0x0000~0xFFFF	A904H	0x0000	○
A9-05	Communication address mapping primitive 5	0x0000~0xFFFF	A905H	0x0000	○
A9-06	Communication address mapping primitive 6	0x0000~0xFFFF	A906H	0x0000	○
A9-07	Communication address mapping primitive 7	0x0000~0xFFFF	A907H	0x0000	○
A9-08	Communication address mapping primitive 8	0x0000~0xFFFF	A908H	0x0000	○
A9-09	Communication address mapping primitive 9	0x0000~0xFFFF	A909H	0x0000	○
A9-10	Communication address mapping primitive 10	0x0000~0xFFFF	A90AH	0x0000	○
A9-11	Communication address mapping primitive 11	0x0000~0xFFFF	A90BH	0x0000	○
A9-12	Communication address mapping primitive 12	0x0000~0xFFFF	A90CH	0x0000	○
A9-13	Communication address mapping primitive 13	0x0000~0xFFFF	A90DH	0x0000	○
A9-14	Communication address mapping primitive 14	0x0000~0xFFFF	A90EH	0x0000	○
A9-15	Communication address mapping image 1	0x0000~0xFFFF	A90FH	0x0000	○
A9-16	Communication address mapping image 2	0x0000~0xFFFF	A910H	0x0000	○
A9-17	Communication address mapping image 3	0x0000~0xFFFF	A911H	0x0000	○
A9-18	Communication address mapping image 4	0x0000~0xFFFF	A912H	0x0000	○
A9-19	Communication address mapping image 5	0x0000~0xFFFF	A913H	0x0000	○
A9-20	Communication address mapping image 6	0x0000~0xFFFF	A914H	0x0000	○

Group A9: Communication address mapping					
Parameter	Name	Setting range	Modbus address	Default value	Modify
A9-21	Communication address mapping image 7	0x0000~0xFFFF	A915H	0x0000	○
A9-22	Communication address mapping image 8	0x0000~0xFFFF	A916H	0x0000	○
A9-23	Communication address mapping image 9	0x0000~0xFFFF	A917H	0x0000	○
A9-24	Communication address mapping image 10	0x0000~0xFFFF	A918H	0x0000	○
A9-25	Communication address mapping image 11	0x0000~0xFFFF	A919H	0x0000	○
A9-26	Communication address mapping image 12	0x0000~0xFFFF	A91AH	0x0000	○
A9-27	Communication address mapping image 13	0x0000~0xFFFF	A91BH	0x0000	○
A9-28	Communication address mapping image 14	0x0000~0xFFFF	A91CH	0x0000	○

Group AD: AIAO correction

Group AD: AIAO correction					
Parameter	Name	Setting range	Modbus address	Default value	Modify
AD-00	AI1 measured voltage 1	0.500V～4.000V	AD00H	Factory calibration	○
AD-01	AI1 display voltage 1	0.500V～4.000V	AD01H	Factory calibration	○
AD-02	AI1 measured voltage 2	6.000V～9.999V	AD02H	Factory calibration	○
AD-03	AI1 display voltage 2	6.000V～9.999V	AD03H	Factory calibration	○
AD-04	AI2 measured voltage 1	0.500V～4.000V	AD04H	Factory calibration	○
AD-05	AI2 display voltage 1	0.500V～4.000V	AD05H	Factory calibration	○
AD-06	AI2 measured voltage 2	6.000V～9.999V	AD06H	Factory calibration	○
AD-07	AI2 display voltage 2	6.000V～9.999V	AD07H	Factory calibration	○
AD-12	AO1 target voltage 1	0.500V～4.000V	AD0CH	Factory calibration	○
AD-13	AO1 measured voltage 1	0.500V～4.000V	AD0DH	Factory calibration	○
AD-14	AO1 target voltage 2	6.000V～9.999V	AD0EH	Factory calibration	○
AD-15	AO1 measured voltage 2	6.000V～9.999V	AD0FH	Factory calibration	○

Group U0: Monitor parameters

Group U0: monitor parameters				
Parameter	Name	Min unit	Modbus address	Display range
U0-00	Operation frequency (Hz)	0.01Hz	7000H	0.00~600.00HZ
U0-01	Setting frequency (Hz)	0.01Hz	7001H	0.00~600.00HZ
U0-02	Bus voltage (V)	0.1V	7002H	0.0~1024.0
U0-03	Output current (A)	0.01A	7003H	0.0~655.35A
U0-04	Output voltage (V)	1V	7004H	0V~1140V
U0-05	Output torque (%) Percentage output value of motor rated torque	0.1%	7005H	-200.0%~200.0%
U0-06	Output power (kW)	0.1kW	7006H	0~32767
U0-07	X input state	1	7007H	0x0000~0x7FFF
U0-08	Y output state	1	7008H	0x0000~0x03FF
U0-09	AI1 voltage (V)/current(mA)	0.01V/0.01mA	7009H	0.00V ~10.57V/0.00mA~20.00mA
U0-10	AI2 voltage (V)/current (mA)	0.01V/0.01mA	700AH	0.00V ~10.57V/0.00mA~20.00mA
U0-12	PULSE input frequency	0.01kHz	700CH	0.00kHz ～ 50.00KHz
U0-13	PULSE input frequency (Hz)	1Hz	700DH	0 ～ 65535Hz
U0-14	PID setting	1	700EH	0 ～ 65535
U0-15	PID feedback	1	700FH	0 ～ 65535
U0-16	Load speed display	Depend on P8-22	7010H	0~65535
U0-17	Feedback speed (Hz)	Depend on P8-22	7011H	-600.00~600.00
U0-20	PLC stage	1	7014H	0~15
U0-21	Count value	1	7015H	0~65535
U0-22	Length value	1	7016H	0~65535
U0-23	Main frequency A display	0.01Hz	7017H	0.01~max output frequency
U0-24	Auxiliary frequency B display	0.01Hz	7018H	0.01~ max output frequency
U0-25	Communication setting	0.01%	7019H	-100.00%~100.00%
U0-26	AI1 voltage/current before calibration	0.001V/0.001mA	701AH	0.000V~10.570V/0.000mA~20.000mA
U0-27	AI2 voltage/current before calibration	0.001V/0.001mA	701BH	0.000V~10.570V/0.000mA~20.000mA
U0-29	Remaining running time	0.1Min	701DH	0.0~6500.0min
U0-30	Present power on time	1Min	701EH	0~65000min
U0-31	Present operation time	0.1Min	701FH	0.0~6500.0min
U0-33	Present fault	1	7021H	1~56

Group U0: monitor parameters					
Parameter	Name	Min unit		Modbus address	Display range
U0-34	Fault information	1		7022H	-
U0-35	Target torque (%)	0.1%		7023H	-200.0%~200.0%
U0-36	Torque upper limit	0.01%		7024H	-200.0%~200.0%
U0-41	Power factor angle	0.1°		7029H	-
U0-42	Setting frequency (%)	0.01%		702AH	-100.00%~100.00%
U0-43	Operation frequency (%)	0.01%		702BH	-100.00%~100.00%
U0-44	VF separate target voltage	1V		702CH	0V ~ motor rated voltage
U0-45	VF separate output voltage	1V		702DH	0V~ motor rated voltage
U0-47	Motor serial number	0: motor 1 1: motor 2		702FH	-
U0-48	Check any memory address value	1		7030H	-
U0-66	Motor Speed	1RPM		7042H	0~motor rated speed
U0-67	Communication Expansion Card Model	-		7043H	-
U0-70	Communication feedback motor speed 1	0.1Hz		7046H	-
U0-71	Communication feedback motor speed 2	1RPM		7047H	0~motor rated speed
U0-72	Special current display for communication card	-		7048H	-
U0-73	Communication card error status	-		7049H	-
U0-74	Motor actual output torque	0.01%		704AH	-200.00%~200.00%
U0-75	Fault code	-		704BH	1~56
U0-76	Operation status word	display bit	Explanation	704CH	0x0000~0xFFFF
		Bit0	0: shutdown 1: in operation		
		Bit1	Normal operation (Non jogging, tuning)		
		Bit2	Jog operation		
		Bit3	Tuning operation		
		Bit4	Jog during operation		
		Bit5~Bit6	0: Constant speed 1: Acceleration 2: Deceleration		
		Bit7	PLC operation		
		Bit8	PID operation		
		Bit9	Torque control		
		Bit10	Set frequency direction		

Group U0: monitor parameters					
Parameter	Name	Min unit		Modbus address	Display range
		Bit11	Current frequency operation direction		
		Bit12	Running reverse flag 0:forward 1:reverse		
		Bit13	Final frequency setting direction 0:forward 1:reverse		

5. EMC

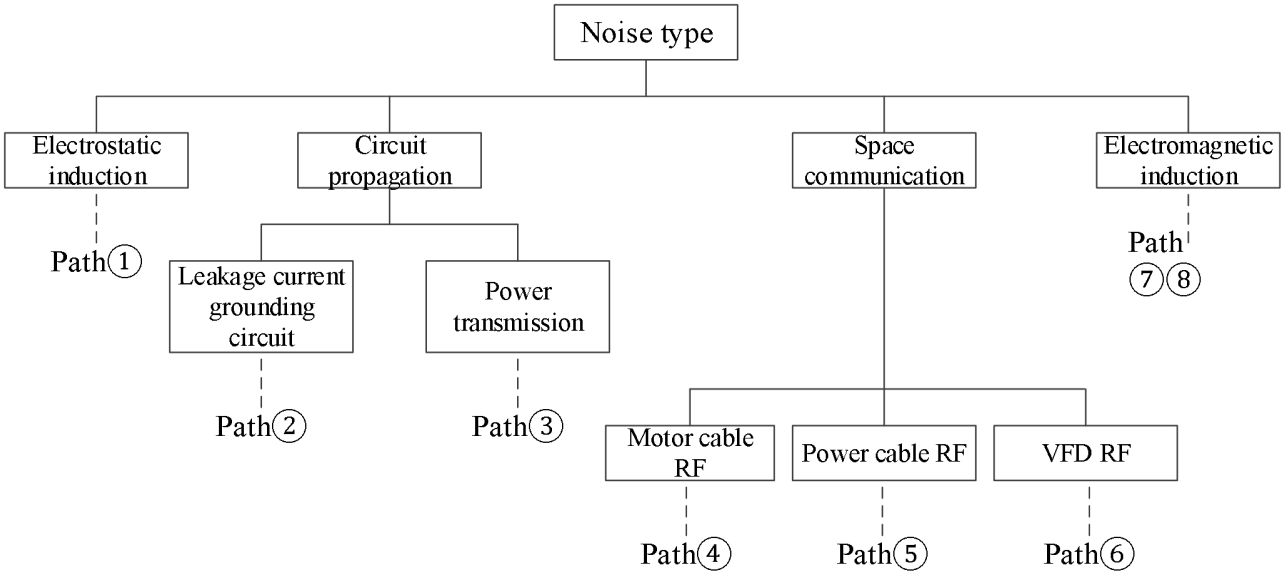
5-1. EMC compliant installation guidelines

The output of the inverter is PWM wave, which will produce electromagnetic noise when it works. In order to reduce the interference of the inverter to the outside world, this section introduces the installation method of EMC in noise suppression, field wiring, grounding, leakage current, power filter use and so on.

5-1-1. Noise suppression

- Noise type

The noise generated by the operation of the frequency converter may affect the nearby instruments and equipment. The degree of influence is related to the control system of the frequency converter, the anti-noise ability of the equipment, the wiring environment, the safe distance, the grounding method and other factors. The types of noise include: electrostatic induction, circuit transmission, space transmission, electromagnetic induction, etc.



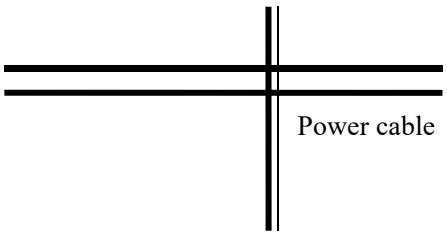
- Basic countermeasures for noise suppression

Noise propagation path	Solution
②	When the grounding wire of peripheral equipment and the wiring of frequency converter form a closed loop, the leakage current of the inverter grounding wire will cause the equipment to misbehave. At this time, if the equipment is not grounded, it will reduce the misoperation.
③	When the power supply of peripheral equipment and the power supply of frequency converter share the same system, the noise generated by the frequency converter propagates against the power line, which will disturb other equipment in the same system. The following measures can be taken to suppress the noise: installing electromagnetic noise filter at the input end of the frequency converter. Use isolation transformer or power filter to isolate other equipment.
④⑤⑥	(1) Equipment and signal lines that are easy to be disturbed should be installed as far away from

	the frequency converter as possible. The signal line should use shielded wire, the shielding layer should be single ended grounding, and should be as far away from the inverter and its input and output lines as possible. If the signal wire must intersect with the strong current cable, the two should be kept orthogonal. (2) High frequency noise filters (ferrite common mode choke) are installed at the root of the input and output sides of the inverter, which can effectively suppress the RF interference of the power line. (3) The motor cable should be placed in the barrier with larger thickness, such as in the pipe with thickness (more than 2mm) or embedded in the cement tank. The power line is sheathed in the metal pipe and grounded with the shielded wire (the motor cable adopts 4-core cable, one of which is grounded on the inverter side and the other side is connected to the motor shell).
①⑦⑧	Avoid parallel wiring or binding of strong and weak current wires. It should be far away from the installation equipment of frequency converter as far as possible, and its wiring should be far away from the input and output lines of frequency converter. Shielded wire is used for signal line and power line. For the equipment with strong electric field or magnetic field, pay attention to the relative installation position with frequency converter, and keep the distance and orthogonality.

5-1-2. Field wiring and grounding

1. The cable (U, V, W terminal outgoing line) from the frequency converter to the motor should avoid parallel wiring with the power line (R, S, T or L, N terminal input line) as far as possible. Keep a distance of more than 30cm.
2. The three motor wires of inverter output U, V and W terminals shall be placed in metal tube or metal wiring slot.
3. The control signal line shall be shielded cable, and the shielding layer shall be connected with the PE end of the frequency converter, and the single end grounding near the side of the frequency converter.
4. The PE end grounding cable of frequency converter shall not borrow the grounding wire of other equipment, but must be directly connected with the ground.
5. The control signal line shall not be parallel to the strong current cable (R, S, T or L, N and U, V, W) for short distance wiring, and shall not be bundled together. The distance above 20 ~ 60 cm (related to the strong current) shall be maintained. If you want to intersect, you should cross each other vertically, as shown in the figure below.



6. Weak current grounding wires such as control signals and sensors must be grounded independently from strong current grounding wires.
7. It is forbidden to connect other devices on the power input terminal (R, S, T or L, N) of frequency converter.

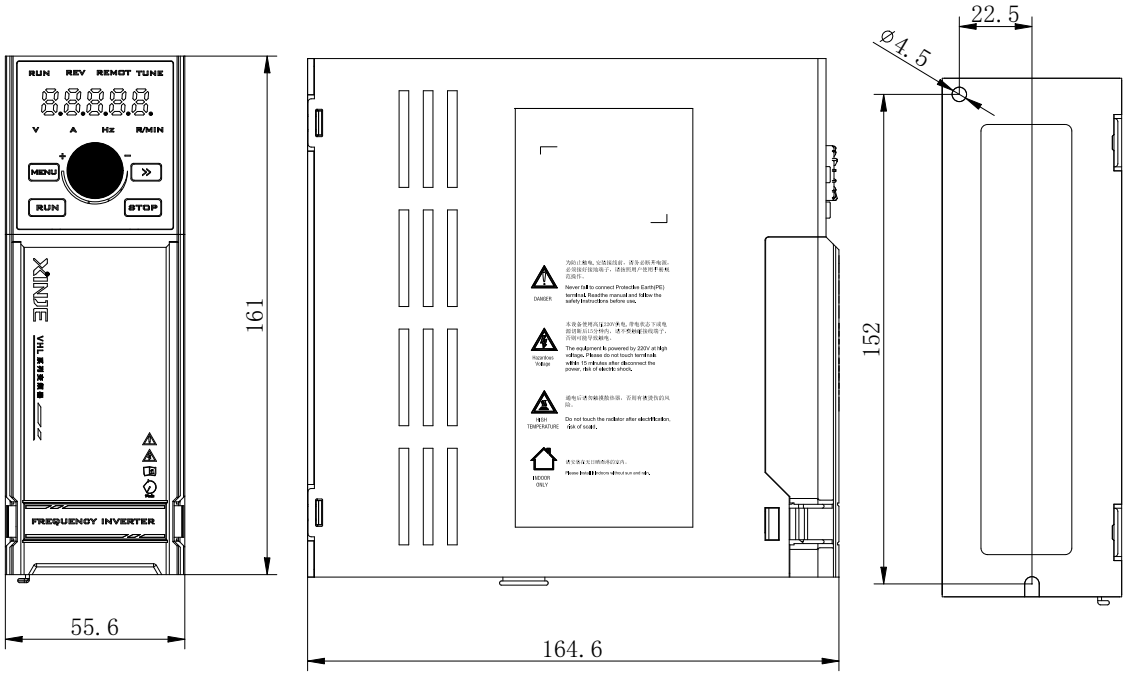
6. Model and dimension

6-1. VHL series VFD electrical specification

Voltage level	Model	Input power capacity (KVA)	Input current (A)	Output current (A)	Matched motor (kW)
380V 50Hz/60Hz	VHL-40P4-B	1	1.9	1.5	0.4
	VHL-40P7-B	1.5	3.4	2.1	0.75
	VHL-41P5-B	3	5	3.8	1.5
220V 50Hz/60Hz	VHL-20P4-B	1	5.4	2.3	0.4
	VHL-20P7-B	1.5	5.6	4.0	0.75

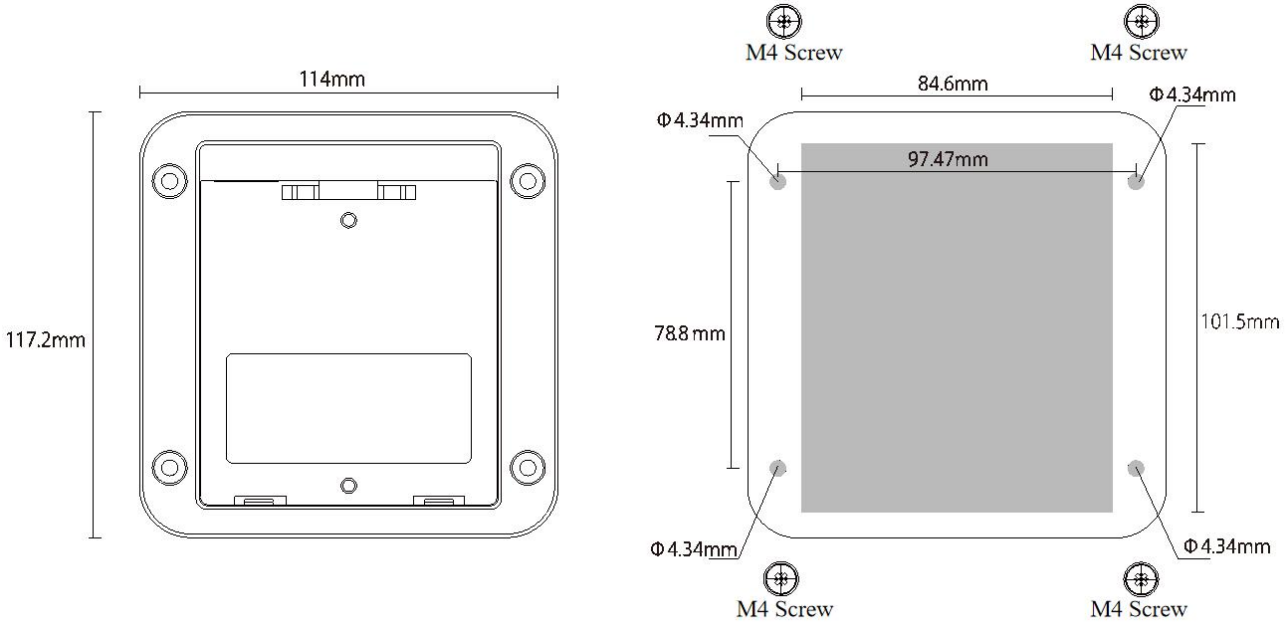
6-2. VHL series VFD dimension

- VHL-20P4/20P7-B、VHL-40P4/40P7/41P5-B Unit: mm



All installation screws are M4.

- Dimension drawing of operation panel mounting bracket



The gray area is the hollowed out part, and the middle hollowed out area is 84.6 × 101.5mm. The diameter of the four corner hollowed out area is 4.34 circle, and M4 screws and nuts are put in to fix the bracket on the panel.

6-3. Accessories selection guide

6-3-1. Accessories functions

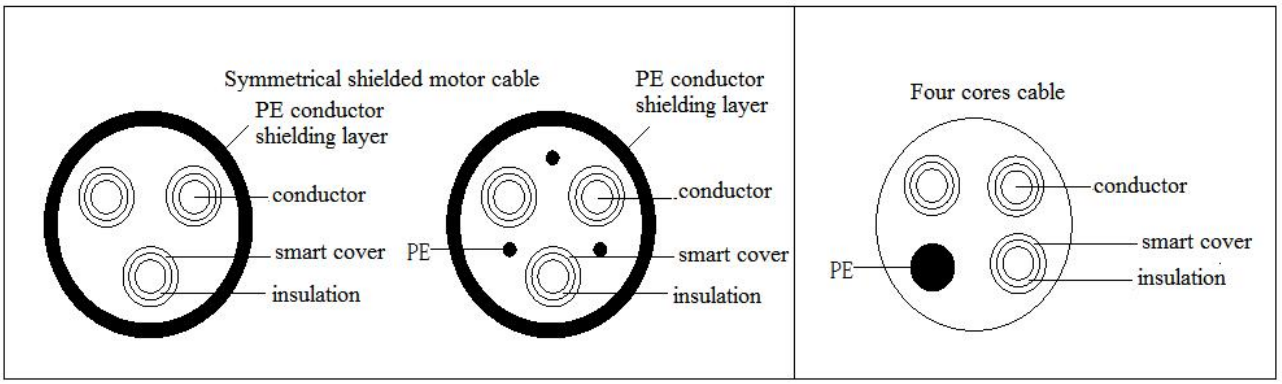
Name	Functions
Cable	A device for transmitting electrical signals
Circuit breaker	To prevent electric shock and the short circuit to ground which may cause leakage current fire (please select leakage circuit breaker for inverter device and with function of suppressing high harmonic. Rated sensitive current of circuit breaker shall be more than 30mA for one frequency converter.)
AC contactor	In order to effectively cut off the input power of the inverter in case of system failure, an electromagnetic contactor is installed on the input side to control the on-off of the main circuit power supply, so as to ensure safety.
input reactor	It is suitable for improving the power factor of the input side of the inverter and restraining the high-order harmonic current.
DC reactor	
Input filter	To suppress the electromagnetic interference of the inverter transmitted to the public power grid through the input power line, please install it as close to the input terminal side of the inverter as possible.
Fuse	It mainly plays the role of overload protection. When the input current of the frequency converter rises to a certain height and heat, the fuse itself will fuse to cut off the current, which can protect the safe operation of the frequency converter.

Braking resistor	The regenerative energy of motor is consumed by resistor or resistor unit to shorten deceleration time and avoid over-voltage alarm of frequency converter.
Output filter	Suppress the interference generated from the output side wiring of the inverter. Please install it close to the output terminal of frequency converter.
Output choke	It is used to extend the effective transmission distance of the frequency converter and effectively suppress the instantaneous high voltage generated when the IGBT module of the frequency converter is switched.

6-3-2. Cable selection

1) Power cable

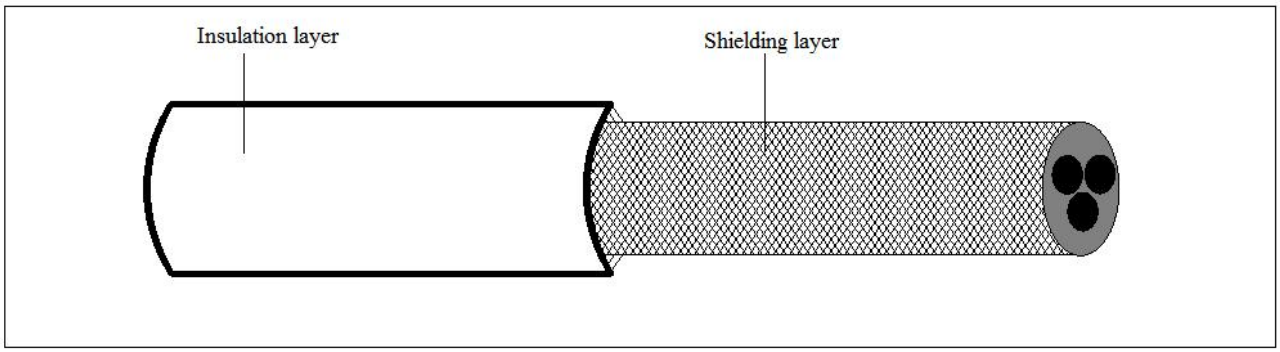
- The size of input power cable and motor cable shall comply with local regulations;
- The input power cable and motor cable must be able to withstand the corresponding load current;
- The maximum rated temperature margin of motor cable under continuous working condition should not be lower than 70℃;
- The conductivity of PE grounding conductor is the same as that of phase conductor;
- For EMC requirements, please refer to the chapter ""EMC"";
- In order to meet the EMC requirements of CE, symmetrical shielded motor cable must be used;
- Four core cable can be used for input cable, but shielded symmetrical cable is recommended. Compared with four core cable, using symmetrical shielded cable can reduce the loss of motor cable and electromagnetic radiation.



If the conductivity of the shielding layer of the motor cable cannot meet the requirements, a separate PE conductor must be used.

In order to protect the conductor, when the shielding wire and the phase conductor are made of the same material, the cross-sectional area of the shielding wire must be the same as that of the phase conductor, so as to reduce the grounding resistance and improve the impedance continuity.

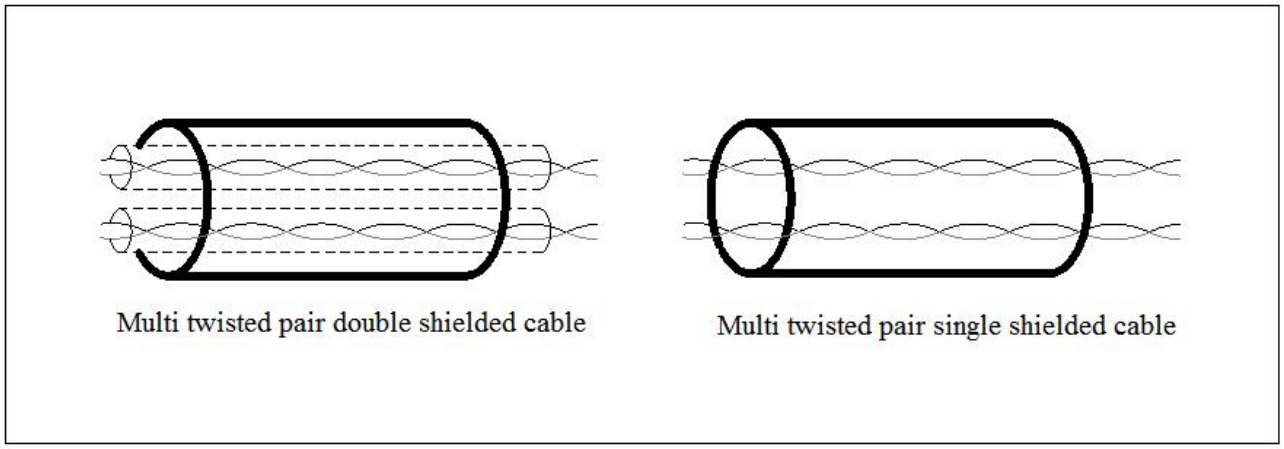
In order to effectively suppress the emission and conduction of radio frequency interference, the conductivity of the shielding wire must be at least 1/10 of that of the phase conductor. For copper or aluminum shielding, this requirement is very easy to meet. The minimum requirements of inverter motor cable are shown in the figure below. The cable contains a spiral copper strip. The tighter the shielding layer is, the better, because the tighter it is, the more effectively it can suppress the electromagnetic interference radiation.



2) Control cable

All analog control cables and cables used for frequency input must use shielded cables. The analog signal cable uses twisted pair shielded cable. Each signal uses a separate pair of shielded twisted pairs. Do not use the same ground wire for different analog signals.

For low-voltage digital signal, it is better to choose double layer shielded cable, but single shielded or unshielded twisted pair can also be used, but for frequency signal, shielded cable must be used.



Relay cables need to be shielded with metal braid.

The keyboard needs to use network cable. For the electromagnetic environment, it is recommended to use shielded network wire.

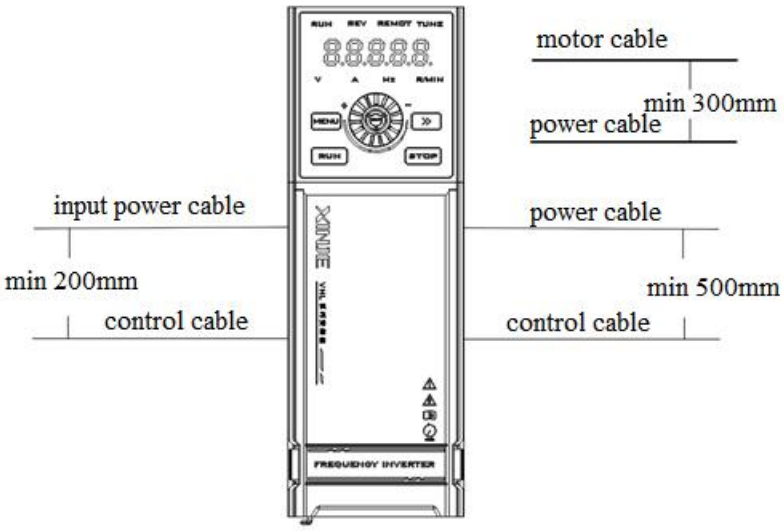
- Analog and digital signals are routed separately using different cables.
- Before connecting the input power cable of the inverter, check the insulation of the input power cable according to the local regulations.

3) Cable wiring

The routing of motor cable must be far away from the routing of other cables. The motor cables of several inverters can be run side by side. It is suggested that the motor cable, input power cable and control cable should be distributed in different trunking. The reason to avoid the side-by-side routing of other cables and motor cables is that the du/dt output from the inverter will increase the electromagnetic interference to other cables.

If the control cable and the power cable must be crossed, the angle between the control cable and the power cable must be 90 degrees.

The cable trunking must be well connected and well grounded. Aluminum trunking can make local equipotential.



4) Insulation inspection

Before operation, please check the insulation of motor and motor cable

(1) Make sure that the motor cable is connected to the motor, and then remove the motor from the output terminal UVW of the inverter.

(2) Use a 500VDC megger to measure the insulation resistance between each phase conductor and the protective grounding conductor. For the insulation resistance of the motor, please refer to the motor manufacturer's instructions.

(3) If the inside of the motor is wet, the insulation resistance will decrease. If moisture is suspected, dry the motor and measure again.

6-3-3. Selection guidance of circuit breaker, contactor and fuse

- In order to prevent the overload from damaging the inverter, it is necessary to add a fuse at the incoming end.
- A manually operated power short circuit device (MCCB) needs to be installed between AC power supply and frequency converter. The circuit breaker equipment must be able to be locked in the cut off position to facilitate installation and maintenance. The capacity of the circuit breaker is generally 1.5-2 times of the rated current of the inverter.
- In order to effectively cut off the input power of frequency converter in case of system failure, AC contactor can be installed on the input side to control the on-off of main circuit power supply, so as to ensure safety.

VFD model	Breaker (A)	Rated current of contactor (A)	Fuse (A)
VHL-20P4-B	10	9	12
VHL-20P7-B	16	12	20
VHL-40P4-B	6	9	5
VHL-40P7-B	10	9	8
VHL-41P5-B	10	9	10

The parameters of the options in the table are ideal values, which can be adjusted according to the actual situation, but try not to be lower than the parameters in the table.

6-3-4. Reactor selection guide

- In order to prevent the instantaneous large current from flowing into the input power circuit and damaging the rectifier components during high-voltage input of the power grid, it is necessary to connect an AC reactor on the input side, which can also improve the power factor on the input side.
- When the distance between the frequency converter and the motor exceeds 50 meters, due to the parasitic capacitance effect of the long cable to the ground, the leakage current is large, and the frequency converter is prone to overcurrent protection. At the same time, to avoid motor insulation damage, output reactor compensation must be added. When a frequency converter is equipped with multiple motors, the sum of the cable lengths of each motor is considered as the total motor cable length. When the total length is greater than 50 meters, an output reactor must be added on the output side of the frequency converter.

VFD model	Input reactor	Output reactor
VHL-20P4-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VHL-20P7-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VHL-40P4-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VHL-40P7-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VHL-41P5-B	ACLSG-6A/4.4V	OCLSG-6A/2.2V

The above options are of Chint brand, users can purchase them according to the model.

6-3-5. Brake resistor selection

When the inverter is slow down with large inertia load or needs to slow down rapidly, the motor will be in power generation state. The load energy will be transmitted to the DC link of the converter through the inverter bridge, which causes the voltage rise of the converter bus. When the value exceeds a certain value, the frequency converter will report an over-voltage alarm. In order to prevent this phenomenon, the brake components must be configured.

1. The design, installation, commissioning and operation of the equipment must be carried out by trained and qualified professionals.
2. In the process of work, all the provisions in the ""warning"" must be observed, otherwise serious personal injury or heavy property loss may be caused.
3. Non professional construction personnel are not allowed to conduct wiring, otherwise the circuit of frequency converter or brake options will be damaged.
4. Before connecting the brake resistor to the inverter, please read the instruction manual of the brake resistor / brake unit carefully.
5. Selecting a resistor with a higher resistance value and lower power rating may result in excessive heat generation. In this case, the default discharge threshold should be reduced to minimize heat accumulation.
6. Do not connect the brake resistor to terminals other than PB and P +, and do not connect the brake unit to terminals other than P+ and P-. Otherwise, the brake circuit and frequency converter may be damaged and fire may be caused.

As shown in the wiring diagram, please connect the inverter with the braking resistance. If the wiring is wrong, the inverter or other equipment may be damaged.

1) Brake resistor selection

When braking, the regenerative energy of the motor is almost all consumed on the braking resistance. According to the formula:

$$U \times U / R = Pb$$

U --- Braking voltage of system stable braking (different system U values are different, the default braking voltage of VHL series inverter is 690V, which can be adjusted through P7-59),

Pb ---Braking power.

2) Brake resistor power selection

Theoretically, the power of the braking resistor is the same as that of the braking power, but considering that the derating is A. According to the formula:

$$A \times Pr = Pb \times D$$

A --- Generally, the value is about 50%,

Pr --- Resistor power,

D --- Braking frequency, that is, the proportion of regeneration process in the whole working process

Value A is the derating coefficient of the braking resistance. A lower value A can ensure that the braking resistance will not overheat. Users can appropriately increase value A when the braking is good, but it is better not to exceed 50%, otherwise there will be the risk of fire caused by overheated resistance.

3) Typical braking frequency value

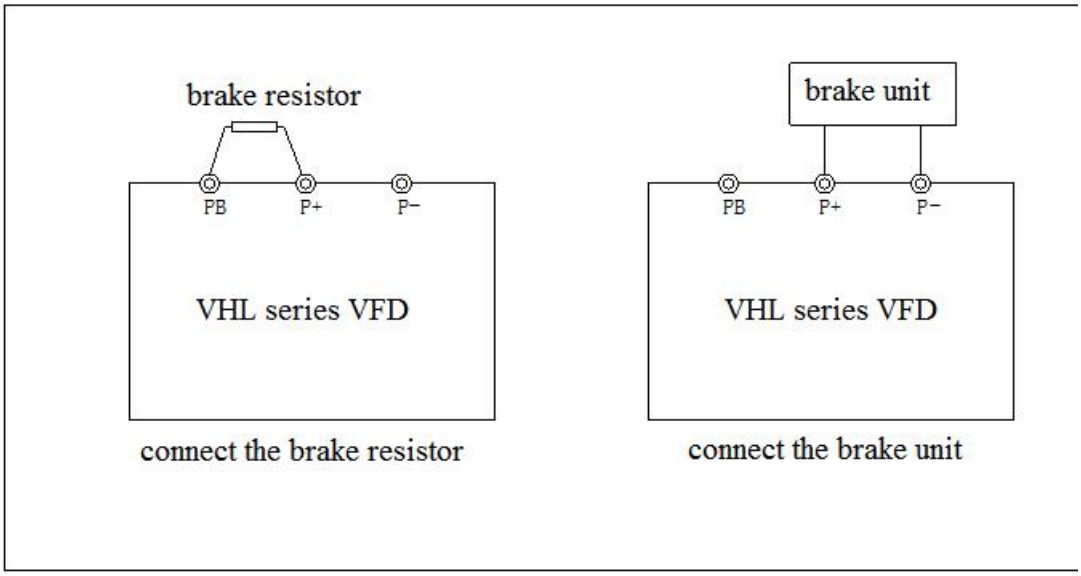
Common applications	Elevator	Unwinding and winding	Centrifuge	Accidental braking load	General occasions
Braking frequency value	20% ~30%	20 ~30%	50%~60%	5%	10%

4) Brake resistor models

The recommended braking resistor specifications in the table below are based on a braking duty cycle of 10%. Please confirm the applicable duty cycle requirements for the actual application.

VFD model	Braking unit	Recommended brake resistor specifications		
		Brake resistor (Ω)	Brake resistor power (W)	Brake resistor quantity
VHL-20P4-B	Built-in	≥200	≥80	1
VHL-20P7-B	Built-in	≥150	≥80	1
VHL-40P4-B	Built-in	≥300	≥150	1
VHL-40P7-B	Built-in	≥300	≥150	1
VHL-41P5-B	Built-in	≥220	≥150	1

- The values in the table are guidance data. Users can choose different resistance values and power according to the actual situation (but the resistance value must not be less than the recommended value in the table, and the power can be larger). The selection of braking resistance needs to be determined according to the power generated by the motor in the practical application system, which is related to the system inertia, deceleration time, energy of potential energy load, etc, Customers need to choose according to the actual situation. The greater the inertia of the system, the shorter the deceleration time and the more frequent the braking, the greater the power and the smaller the resistance value of the braking resistor.
- The brake resistance cable shall be shielded cable.
- All resistors must be installed in a well ventilated place.
- It is suggested that the material of brake resistor accessories should be flame retardant, and the surface temperature of the resistor is very high. Even the temperature of the air flowing out of the resistance can be as high as several hundred degrees, so the material must be prevented from contacting with the resistance.
- The brake resistor must be connected to the PB and P + terminals, and the brake unit must be connected to the P+ and P- terminals. As shown in the figure below:



7. Fault and solution

7-1. Fault alarm and solution

When the inverter is abnormal, the LED tube will display the function code and its content of the corresponding fault, the fault relay will act, and the inverter will stop output. In case of fault, if the motor is rotating, it will stop freely until it stops rotating. The possible fault types of frequency converter are shown in the table. When the frequency converter fails, the user should first check according to the table, and record the failure phenomenon in detail. If you need technical service, please contact our after-sales service and technical support department or our agents.

Fault Code	Name	Reason	Solution
Err01	Acceleration over current	1. There is grounding or short circuit in the output circuit of frequency converter 2. The control mode is vector control without parameter tuning 3. The acceleration time is too short 4. Improper manual torque lifting or VF curve 5. The voltage is low 6. Start the rotating motor 7. Sudden loading during acceleration 8. The selection of frequency converter is too small	1. Remove peripheral faults 2. Tuning of motor parameters 3. Increase acceleration time 4. Adjust the manual lifting torque or VF curve 5. Adjust the voltage to the normal range 6. Select speed tracking start or wait until the motor stops 7. Cancel sudden loading 8. Choose the frequency converter with higher power level
Err02	Deceleration over current	1. There is grounding or short circuit in the output circuit of frequency converter 2. The control mode is vector control without parameter tuning 3. The deceleration time is too short 4. The voltage is low 5. Sudden loading during deceleration 6. There is no additional brake unit and brake resistor	1. Remove peripheral faults 2. Tuning of motor parameters 3. Increase deceleration time 4. Adjust the voltage to the normal range 5. Cancel sudden loading 6. Add brake unit and resistor
Err03	Constant speed over current	1. There is grounding or short circuit in the output circuit of frequency converter 2. The control mode is vector control without parameter tuning 3. The voltage is low 4. Is there sudden load in operation 5. The selection of frequency converter is too small	1. Remove peripheral faults 2. Tuning of motor parameters 3. Adjust the voltage to the normal range 4. Cancel sudden loading 5. Choose the frequency converter with higher power level
Err04	Acceleration overvoltage	1. High input voltage 2. There is external force to drive the motor during acceleration 3. Acceleration time too short 4. There is no additional brake unit and brake resistor	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor 3. Increase acceleration time 4. Add brake unit and resistor

Fault Code	Name	Reason	Solution
Err05	Deceleration over voltage	1. High input voltage 2. There is external force to drive the motor during deceleration 3. The deceleration time is too short 4. There is no additional brake unit and brake resistor	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor 3. Increase deceleration time 4. Add brake unit and resistor
Err06	Constant speed over voltage	1. High input voltage 2. In the process of operation, there is external force to drive the motor	1. Adjust the voltage to the normal range 2. Cancel additional force or add brake resistor
Err07	Buffer resistance overload fault	1. Unstable supply voltage 2. The main control board is abnormal	1. Adjust the voltage to the normal range 2. Contact us
Err08	Under voltage	1. Instantaneous power failure 2. The input voltage of frequency converter is not in the range of specification requirements 3. Abnormal bus voltage 4. Abnormal rectifier bridge and buffer resistance 5. Abnormal drive board 6. Abnormal control board	1. Reset fault 2. Adjust the voltage to the normal range 3. Contact us
Err09	VFD overload	1. Whether the load is too large or the motor stalls 2. The selection of frequency converter is too small	1. Reduce the load and check the motor and mechanical condition 2. Choose the frequency converter with higher power level
Err10	Motor overload	1. Is the setting of motor protection parameters appropriate 2. Whether the load is too large or the motor stalls 3. The selection of frequency converter is too small	1. Set this parameter correctly 2. Reduce the load and check the motor and mechanical condition 3. Choose the frequency converter with higher power level
Err11	Input lack phase	1. Abnormal three-phase input power supply 2. Abnormal drive board 3. Abnormal lightning protection board 4. The main control board is abnormal	1. Check and eliminate problems in peripheral circuit 2. Contact us
Err12	Output lack phase	1. The lead from inverter to motor is abnormal 2. The three-phase output of inverter is unbalanced when the motor is running 3. Abnormal drive board 4. Module is abnormal	1. Remove peripheral faults 2. Check whether the three-phase winding of the motor is normal and remove the fault 3. Contact us
Err13	Overheated radiator / module	1. The ambient temperature is too high 2. Air duct blocked 3. The fan is damaged 4. Module thermistor damaged 5. Inverter module damaged	1. Reduce the ambient temperature 2. Clean the air duct 3. Replace the fan 4. Replace the thermistor 5. Replace inverter module

Fault Code	Name	Reason	Solution
Err14	Contactor fault	1. Abnormal drive board and power supply 2. The contactor is abnormal	1. Replace the drive board or power board 2. Replace the contactor
Err15	Current detection fault	1. Check the Hall device 2. Abnormal drive board	1. Replace Hall element 2. Replace the drive plate
Err16	Motor tuning fault	1. The motor parameters are not set according to the nameplate 2. Parameter tuning process timeout	1. Set the motor parameters correctly according to the name plate 2. Check the lead from inverter to motor
Err17	Code disk failure	1. Encoder model mismatch 2. Encoder connection error 3. Encoder damaged 4. Abnormal PG card	1. Set encoder type correctly 2. Remove circuit fault 3. Change encoder 4. Replace PG card
Err18	Short circuit fault of motor to ground	Motor short circuit to ground	Replace motor or cable
Err19	Load drop	VFD operation current is lower than P7-61	Confirm whether the load is separated or whether the P7-61 and P7-62 parameter settings conform to the actual operating conditions
Err20	Wave by wave current limiting fault	1. Whether the load is too large or the motor stalls 2. The selection of frequency converter is too small	1. Reduce the load and check the motor and mechanical condition 2. Choose the frequency converter with higher power level
Err21	Pole position detection failed	The deviation between the motor parameters and the actual value is too large	Re-determine the motor parameters, focusing on whether the motor rated current is too small
Err23	Brake resistance short circuit	Output current too high	1. Increase acceleration and deceleration time 2. Reduce the load
Err26	SVC stall fault	1. Excessive load 2. Torque limit too small (P6-11)	1. Reduce the load 2. Increase torque limit
Err43	External fault	1. Input the signal of external fault through multi-function terminal X 2. Input external fault signal through virtual Y function	Reset and run again
Err44	Communication (timeout) fault	1. The upper computer is not working properly 2. The communication cable is abnormal 3. Incorrect setting of communication parameter group PC	1. Check the upper computer wiring 2. Check the communication cable 3. Setting communication parameters correctly
Err45	EEPROM read write error	EEPROM chip damaged	Replace the main circuit board
Err46	Operation time arrival	The accumulated running time reaches the set value	Use the parameter initialization function to clear the record information
Err47	Power on time arrival	The accumulated power on time reaches the set value	Use the parameter initialization function to clear the record information

Fault Code	Name	Reason	Solution
Err48	User defined fault 1	1. Input user-defined fault 1 signal through multi-function terminal X 2. Input user defined fault 1 signal through virtual IO function	Reset and run again
Err49	User defined fault 2	1. Input user-defined fault 2 signal through multi-function terminal X 2. Input user defined fault 2 signal through virtual IO function	Reset and run again
Err50	PID feedback lost in operation	PID feedback is less than P7-27 setting value	Check PID feedback signal or set P7-27 to an appropriate value
Err51	Switch motor in operation	In the process of inverter operation, change the current motor selection through the terminal	Switch the motor after the frequency converter stops
Err52	Speed offset too large	1. Encoder parameter setting incorrect 2. Motor blocked 3. Incorrect UVW wiring	1. Setting encoder parameters correctly 2. Check whether the machine is abnormal 3. Check whether the wiring between frequency converter and motor is abnormal
Err53	Motor overspeed fault	1. Incorrect setting of encoding parameters 2. The motor is not tuned 3. Unreasonable setting of motor over speed detection parameters P7-63 and P7-64	1. Setting encoder parameters correctly 2. Tuning correctly 3. Set reasonable parameters according to the actual situation
Err54	Motor overheat fault	1. Loose wiring of temperature sensor 2. Motor temperature too high	1. Check the wiring of temperature sensor 2. Reduce the carrier wave or take other measures to dissipate the motor heat.
Err55	Motor overtemperature fault	1. The temperature sensor wiring is loose 2. Motor temperature is too high	1. Check the temperature sensor wiring and eliminate the fault 2. Reduce the carrier frequency or take other measures to cool the motor
Err56	Power on lock time reached	Power on time arrival	When the usage time arrives, please enter the password in A4-00.

7-2. Fault record query

This series of inverter records the fault codes and operation parameters of the inverter for the last three times. Querying these information is helpful to find out the cause of the fault. All fault information is saved in P7 group parameters. Please refer to the keyboard operation method to enter P7 group parameters to check the information.

7-3. Fault reset

In case of a failure of the inverter, to resume normal operation, you can select any of the following operations:

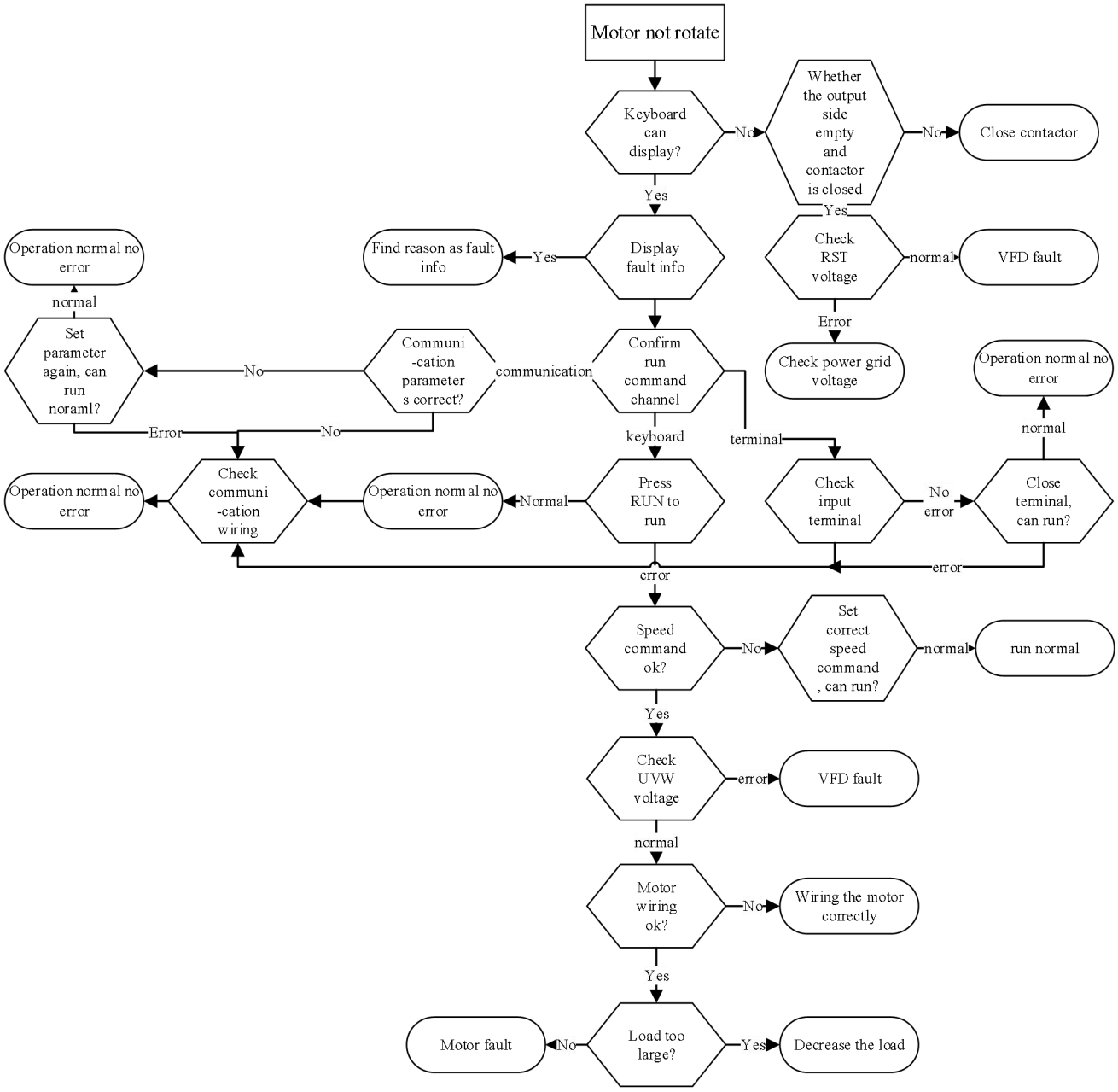
- When the fault code is displayed, press stop after confirming that it can be reset.

- Set any terminal of X1-X4 to reset stop input for external fault, and then disconnect from com terminal after closing.
- Cut off the power supply.

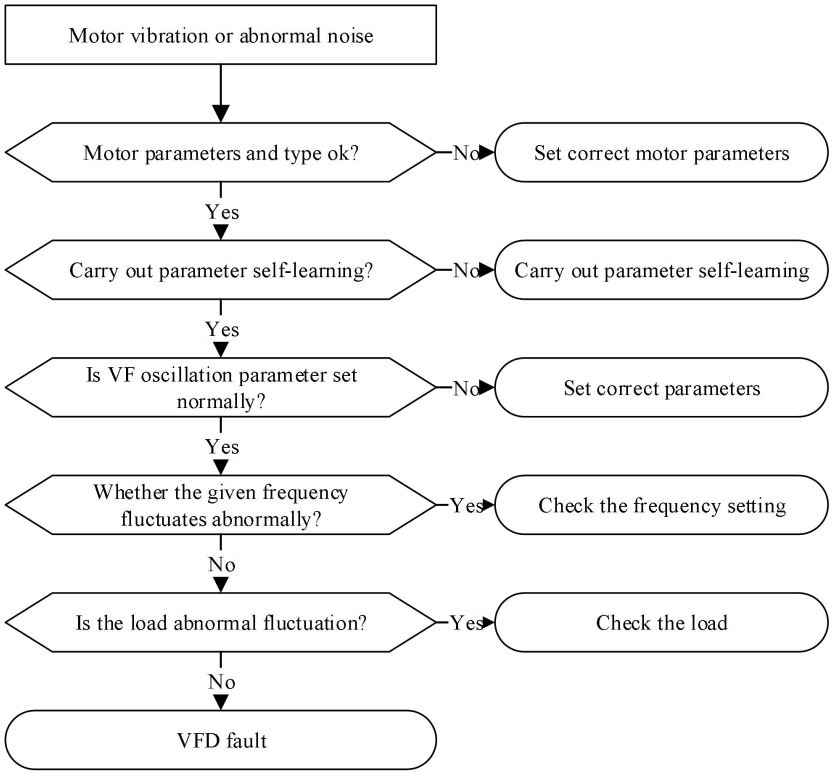
- Before reset, the reason of the fault must be thoroughly identified and eliminated, otherwise, the permanent damage of the frequency converter may be caused.
- If the fault cannot be reset, check the reason, and the continuous reset will damage the inverter.
- When overload and overheating protection acts, it shall be reset 5 minutes later.

7-4. VFD common fault analysis

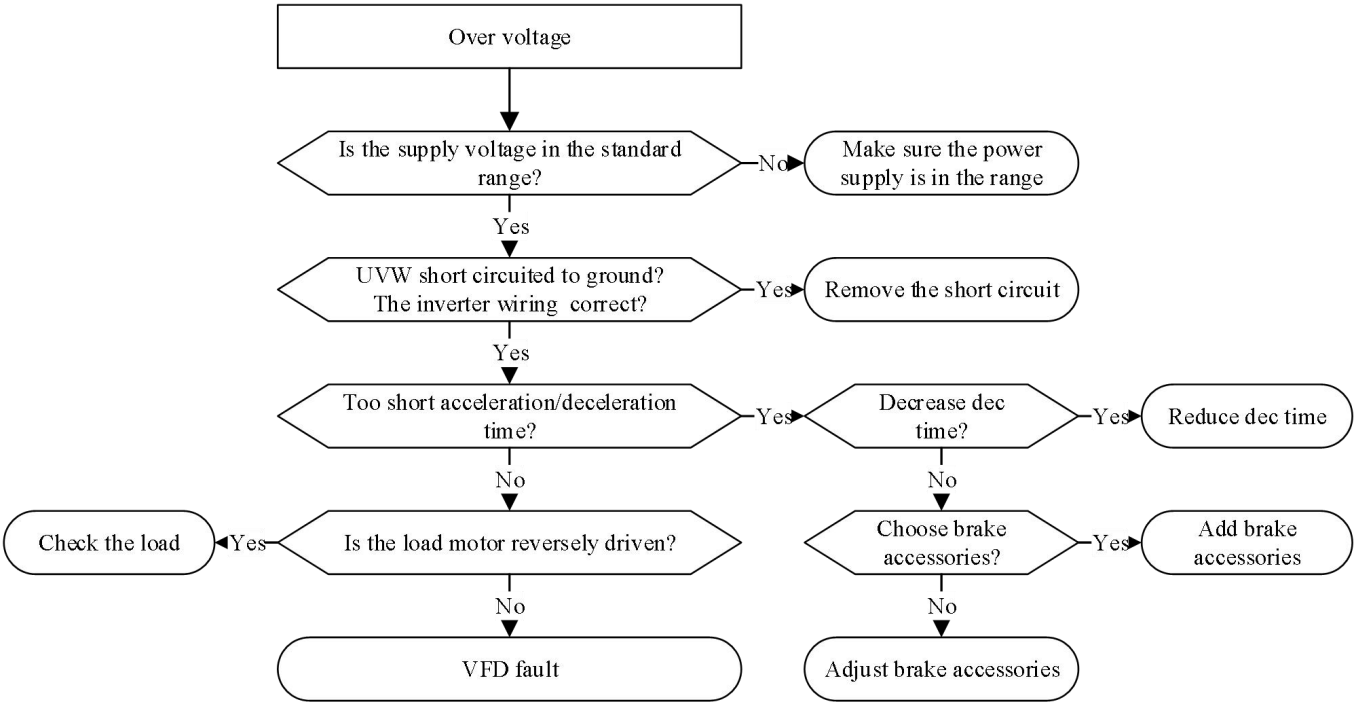
7-4-1. Motor not rotate



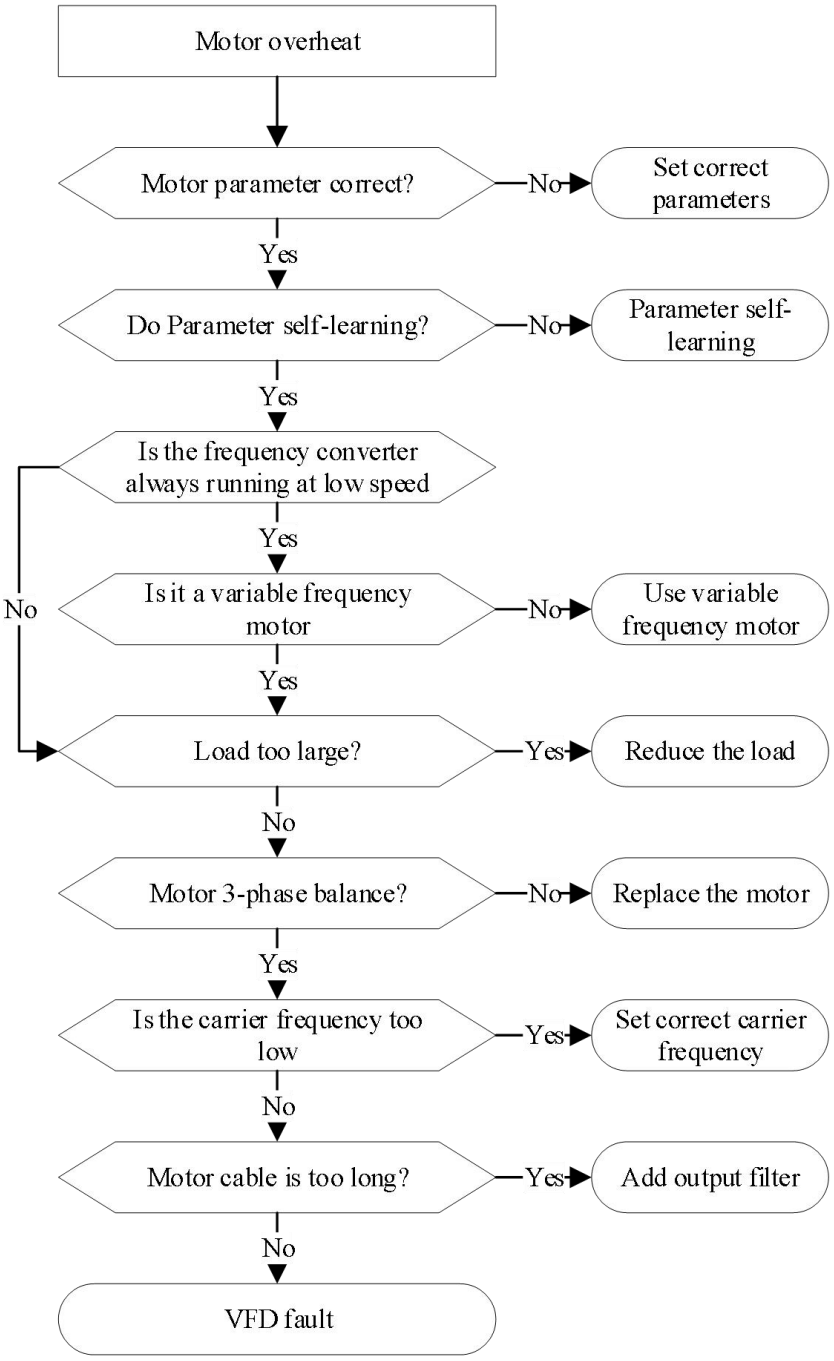
7-4-2. Motor vibration



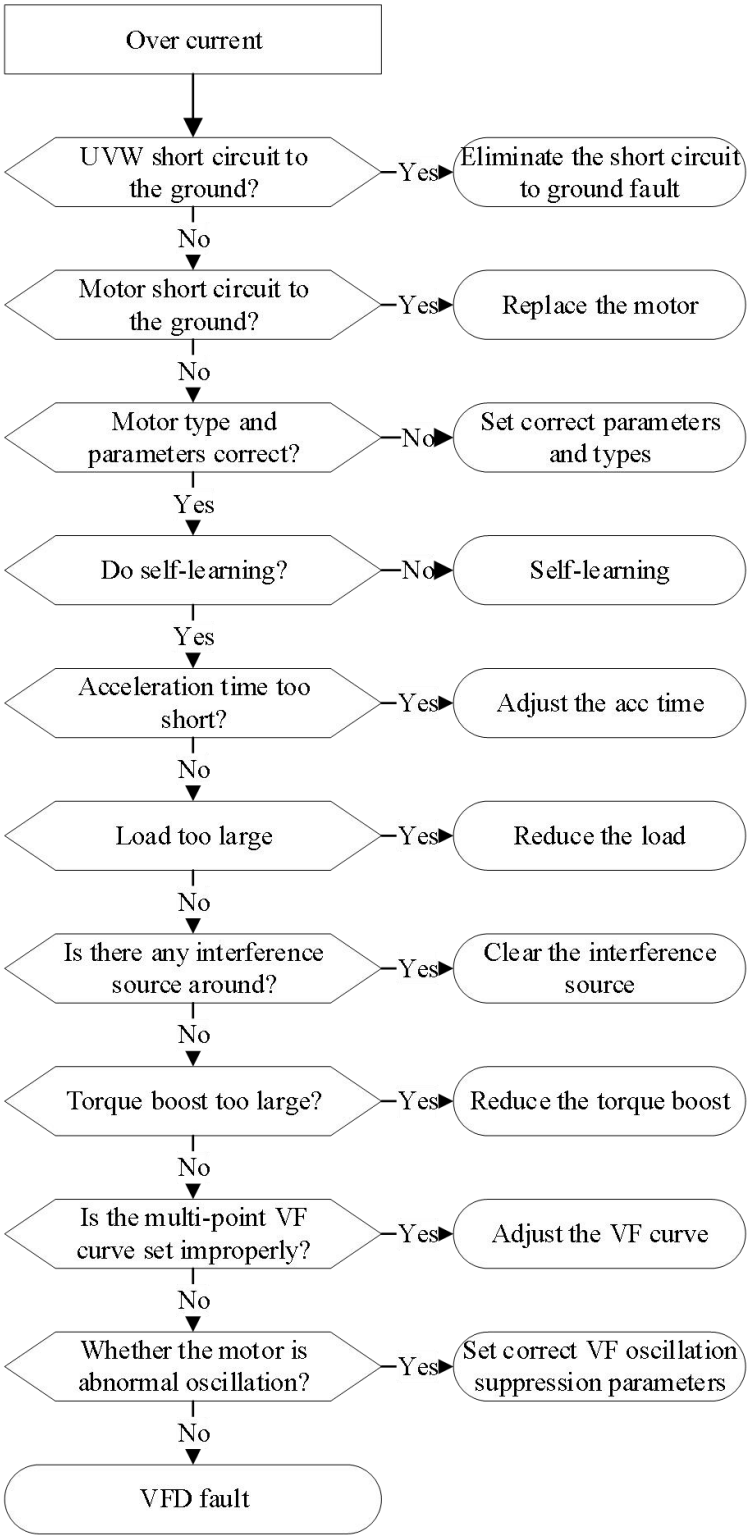
7-4-3. Over voltage



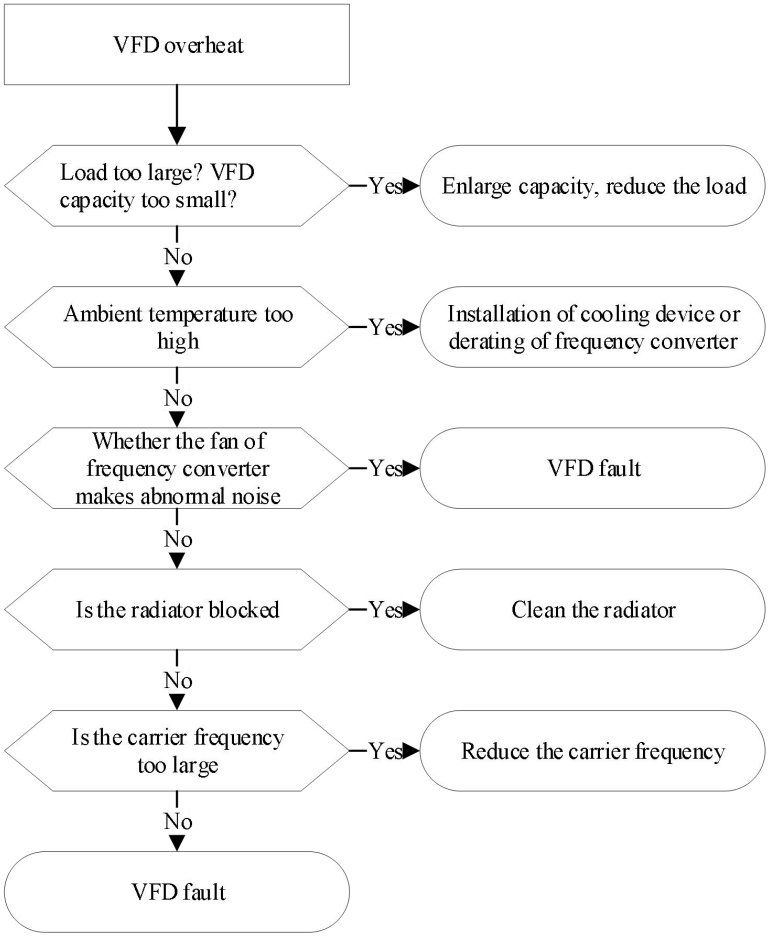
7-4-4. Motor overheat



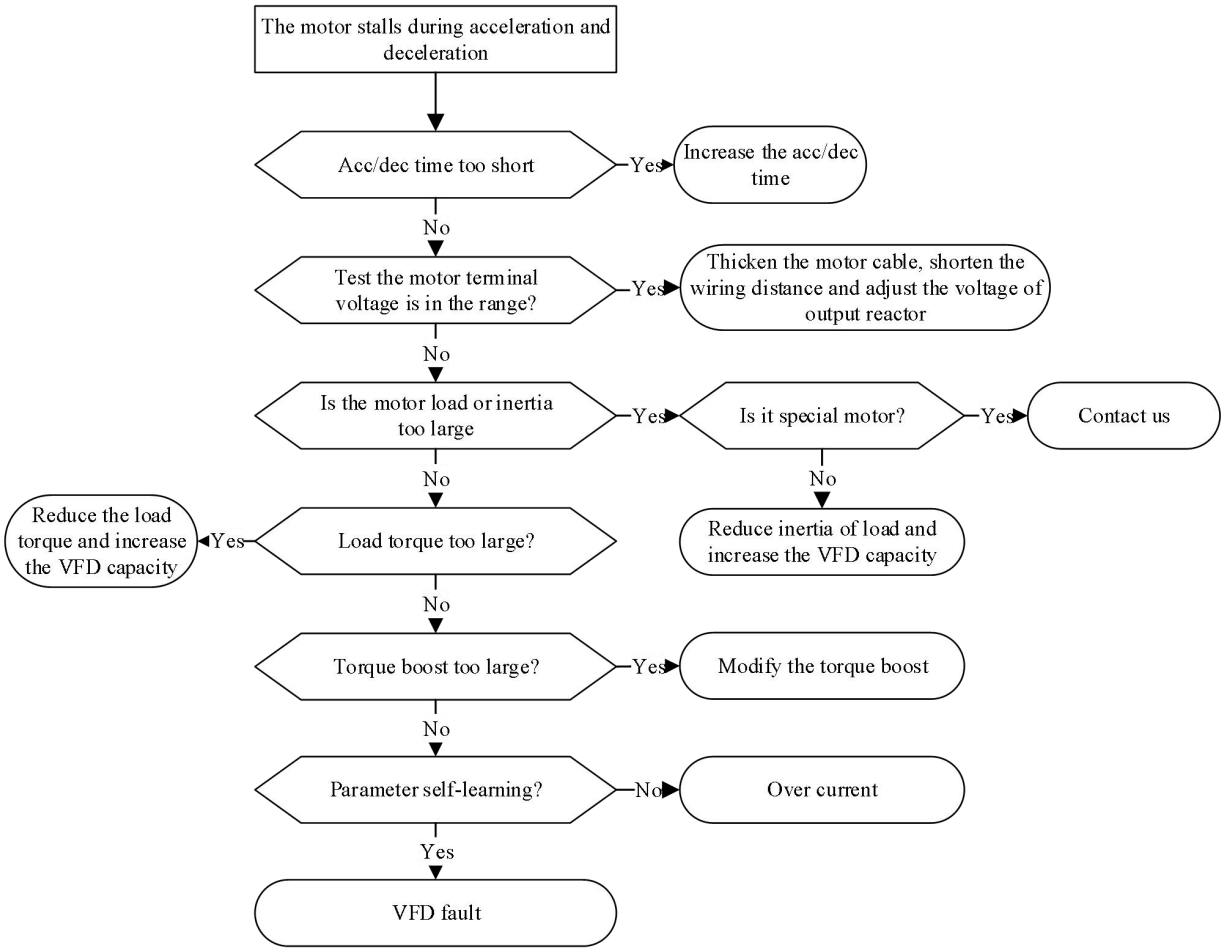
7-4-5. Over current



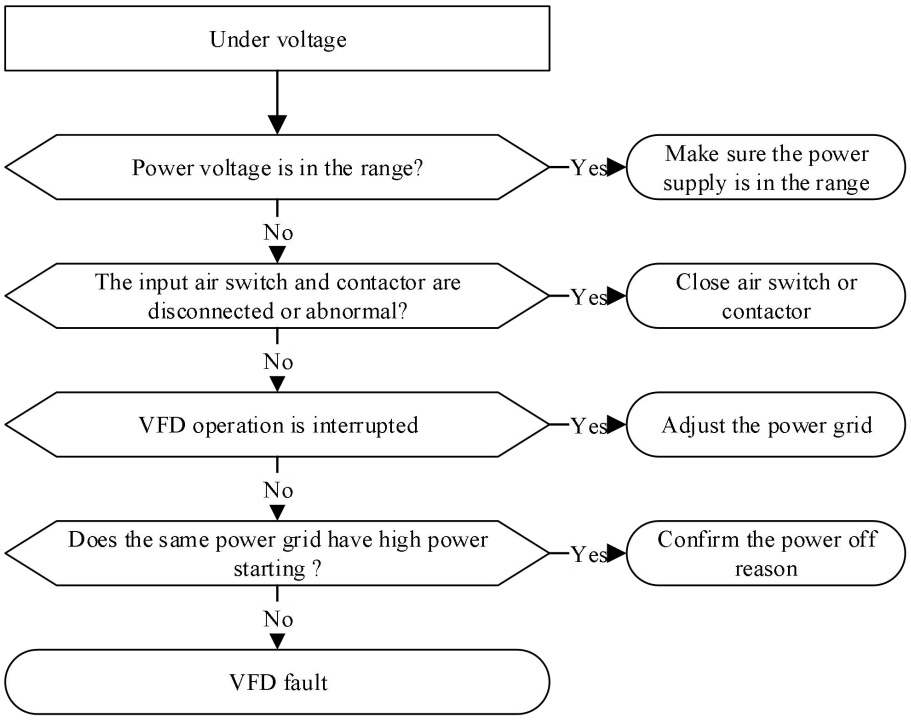
7-4-6. VFD overheat



7-4-7. The motor stalls during acceleration and deceleration



7-4-8. Under voltage



8. Maintenance and Upkeep

8-1. Maintenance

The change of the operating environment of the inverter, such as the influence of temperature, humidity, smoke, etc., and aging of the internal components of the converter, may lead to various faults of the inverter. Therefore, the inverter must be checked daily during storage and use, and regular maintenance should be carried out.

8-1-1. Routine maintenance

When the frequency converter is turned on normally, please confirm the following items:
(1) Whether the motor has abnormal sound and vibration.
(2) Whether the frequency converter and motor have abnormal heating.
(3) Whether the ambient temperature is too high.
(4) Whether the load ammeter is the same as usual.
(5) Check whether the cooling fan of frequency converter operates normally.

8-2. Regular maintenance and upkeep

8-2-1 Regular maintenance

When the frequency converter is regularly maintained and inspected, it is necessary to cut off the power supply, and the inspection can only be carried out after the monitor is not displayed and the power indicator of the main circuit is off. The inspection contents are shown in the table below.

Item	Contents	Solution
Screw of main circuit terminal and control circuit terminal	Is the screw loose	Tighten with a screwdriver
Heat sink	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
PCB board	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
Cooling fan	Whether there is abnormal sound and vibration, and the accumulated operation time is up to 20000 hours	Replace the fan
Power element	Is there any dust	Blow off with 4 ~ 6kgcm^2 dry compressed air
Aluminum electrolytic capacitor	Discoloration, odor and blistering	Replace the Aluminum electrolytic capacitor

8-2-2 Maintenance upkeep

In order to make the inverter work normally for a long time, regular maintenance must be carried out according to the service life of the internal electronic components of the inverter. The service life of electronic components of frequency converter is different because of its different environment and conditions. As shown in the table below, the maintenance period of frequency converter is only for users' reference.

Component name	Standard replacement years
Cooling fan	2~3 years
Electrolytic capacitor	4~5 years
PCB board	5~8 years
Fuse	10 years

The service conditions for the replacement time of the above inverter components are as follows:

(1) Ambient temperature: annual average 30℃.

(2) Load factor: below 80%.

(3) Running time: less than 12 hours per day.

8-3. Warranty of frequency converter

The company will provide warranty service in case of the following conditions:

(1) The warranty scope only refers to the inverter body;

(2) In normal use, if the inverter fails or is damaged within 15 months, the company is responsible for the warranty; reasonable maintenance fee will be charged for more than 15 months;

(3) Within 15 months, a certain maintenance fee shall also be charged in case of the following situations:

- Failure to follow the operation steps in the instruction manual will cause damage to the frequency converter;
- Frequency converter damage caused by flood, fire, abnormal voltage, etc;
- Frequency converter damage caused by wrong connection cable, etc;
- Damage caused by using frequency converter for abnormal functions;

(4) The service fee shall be calculated according to the actual cost. If there is a contract, it shall be handled according to the principle of contract priority.

Appendix

Appendix A. Communication protocol

Appendix A-1. Communication protocol overview

VHL series frequency converter provides the general RS485 communication interface in industrial control to users. The communication protocol adopts MODBUS standard communication protocol. The converter can be used as slave and communicate with the upper computer with the same communication interface and the same communication protocol (such as PLC controller and PC) to realize centralized monitoring of the frequency converter. In addition, the user can also use a frequency converter as the master, and connect several frequency converters of our company as slave through RS485, in order to realize the multi-machine linkage of the frequency converter. The remote control keyboard can also be connected through the communication port to realize the remote operation of the frequency converter by users.

The MODBUS communication protocol of this converter supports RTU mode. The following is a detailed description of the communication protocol of the inverter.

Appendix A-2. Communication protocol explanation

Appendix A-2-1. Communication protocol mode

The inverter can be used as the master or slave in RS485 network. When used as the master, it can control other frequency converters of our company to realize multi-level linkage. When it is used as slave, PC or PLC can be used as the master to control the inverter. The specific communication mode is as follows:
(1) The frequency converter is slave, and the master-slave point-to-point communication is adopted. When the master uses the broadcast address to send commands, the slave does not respond.
(2) As the master, the frequency converter sends commands to the slave using broadcast address, and the slave does not respond.
(3) Users can set the local address, baud rate and data format of the converter by keyboard or serial communication.
(4) The slave reports the current fault information in the last reply frame to the master.

Appendix A-2-2. Communication port

The communication is RS485 interface, asynchronous serial, half duplex transmission. The default data format is: 1 start bit, 8 data bits and 1 stop bit.
The default baud rate is 19200bps. Please refer to P9 group parameters for communication parameter settings.

Appendix A-3. Modbus-RTU protocol

Appendix A-3-1. Character structure

RTU: 1－8－2, no parity

Start bit	0	1	2	3	4	5	6	7	Stop bit	Stop bit

RTU: 1－8－1, odd parity

Start bit	0	1	2	3	4	5	6	7	Odd parity	Stop bit

RTU: 1－8－1, even parity

Start bit	0	1	2	3	4	5	6	7	Even parity	Stop bit

RTU: 1－8－1, no parity

Start bit	0	1	2	3	4	5	6	7	Stop bit

ASCII：1－7－1, even parity

Start bit	0	1	2	3	4	5	6	Even parity	Stop bit

Appendix A-3-2. Communication data structure

1) RTU mode

START	Keep no input signal at least 10ms
Address	Communication address: 8-bit binary address
Function	Function code: 8-bit binary address
DATA（n-1）	Data content: N*8-bit data, N<=8, max 8 bytes
……	
DATA 0	
CRC CHK Low	CRC parity
CRC CHK High	16-bit CRC parity code is composed of two 8-bit binary
END	Keep no IO signal at least 10ms

2) Communication address

00H: all frequency converter broadcast

01H: communicate with 01 address inverter.

0FH: communication with 15 address inverter.

10H: communication with 16 address inverter. And so on... , up to 254 (FEH).

3) Function code and data

Function code	Explanation
03H	Read the contents of registers, read multiple registers, but not more than 12 at a time, each time can only read the same group of data
06H	Write data into the register
08H	Loop detection

(1) Function code 03H: read register

For example, read the register address 7000H (operation frequency).

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	03H	Function code	03H
Register address	70H	Byte number	02H
	00H		
Register quantity	00H	Data contents	00H
	01H		00H
CRC CHECK Low	9EH	CRC CHECK Low	B8H
CRC CHECK High	CAH	CRC CHECK High	44H

(2) Function code 06H: write into the register

For example, write 50.00Hz in the inverter address 1000H.

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	06H	Function code	06H
Register address	10H	Register address	10H
	00H		00H
Data contents	27H	Data contents	27H
	10H		10H
CRC CHECK Low	97H	CRC CHECK Low	97H
CRC CHECK High	36H	CRC CHECK High	36H

(3) Function code 10H: write multi-group data to the register.

For example, write 1 to H0001(P0-01) and write 2 to H0002(P0-02) .

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	10H	Function code	10H
Register code	00H	Register address	00H
	01H		01H
Register quantity	00H	Register quantity	00H
	02H		02H

Byte quantity	04H(2*Register quantity)	CRC CHECK Low	10H
Data 1 content high	00H	CRC CHECK High	08H
Data 1 content low	01H		
Data 2 content high	00H		
Data 2 content low	02H		
CRC CHECK Low	E2H		
CRC CHECK High	62H		

(4) Command code: 08H communication loop test

This command is used to test whether the communication between the master control equipment and the inverter is normal. The frequency converter will return the received data to the main control equipment.

RTU mode:

Format of inquiry information		Format of response information	
Address	01H	Address	01H
Function code	08H	Function code	08H
Contents	01H	Contents	01H
	02H		02H
	03H		03H
	04H		04H
CRC CHECK Low	41H	CRC CHECK Low	41H
CRC CHECK High	04H	CRC CHECK High	04H

4) Parity code

RTU mode: double byte hexadecimal number.

The CRC domain is two bytes, containing 16-bit binary values. It is added to the message after calculation by the sender. The high byte of CRC is the last byte of the sending message. The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC domain. If the two values are different, the received message has an error, discards the message frame, and does not respond to it. The next frame data will be received.

The LRC field consists of one byte containing an 8-bit binary value. The LRC value is calculated by the transmitting device and added to the message frame. During message reception, the receiving device calculates the LRC value and compares it with the LRC value contained in the received message. If the two values do not match, an error is detected.

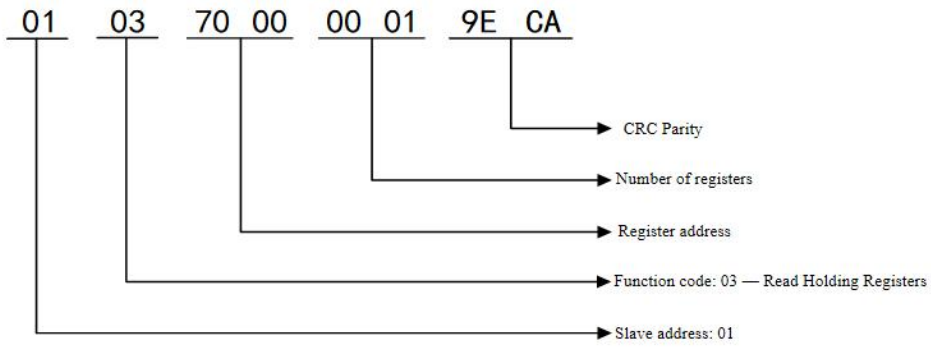
The LRC check is a simple error-checking method used in ASCII mode. It checks all message fields except for the start character (:) and the end-of-frame characters (CR and LF).

In ASCII mode, each 8-bit byte is divided into two ASCII characters for transmission. For example, the hexadecimal value 0x03 is divided into two ASCII characters, "0" and "3", corresponding to ASCII codes 0x30 and 0x33 (binary values 00110000 and 00110011). Therefore, the amount of transmitted data is twice that of RTU mode.

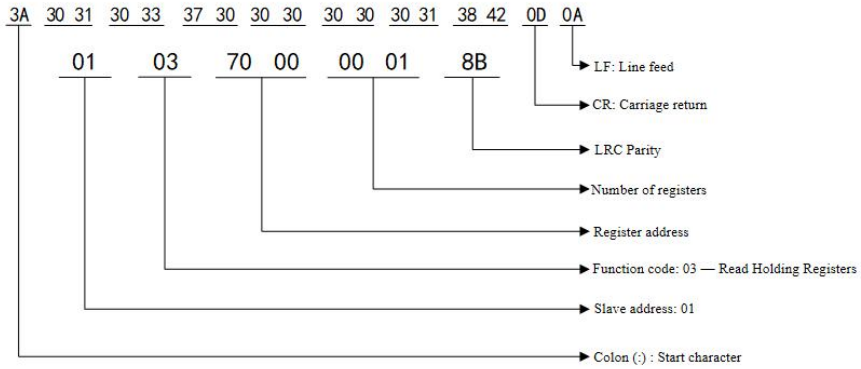
In RTU mode, each byte is transmitted directly as one hexadecimal byte. For example, the hexadecimal value 0x33 is transmitted directly as 0x33 (binary value 00110011). The transmission efficiency is twice that of ASCII mode.

Example: Read the contents of register address 7000H (running frequency).

Data transmitted in RTU mode:
01 03 70 00 00 01 9E CA



ASCII mode transmission data:
3A 30 31 30 33 37 30 30 30 30 30 30 31 38 42 0D 0A
(Equivalent RTU frame: 01 03 70 00 00 01 8B)



5) Common ASCII Code Table

Binary	Decimal	Hexadecimal	Character	Binary	Decimal	Hexadecimal	Character
0000 1101	13	0D	CR	0011 1000	56	38	8
0000 1010	10	0A	LF	0011 1001	57	39	9
0011 0000	48	30	0	0011 1010	58	3A	:
0011 0001	49	31	1	0100 0001	65	41	A
0011 0010	50	32	2	0100 0010	66	42	B
0011 0011	51	33	3	0100 0011	67	43	C
0011 0100	52	34	4	0100 0100	68	44	D
0011 0101	53	35	5	0100 0101	69	45	E
0011 0110	54	36	6	0100 0110	70	46	F

0011 0111	55	37	7				

Appendix A-3-3. Communication protocol parameter address

(1) The communication address of the function code parameter is shown in the table below. The high position is the group number and the low position is the parameter serial number.

Parameter group	Power off memory address	Power off no memory address
P0~PF	0x0000~0x0FFF	0x3000~0x3FFF
A0~AF	0xA000~0xAFFF	0x4000~0x4FFF
U0	0x7000~0x70xx	

- When reading function code data through the communication

For group P and group A function code data, the upper 16 bits of the communication address are the group number, and the lower 16 bits are the serial number of the function code in the function group.
For example, P0-16, communication address is 0x0010, 00 represents the function parameter of group P0, and 10 represents the hexadecimal data format of 16.
A0-15, communication address is 0xA00F, A0 represents A0 group function parameter, 0F represents hexadecimal data format of 15.

- When writing function code data through the communication

For group P function code data, the upper 16 bits of its communication address are divided into 0x0000 ~ 0x0FFF or 0x3000 ~ 0x3FFF according to whether it is written into EPPROM. The lower 16 bits are directly the serial number of the function code in the function group, for example:
Write function parameters P0-16:
When it is not necessary to be written in EPPROM, its communication address is 0x3010;
When it is necessary to be written in EPPROM, its communication address is 0x0010.

For group A function code, its communication address high 16 bits can be divided into 0xA000 ~ 0x0FFF or 0x4000 ~ 0x4FFF according to whether it is written into EPPROM. The lower 16 bits are the serial number of the function code in the function group,
for example:
Write function parameter A0-15:
When it is not necessary to be written in EPPROM, its communication address is 0x400F;
When it is necessary to be written in EPPROM, its communication address is 0xA00F.

(2) Non function code

Definition	Modbus address	Function	Note
Communication setting	1000H	Communication frequency	Write
Control command	1100H	1: Forward running 2: Reverse operation 3: Forward jog 4: Reverse jog 5: Deceleration stop 6: Free stop	Write

Definition	Modbus address	Function	Note
		7: Fault reset	
Digital output terminal control	1101H	bit0:Y1 output control bit1: Reserved bit2: Reserved bit3: RELAY1 output control bit4: RELAY2 output control	Write
Y1 high speed pulse control	1102H	0~7FFF represents 0%~100%	Write
Analog output AO1	1103H	0~7FFF represents 0%~100%	Write
Torque setting	1105H	0~1000 represents 0.0%~100.0%	Write
Operation status	1200H	1: Forward run 2: Reverse run 3: Stop	Read
VFD fault	1210H	0000H: None 0001H: Acceleration over current 0002H: Deceleration over current 0003H: Constant speed over current 0004H: Acceleration overvoltage 0005H: Deceleration overvoltage 0006H: Constant speed over voltage 0007H: Buffer resistance overload fault 0008H: Under voltage fault 0009H: Inverter overload 000AH: Motor overload 000BH: Input phase missing 000CH: Output phase missing 000DH: Radiator overheating 000EH: Contactor fault 000FH: Current detection fault 0010H: Motor tuning fault 0011H: Code disk failure 0012H: Motor short circuit to ground fault 0014H: Wave by wave current limiting fault 0015H: Pole position detection failed 0016H: UVW signal feedback error 0017H: Brake resistance short circuit 001AH: SVC stall fault 002BH: External fault 002CH:Communication (timeout) failure 002DH: EEPORM read / write failure 002EH: Run time arrived 002FH: Power on time arrived	Read

Definition	Modbus address	Function	Note
		0030H: User defined fault 1 0031H: User defined fault 2 0032H:PID feedback lost during operation 0033H: Switch motor during operation 0034H: Large speed deviation 0035H: Motor overspeed 0036H: Motor overtemperature	

When the frequency is set by communication (P0-03=6),

$$Frequency\ (\text{Hz}) = \frac{Data \times \text{P0-13}}{10000}$$, (Data range:0~10000)

Data can be a register value or a direct numerical value. The valid range of Data is 0 - 10000. Values exceeding this range cannot be written. When users set the frequency through RS-485 communication, the corresponding Data value can be calculated according to the following formula.

For example, if the maximum output frequency of P0-13 is set to 50Hz, write 10000 to the corresponding address H1000 of the frequency, and the actual panel displays the frequency value of 100.00*50%=50Hz.

If there is a user password: after writing the correct password, read it within 30s, otherwise it will need to be written again.

H1000 is retained after power-off. If the power supply voltage is too low or the write operation time is insufficient, the H1000 value may not be saved after power-off.

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