VH5 series general frequency converter

Fast manual

Wuxi Xinje Electric Co., Ltd.

No. S561007E 1.2

This manual contains basic precautions to ensure personal safety and protect this product and connected equipment. These precautions are highlighted in the manual with warning triangles. For other unfinished matters, please follow the basic electrical operation procedures.

Installation notes

Please observe the precautions. If you do not adopt the correct operating procedures, the control system may work incorrectly or abnormally, and serious property damage may be caused.

Correct application

The equipment and its parts can only be used for the applications described in the product catalogue and technical description, and can only be used with the equipment or parts produced by peripheral manufacturers approved or recommended by Xinje.

The product can operate normally only if it is transported, stored, configured and installed correctly, and operated and maintained according to the recommendations.

WUXI XINJE ELECTRIC CO., LTD. All rights reserved

This material or its contents shall not be copied, transmitted or used without explicit written permission. Violators shall be liable for the losses caused.

Statement of responsibility

We have checked that the contents of this manual are consistent with the hardware and software described, because errors are inevitable, we cannot guarantee complete consistency. The manual is subject to change without notice.

March 2022

Catalog

Notes

Safety precautions

(1) Security information definition

	Note	Steps taken to ensure correct operation.
	Danger	Failure to comply with relevant requirements will cause serious personal injury or even death.
	Warning	Failure to comply with relevant requirements may cause personal injury or equipment damage.

(2) Safety precautions

- During unpacking acceptance

 Note

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 model identification on the outside of the packing box is consistent with the ordered model.
3. Please check the surface of the product for damage and corrosion when unpacking.
4. After unpacking, please check whether the product nameplate label is consistent with the external model identification.
5. After unpacking, check whether the internal accessories are complete, including instructions, operation panel and expansion card.

If any of the above five points occurs during unpacking acceptance, please contact the local Xinjie office or Xinje dealer in time,
We will solve the problem for you at the first time.

- During installing

 Note

1. When carrying, please hold the bottom of the machine body.
If you only hold the panel, there is a risk that the main body will fall and hit your feet.
2. Please install it on metal and other non combustible material plates.
Installed on flammable materials, there is a risk of fire.
3. When more than two frequency converters are installed in the same control cabinet, please set cooling fans

and keep the air temperature at the air inlet below 40℃
Overheating may cause fire and other accidents.

- Wiring


Note

1. Please confirm whether the AC main circuit power supply is consistent with the rated voltage of the frequency converter.
Danger of injury and fire.
2. Do not conduct voltage withstand test on the frequency converter.
It will cause damage to semiconductor components.
3. Please connect the braking resistor or braking unit according to the wiring diagram.
There is a risk of fire.
4. Please fasten the terminal with a screwdriver with the specified torque.
There is a risk of fire.
5. Do not connect the input power cable to the output U, V and W terminals.
If the voltage is applied to the output terminal, it will cause internal damage to the frequency converter.
6. Do not connect the phase-shifting capacitor and LC / RC noise filter to the output circuit.
It will cause internal damage to the frequency converter.
7. Do not connect the electromagnetic switch and electromagnetic contactor to the output circuit.
When the frequency converter operates with load, the surge current generated by the action of electromagnetic switch and electromagnetic contactor will cause the overcurrent protection of the frequency converter.
8. Do not remove the front panel cover. Only remove the terminal cover during wiring.
It may cause internal damage to the frequency converter.


Danger

1. Before wiring, please confirm that the input power supply has been cut off.
Danger of electric shock and fire.
2. Ask electrical engineering professionals to conduct 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.
Danger of injury. (The responsibility for wiring shall be borne by the user)
5. Do not directly touch the output terminal. The output terminal of the frequency converter shall not be connected with the cover, and the output terminals shall not be short circuited. Electric shock and risk of short circuit.
6. After cutting off the AC power supply and before the indicator light of the digital operator of the AC motor

driver goes out, it indicates that there is still high voltage inside the AC motor driver.
Very dangerous, do not touch the internal circuit and components.

- Maintenance and inspection


Note

1. CMOS integrated circuits are installed on the keyboard board, control circuit board and drive circuit board. Please pay special attention when using.
If you touch the circuit board directly with your fingers, electrostatic induction may damage the integrated chip on the circuit board.
2. Do not change the wiring and remove the terminal wiring during power on. Do not check the signal during operation. Damage to equipment.


Danger

1. Do not touch the wiring terminal of the frequency converter. There is high voltage on the terminal.
Danger of electric shock.
2. Before power on, be sure to install the terminal housing. When removing the housing, 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 low speed operation

When the frequency converter runs with ordinary motor at low speed for a long time, the service life of the motor will be affected due to the poor heat dissipation effect. If it is necessary to operate at low speed and constant torque for a long time, a special frequency conversion motor must be selected.

- Confirmation of motor insulation

When applying VH5 series frequency converter, please confirm the insulation of the motor before taking the motor to prevent damage to 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 occasions such as lifting load, negative torque often occurs, and the frequency converter will trip due to overcurrent or overvoltage fault. At this time, the selection of braking resistance should be considered.

- Mechanical resonance point of load device

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

- Capacitor or pressure sensitive device for improving power factor

Since the output voltage of the frequency converter is pulse wave type, if the output side is equipped 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 the damage of devices. Please remove it. In addition, it is recommended not to add switching devices such as air switch and contactor on the output side.

- Derating use 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 out of the motor.

- Operate at frequencies above 50Hz

If the operation exceeds 50Hz, in addition to considering the increase of motor vibration and noise, it is also necessary to ensure the service speed range of motor bearings and mechanical devices, and be sure to inquire in advance.

- Electronic thermal protection value of motor

When the adaptive motor is selected, the frequency converter can implement thermal protection for the motor. If the rated capacity of the motor does not match that of the frequency converter, be sure to adjust the protection value or take other protection measures to ensure the safe operation of the motor.

- Altitude and derating use

In areas with an altitude of more than 1000 meters, the heat dissipation effect of the frequency converter becomes worse due to the thin air, so it is necessary to reduce the rating for use.

- About degree of protection

The protection grade IP20 of VH5 series frequency converter refers to that achieved when the status display unit or keyboard is selected.

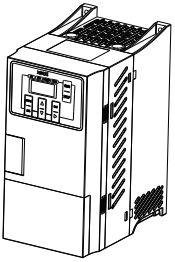
Scrapping precautions

When scrapping the frequency converter, please pay attention to:

Explosion may occur when the electrolytic capacitor of the main circuit and the electrolytic capacitor on the printed board are burned. Toxic gases will be produced when plastic parts are burned. Please treat it as industrial waste.

1. Product introduction

1-1. Product overview



VH5 series is a communication type open-loop vector frequency converter developed by Xinje company. The product adopts vector control technology to realize asynchronous open-loop vector control. At the same time, it also strengthens the reliability and environmental adaptability of the product.

1-1-1. Naming rule

VH 5 – 4 1P5 – B
① ② ③ ④ ⑤

Code	Description	
①	Product identification	VH: general frequency converter
②	Product series	5: communication type open-loop vector frequency converter
③	Input voltage level	4: AC 380V 2: AC220V
④	Power grade	1P5: 1.5KW 0P7: 0.75KW The decimal point is represented by P
⑤	Braking unit	B: built-in braking unit Vacant: no

1-2. Product specifications

1-2-1. Technical specification

Model VH5-_ _ _ _-B	20P7	21P5	22P2	40P7	41P5	42P2	43P7	45P5
Adaptive motor (KW)	0.75	1.5	2.2	0.75	1.5	2.2	3.7	5.5
Input rated current (A)	5.6	9.3	12.7	3.4	5.0	5.8	10.5	14.6
Power supply capacity (KVA)	1.5	3.0	4.5	1.5	3.0	4.0	5.9	8.9
Output rated current (A)	4.0	7.0	9.6	2.1	3.8	5.1	9.0	13.0

1-2-2. General specification

Item		Specification	
Input	Rated voltage, frequency	Three phase 380V: three phase 380V, 50Hz/60Hz 220V: single phase 220V, three phase 220V, 50Hz/60Hz	
	Allowable voltage fluctuation range	-15%~+15%, voltage unbalance rate <3%	
Output	Voltage	0~input voltage	
	Frequency	0~500Hz	
Control	Control motor type	Asynchronous motor	
	Control performance	Vector control without speed sensor (SVC)	V/F control (VVF)
	Speed accuracy	±0.5%	±1%
	Speed fluctuation	±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 for 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 4 channels digital input X, 1 channel analog input (0~10V/0~20mA)	
	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)	
Function	Startup command setting	Communication setting (Modbus, CANopen, EtherCAT), operate panel setting, terminal setting	
	Frequency setting mode	Communication setting (Modbus, CANopen, EtherCAT), operate panel setting, terminal setting, analog AI setting, multi-speed setting, simple PLC	

Item		Specification
		setting, PID setting, main and auxiliary seting
	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
	DC reactor	18.5kw and above are built-in DC reactors
	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, extensible EtherCAT and CANopen
	Multi-encoder	Differential input encoder, OC input encoder and resolver transformer
	LCD panel	LCD display, parameter setting, status monitoring, parameter copy, fault analysis and location, program download, mass storage of parameters
	Non stop when instantaneous power failure	In case of instantaneous power failure, the load feedback energy compensates for the decrease of voltage and keeps the inverter running for a short time

Item		Specification
	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	Multi function terminal X has 51 types, Y has 42 types, AO has 19 kinds of logic function selection, meet the general inverter control function requirements
	Communication customization parameters	It is convenient for users to read and write the inverter parameters continuously
	Software	Rich background monitoring function, convenient for field data collection and debugging
Display and keyboard	Keyboard display	It can display the set frequency, output frequency, output voltage, output current, input and output status and other parameters
	Button locking	Realize the partial or total locking of keys to prevent false triggering
	Parameter copy	Standard LED single display numeric keyboard, optional LCD English display keyboard (parameter download)
	Optional accessories	LCD keyboard
Environment	Using place	Indoor, free from direct sunlight, dust, corrosive gas, combustible gas, oil mist, water vapor, dripping or salt, etc
	Altitude	Below 1000 meters. (derating is required when the height is higher than 1000m, and the output current will be reduced by about 10% of the rated current when the height is increased every 1000m.)
	Ambient temperature	-10℃~+40℃ (When the ambient temperature is between 40℃ and 50℃, please reduce the rating or enhance the heat dissipation)
	Ambient humidity	Less than 95%RH, no condensation
	Vibration	Less than 5.9 m/s² (0.6G)
	Storage temperature	-40℃~+70℃
	Protection level	IP20

Item		Specification
	Cooling mode	Forced air cooling
Installation mode		Wall mounted and embedded

2. Installation and wiring

2-1. Installation environment

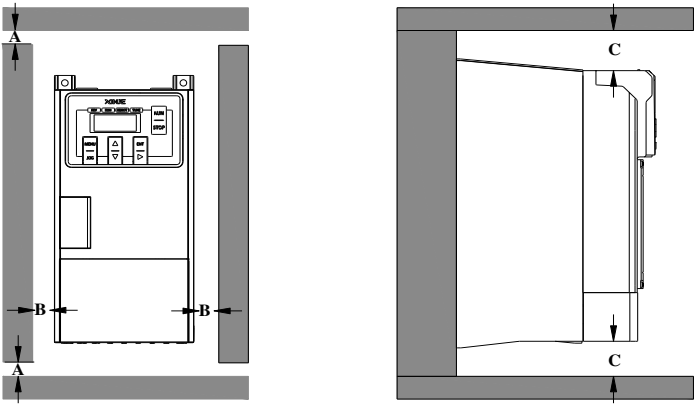
2-1-1. Environment requirements

- It should be installed in a well ventilated indoor place, and the ambient temperature should be within the range of -10°C ~ 40°C. If the temperature exceeds 40°C, it needs external forced cooling or derating.
- Avoid installation in places with direct sunlight, dusty, floating fiber and metal powder.
- It is strictly forbidden to install in places with corrosive and explosive gas.
- The humidity should be lower than 95% RH without condensation.
- It is installed in the place where the fixed vibration is less than 5.9m/s² (0.6G).
- Be far away from EMI sources and other electronic equipment sensitive to EMI.

2-1-2. Installation space and direction

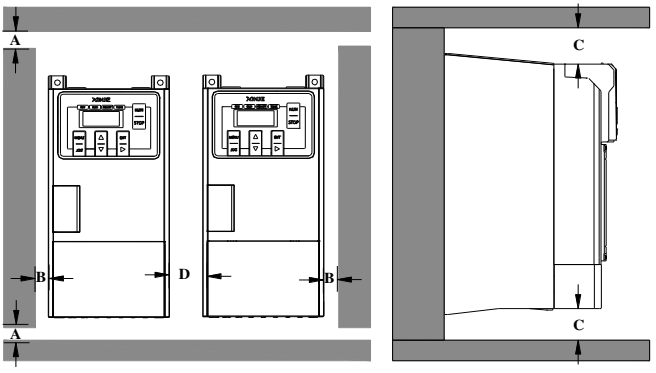
- Generally, it should be installed vertically.
- Minimum requirements for installation spacing and distance.
- When multiple frequency converters are installed up and down, the middle part shall be equipped with guide plate.

2-1-3. Single installation



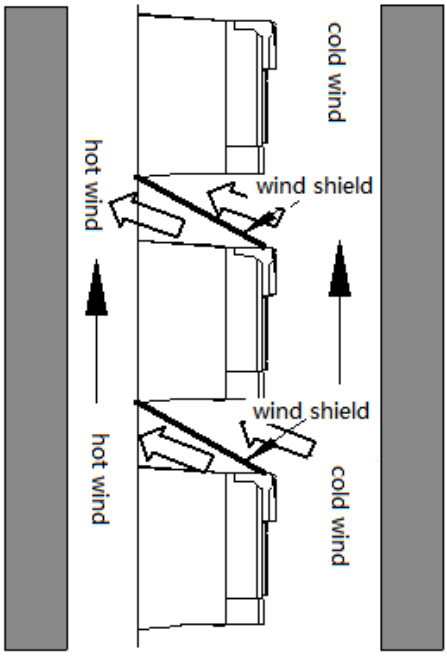
Note: the distance of A and B is more than 50 mm, and the distance of C is more than 100 mm.

2-1-4. Multiple installation



Note: the distance of A and B is more than 50mm, and the distance of C and D is more than 100mm.

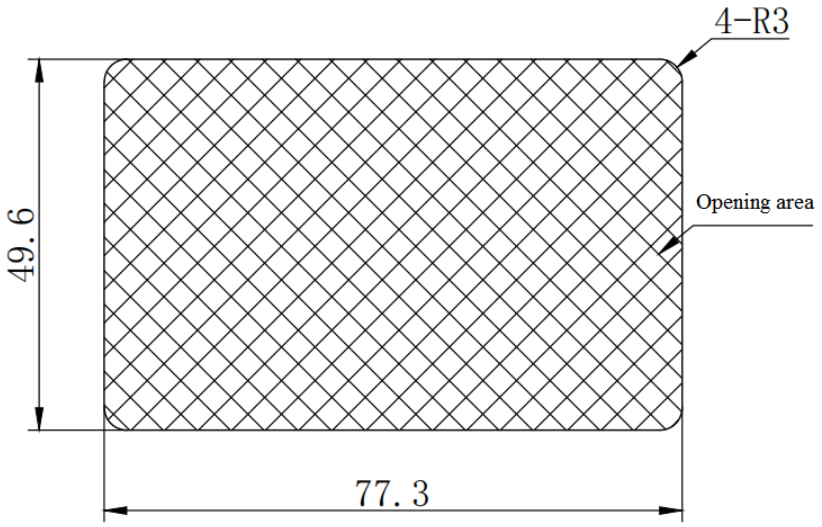
2-1-5. Vertical installation



Note: when installing vertically, the wind shield must be added, otherwise it will cause mutual influence between multiple inverters, resulting in poor heat dissipation.

2-1-6. Extend the operate panel

Unit: mm



Installation instructions: according to the size in the figure above, open a hole on the outer surface where the operation panel needs to be installed, then remove the panel controller on the frequency converter by gently pinching the buckle, install it in the opening area, and push it in place.

2-2. Wiring notice

Notice

- Ensure that the power supply has been completely cut off for more than 15 minutes before wiring, otherwise there is a risk of electric shock.
- It is strictly forbidden to connect the power cable with the output terminal U, V and W of the frequency converter.
- There is leakage current in the inverter itself. In order to ensure safety, the inverter and motor must be grounded safely. Generally, the diameter of grounding wire is more than 3.5mm² copper wire, and the grounding resistance is less than 10Ω.
- The inverter has passed the withstand voltage test before leaving the factory, and the user cannot carry out the withstand voltage test on the inverter.
- The electromagnetic contactor, absorption capacitor or other resistance capacitance absorption device shall not be installed between the frequency converter and the motor.
- In order to provide the convenience of input side over-current protection and power failure maintenance,

the frequency converter shall be connected with the power supply through the circuit breaker.

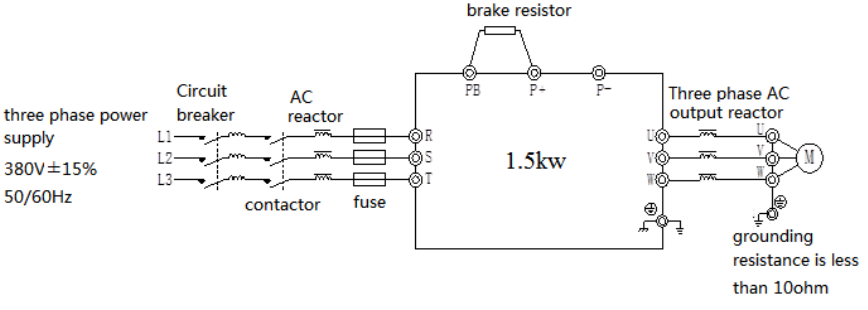
- The input and output circuits of control terminals shall be connected with twisted wires or shielded wires of more than 0.75mm². One end of the shielding layer shall be suspended, and the other end shall be connected with the grounding terminal PE of frequency converter, and the wiring length shall be less than 50m.

Danger

- Ensure that the power supply of the inverter has been completely cut off, all LED indicators of the operation keyboard are off, and wait for more than 15 minutes before wiring operation.
- The internal wiring can be started only after the DC voltage between P+ and P- of the internal electrolytic capacitor of the frequency converter is reduced to less than DC36V.
- The wiring operation can only be carried out by trained and authorized qualified professionals.
- Before power on, pay attention to check whether the voltage level of the frequency converter is consistent with the supply voltage, otherwise it may cause casualties and equipment damage.

2-3. Main circuit wiring

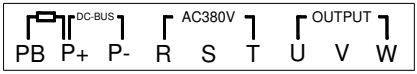
2-3-1. VH5-41P5-B wiring diagram



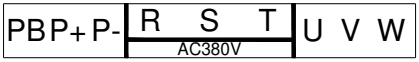
Note: circuit breaker, contactor, AC reactor, fuse, brake resistor and output reactor are optional parts. Please refer to chapter 6 for details.

2-3-2. Arrangement and description of main circuit terminals

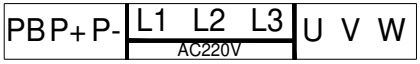
- VH5-45P5-B main circuit terminals



- VH5-40P7-B/VH5-41P5-B/VH5-42P2-B/ VH5-43P7-B main circuit terminals



- VH5-20P7-B/VH5-21P5-B/VH5-22P2-B main circuit terminals



- Main circuit terminal description

Terminal	Name	Description
R, S, T	Three phase power supply input	AC three phase power supply input
U, V, W	VFD output terminal	Connect to the three phase motor
PE	Grounding terminal	Connect to the ground
P+, PB	Brake resistor terminal	Connect to the brake resistor
P+, P-	DC bus +/-	Common DC bus input

Note:

(1) Input power supply R, S, T

① There is no phase sequence requirement for input side wiring of frequency converter.

② Circuit breaker, contactor, AC reactor, fuse, brake resistor and output reactor are optional parts. Please refer to chapter 6 for details.

(2) P+, P-

① After the power failure, there is residual voltage between P + and P -, all the LED indicator lights of the operation keyboard go out, and wait for more than 15 minutes before wiring operation.

② Do not connect the brake resistor directly to the bus, otherwise the inverter will be damaged or even fire.

(1) P+, PB

① Refer to the recommended value for brake resistance selection, and the wiring distance is less than 5m, otherwise the inverter may be damaged.

(2) Output U, V, W

① Please refer to chapter 6 for output cable.

② No capacitor or surge absorber can be connected to the output side of the inverter, otherwise the inverter will be damaged.

③ When the length of motor cable is more than 100m, it is easy to produce electrical resonance due

to the influence of distributed capacitance, so it is necessary to install AC output reactor near the frequency converter.

(3) Grounding terminal PE

① The terminal must be reliably grounded, and the grounding resistance must be less than 10Ω. Otherwise, the equipment will work abnormally or even be damaged.

② It is not allowed to share the grounding terminal PE and the power zero cable N terminal.

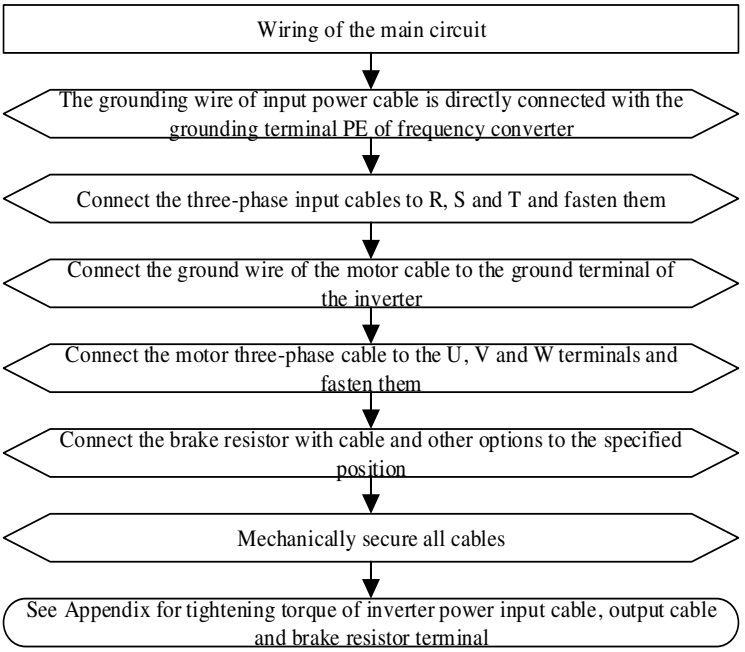
③ The impedance of protective grounding conductor must meet the requirement of withstanding large short-circuit current in case of fault.

④ The size of protective grounding conductor shall be selected according to the table below.

Sectional area of single phase cable (S)	Minimum 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 Yellow and green cable must be used for protective grounding.

2-3-3. Wiring process of main circuit



2-4. Configuration and wiring of the control circuit

2-4-1. Control circuit terminals

(1) VH5 series VFD control terminals

TA TB TC	X1	X3	COM	24V	AI	GND	10V	
	X2	X4	Y1	0V	AO	485-	485+	

(2) Terminal description of control circuit

Type	Terminal	Name	Description
communication	485+ 485-	RS485 terminal	Standard RS485 communication interface, using twisted pair or shielded wire.
Power supply	10V-GND	+10V power supply	External + 10V power supply, maximum output current: 20mA. Generally used for external potentiometer speed regulation.

	24V-0V	DC 24V power supply	Provide + 24V power supply for terminal, maximum output current: 100 mA It is generally used as working power supply for digital input and output terminals. External load is not allowed to connect.
Analog input	AI-GND	AI	Select voltage/current input by DIP switch Input voltage range: 0~10V (Input impedance: 22kΩ) Input current range: 0~20mA (Input impedance: 500Ω)
Analog output	AO-GND	AO	Voltage output range: 0~10V. External load: 2kΩ-1MΩ Current output range: 0~20mA. External load less than 500Ω Select voltage/current output by DIP switch
Common terminal	COM	Common terminal of input X	COM and 24 V are short circuited to form NPN input COM and 0V are short circuited to form PNP input When using external signal to drive X1 ~ X4, com needs to be connected with external power supply and disconnected from 24 V power supply of inverter body;
Digital input	X1	Input terminal 1	Optocoupler isolation input Input impedance: R = 2KΩ The input voltage range is 9 ~ 30V. Compatible with bipolar input. Note: VH5 does not support high speed pulse input
	X2	Input terminal 2	
	X3	Input terminal 3	
	X4	Input terminal 4	
Digital output	Y1	Digital output terminal 1	Collector open circuit output Output voltage range: 0 ~ 24V Output current range: 0 ~ 50mA
Relay output	TA TB TC	Output relay	Programmable is defined as a variety of electrical output terminals, TA-TB: normally open TA-TC: normally closed Contactor capacity: AC250V/2A (COSΦ=1) AC250V/1A (COSΦ=0.4)

			DC30V/1A

Note:

(1) Before the frequency converter is put into use, the terminal wiring and all jumper switches on the control board should be set correctly.

(2) DIP switch:

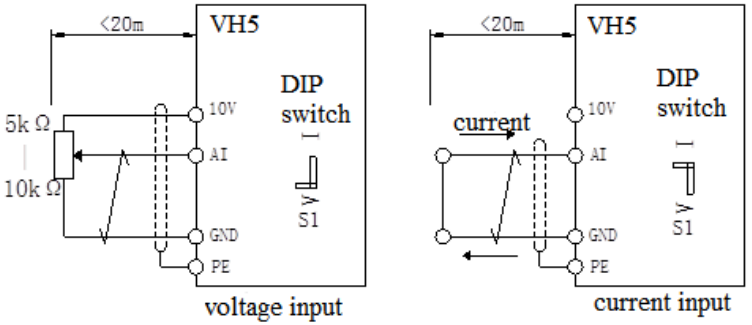
S1: AI OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

S2: AO OFF = 0 - 10V, ON = 0 - 20mA, default is OFF

2-4-2. Analog I/O wiring

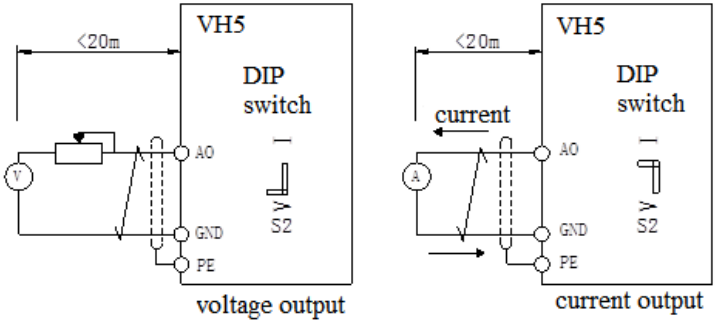
(1) Analog input terminal AI wiring

AI terminal receives analog signal input, and AI dial switch can select input voltage (0 ~ 10V) or current (0 ~ 20mA). The specific wiring is shown in the figure below:



(2) Analog output terminal AO wiring

AO external analog meter can indicate a variety of physical quantities, AO dial switch can select output voltage (0 ~ 10V, external load 2KΩ – 1MΩ) or current (0 ~ 20mA, external load less than 500Ω). The terminal wiring mode is shown in the figure below.



Note:

(1) When using analog input, filter capacitor or common mode inductor should be installed between AI and GND.

(2) The resistance ranges of the potentiometer connected between the control terminal 10V and GND is 5~10K.

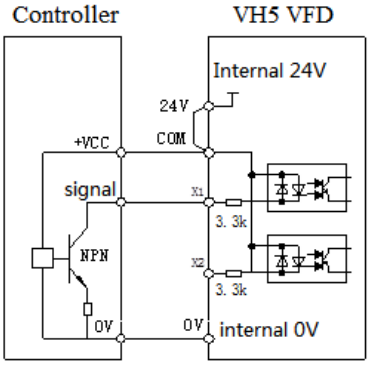
(3) Analog input and output signals are vulnerable to external interference. Shielded cables must be used for wiring and well grounded. The length of wiring should be as short as possible and no more than 20m.

2-4-3. Digital I/O wiring

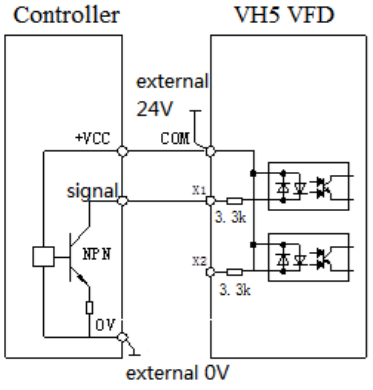
(1) Digital input terminal

Generally, shielded cables are required, and the wiring distance should be as short as possible, not more than 20m. When active driving mode is selected, necessary filtering measures should be taken for the crosstalk of power supply. The contact control mode is recommended, and the specific wiring diagram is as follows:

- Single inverter source wiring mode



Single VFD uses internal 24V source wiring

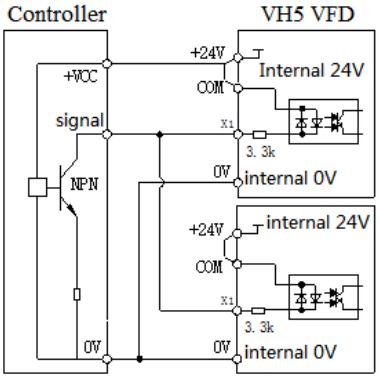


single VFD uses external 24V source wiring

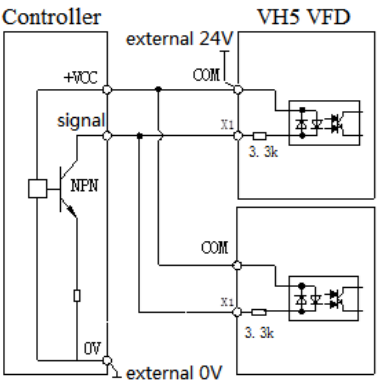
It is the most common wiring mode to use the internal 24V power supply of frequency converter. The com of the inverter is short circuited to 24V, and the 0V of the inverter is connected to the 0V of the external controller.

If the external 24V is used, the com end of the frequency converter should be connected to the external 24V, and the external power supply 0V is connected to the corresponding X terminal through the control contact of the external controller.

- Multi-inverter source wiring mode

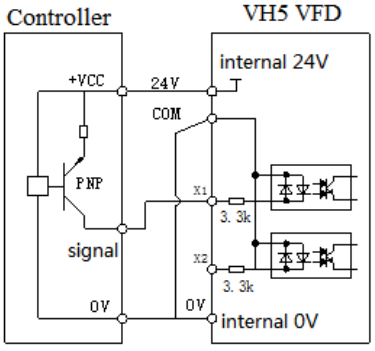


Multi-inverter uses internal 24V source wiring

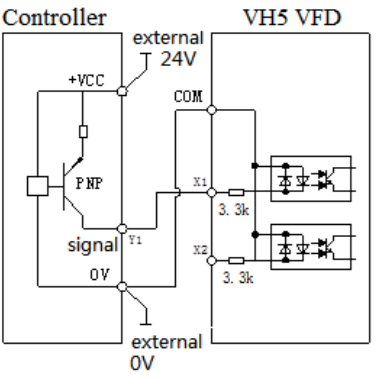


Multi-inverter uses external 24V source wiring

- Single inverter leakage wiring mode



Single VFD uses internal 24V leakage wiring

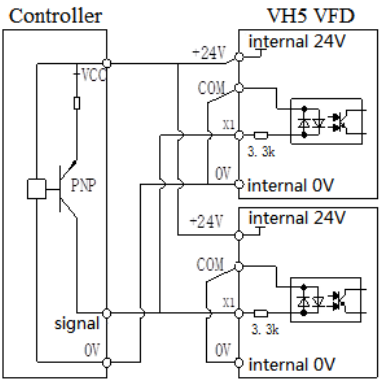


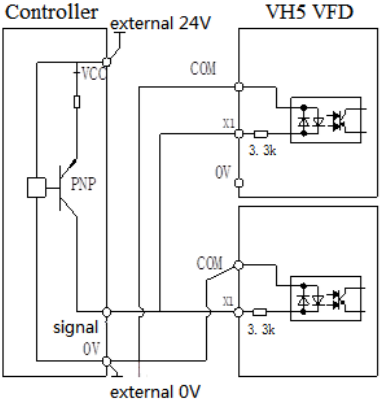
Single VFD uses external 24V leakage wiring

If the internal 24V power supply of the converter is used, the 0V and com of the converter shall be short connected, and the 24V of the converter shall be connected with the common end of the external controller.

If external 24V is used, the com end of the converter shall be connected with external 0V, and the external power supply 24V shall be connected to the corresponding X terminal through the control contact of the external controller.

- Multi-inverter leakage wiring mode

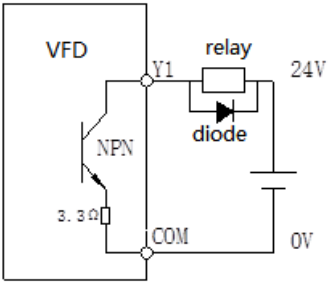




(2) Digital output terminal

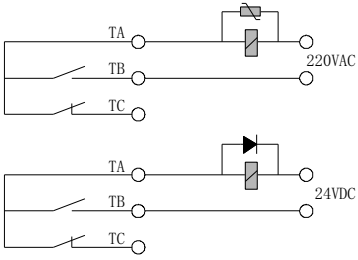
When the digital output terminal needs to drive the relay, freewheeling diodes should be installed on both sides of the relay coil. Otherwise, it is easy to damage the DC24V power supply. The driving capacity is no more than 50mA.

Note: the polarity of freewheeling diode must be correctly installed. As shown in the figure below. Otherwise, when the digital output terminal has output, the DC24V power supply will be burnt out immediately. Selection standard of freewheeling diode: the reverse withstand voltage is greater than 5 ~ 10 times of the load voltage, and the current is greater than the load current.

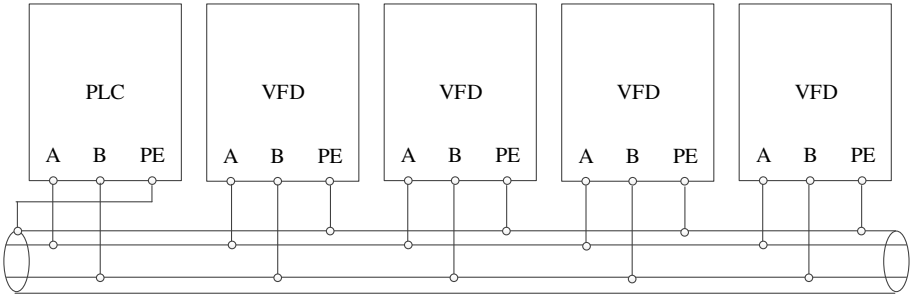


(3) Relay output terminal

Inductive loads (relays, motors, indicator lights) can cause voltage spikes when the current is cut off. The relay contacts are protected by varistors, and the inductive load is equipped with absorption circuits, such as varistors, RC absorption circuits, diodes, etc., to ensure the minimum interference current when turning off.



(4) Multiple inverters can be connected together through RS485 and controlled by PLC (or upper computer), as shown in the figure. With the increase of the number of connections, the communication system is more vulnerable to interference. It is suggested that the following wiring methods be adopted:

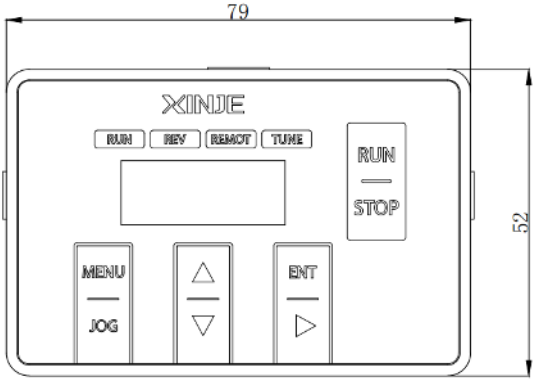


3. Operation and application

3-1. Operation panel

3-1-1. Keboard appearance

The operation panel and control terminal of the frequency converter can control the starting, speed regulating, stopping, braking, operation parameter setting and peripheral equipment of the motor. The appearance of the operation panel is shown in the figure below.



3-1-2. Keyboard functions

There are 8 keys on the frequency converter operation panel, and the functions are defined as follows:

Button	Name	Function
MENU	Programming/ exit	Enter or exit the programming status
ENT	Save/switch	Save the parameter or enter next menu in programming status
RUN	Forward run	Press this button to run forward in operation panel running command mode
STOP	Stop/reset	Stop/reset the fault
JOG	Multi-function	Set through P8-00
▲	Increase	Increase the value or pause frequency in operation
▼	Decrease	Decrease the value or pause frequency in operation
►	Shift/monitor	In the editing state, you can choose to set the modification bit of the data; in other states, you can switch the display state and monitor parameters

3-1-3. LED lights

There are 5-digit 7-segment LED digital tubes and 4 status indicators on the inverter operation panel.

The four status indicators are located above the LED tube, from left to right: RUN, REV, REMOT, TUNE. The following table describes the indicator lights.

Indicator lights	Meaning	Function
RUN	Operation indicator	On: running OFF: stop
REV	Forward/reverse operation indicator	ON: reverse operation OFF: forward operation Flashing: status switching
REMOT	Command source indicator	OFF: panel start/stop ON: terminal start/stop Flashing: communication start/stop
TUNE	Tuning indicator	Flash slowly: tuning status Flash quickly: fault status ON: torque status

3-1-4. Operation method

Through the operation panel, the inverter can be operated in various ways, for example:

(1) Parameter display and switch

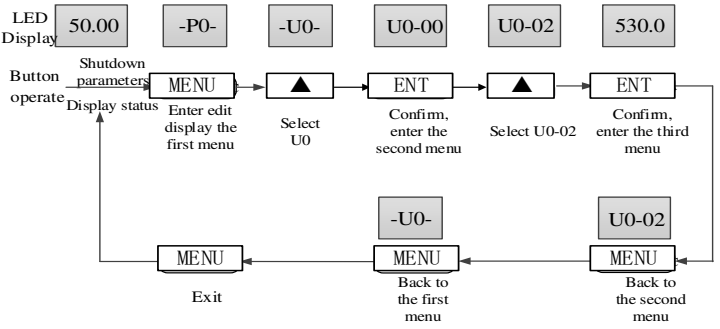
Method 1:

Press ▶ button, switch LED display parameter, set running display parameter P8-07 and P8-08, set stop display parameter P8-09.

When checking status monitoring parameters, you can press ENT key to switch back to the default display status of monitoring parameters. The default monitoring parameter of shutdown state is the setting frequency, and the default monitoring parameter of operation state is output frequency.

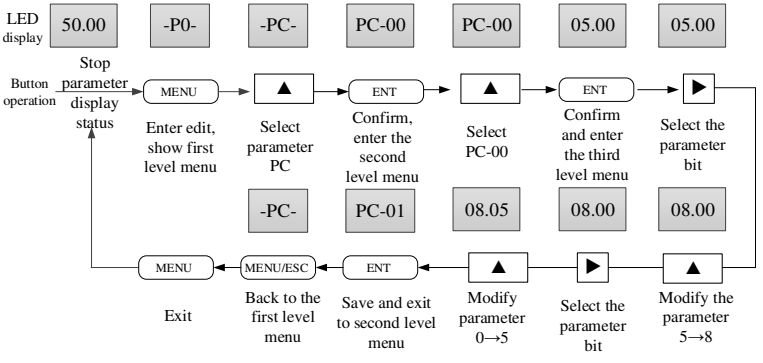
Method 2:

Check group U0 parameters, for example, U0-02.



(2) Set the parameter

For example, the parameter PC-00 (jog frequency) is changed from 5.00Hz to 8.05Hz.



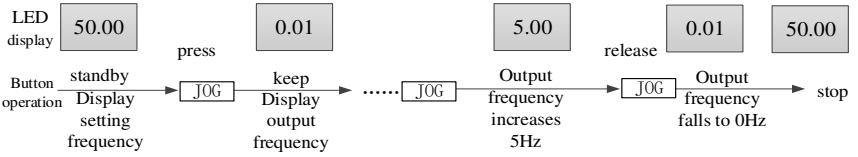
In the three-level menu, if the parameter has no flashing bit, it means that the parameter cannot be modified. The possible reasons are as follows:

(1) The parameters are not modifiable, such as the actual detection state parameters, operation record parameters, etc;

(2) This parameter can not be modified in the running state, and can be modified only after shutdown.

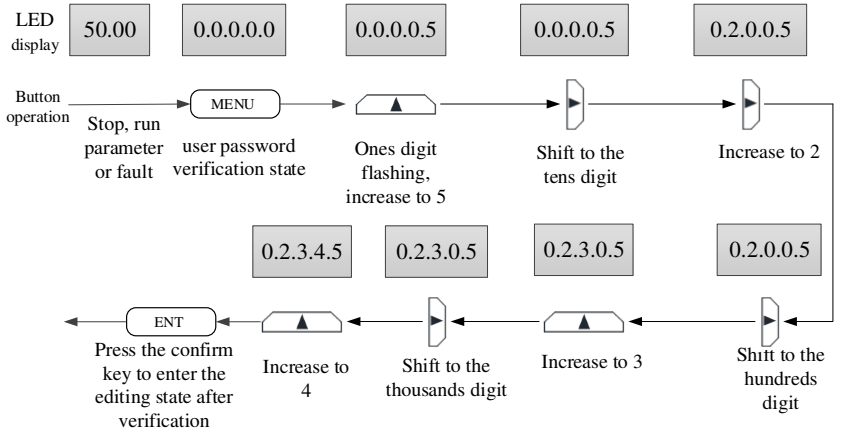
(3) Jog operation

Suppose that the current operation command channel is the operation panel, in the shutdown state, press the JOG function key to select jog forward (P8-00 = 2), and the jog frequency is 5Hz.



(4) Set user password

Suppose that user password P8-03 has been set to 02345. The numbers in bold in the figure below indicate the flash position.



(5) Check fault status and parameters

The method of fault status query is the same as group U0 monitoring parameters.

Note:

- User pressed ▶ in fault status to check group P6 parameters.
- When the user checks the fault parameters, he can directly switch back to the fault code display state by pressing the MENU button.

(6) Set frequency through buttons ▲ ▼

Assuming the VFD is in shutdown parameter display status, P0-03 = 0, the operation mode is as follows:

- Frequency setting through digital setting
- Keep press ▲ to increase ones bit, tens bit, hundreds bit…If release ▲ and press ▲ , it will increase from ones bit again.
- Keep press ▼ to decrease ones bit, tens bit, hundreds bit…If release ▼ and

press , it will decrease from ones bit again.

3-1-5. Multi-function buttons

The function of JOG button can be defined by P8-00, which is used to switch the menu, the rotation direction of frequency converter or jog. Please refer to the explanation of P8-00 function code for specific setting method.

3-1-6. Quick reference of parameters

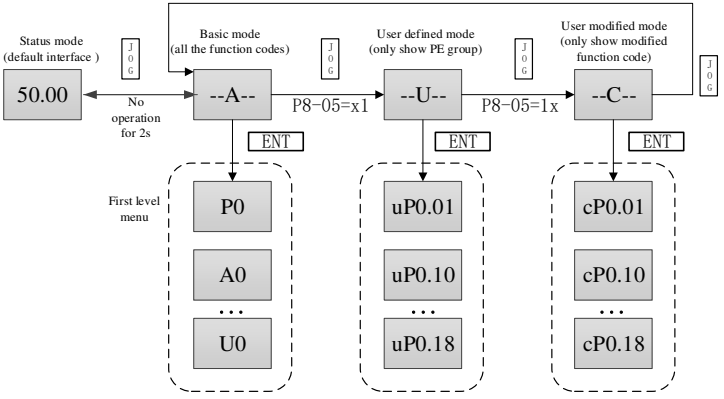
There are many function codes in VH5 series. In order to facilitate users to quickly find the function codes, the frequency converter provides two methods to quickly find the function codes

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

(2) The function codes which are different from the factory values are arranged automatically by the frequency converter for users to select quickly. Three ways to check the function codes:

Parameter display mode	Display
Function parameters	--A--
User defined parameters	--U--
User modified parameters	--C--

The three kinds of display mode are switched through the multi-function keys on the panel. After entering the function codes of each group, the search or modification method is the same as the previous keyboard operation.



P8-05 is used to control the display of user defined group and user modified group parameters.

P8-05	Default value: 00		
	Set value	Tens bit	Ones bit
	Function	Group --C-- display	Group --U-- display

	Range	0: no display 1: display	0: no display 1: display

Basic function codes

The basic function code group is the whole function code of the inverter. After entering, it is the level I menu. Please check them according to the operation mode described above.

User defined function codes

The user defined menu is easy to check the general parameters. The display form of parameters in the user-defined menu is like "uP0.01", which represents the function parameter P0.01. The effect of modifying parameters in the user-defined menu is the same as that in the normal programming state.

The function parameters of user-defined menu come from group PE. If the function parameters are selected by group PE, and set to P0.00 means that they are not selected, and a total of 32 can be set. If "null" is displayed when entering the menu, it means that the user-defined menu is empty.

Users can customize and edit according to their specific needs.

User modified function codes

In the group of function codes that have been changed by the user, only the current set value is listed. This is a list generated automatically by the frequency converter, which makes it easy for users to quickly access the modified function code.

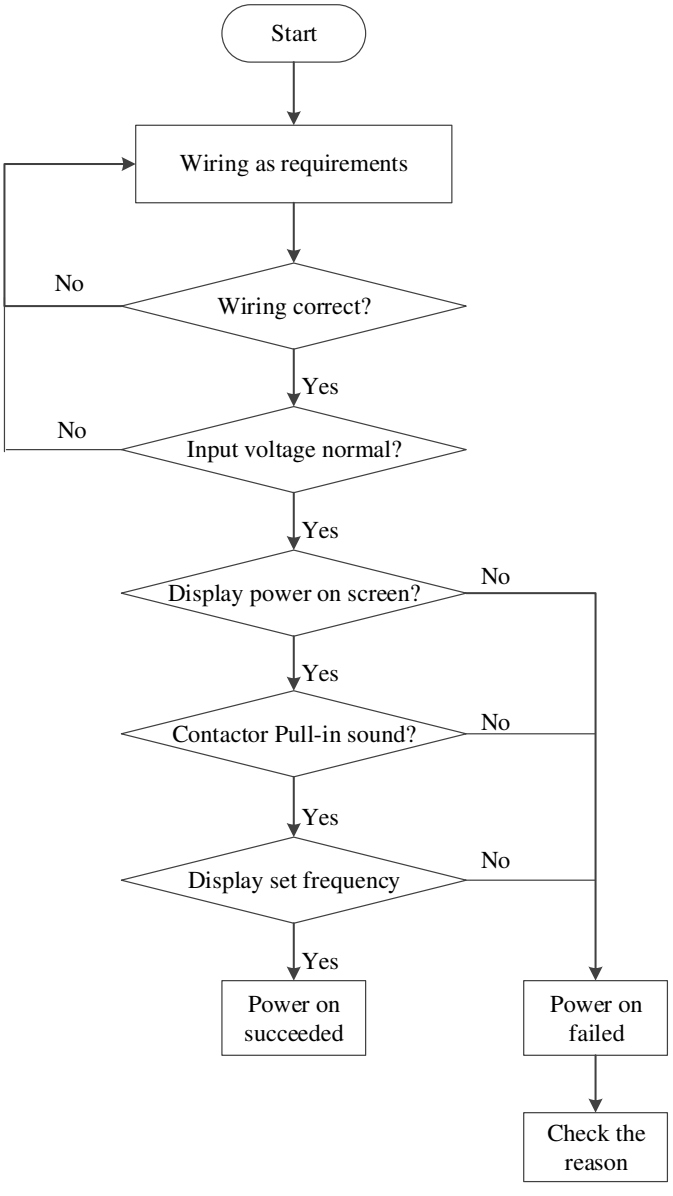
3-2. VFD power on

3-2-1. Inspection after power on

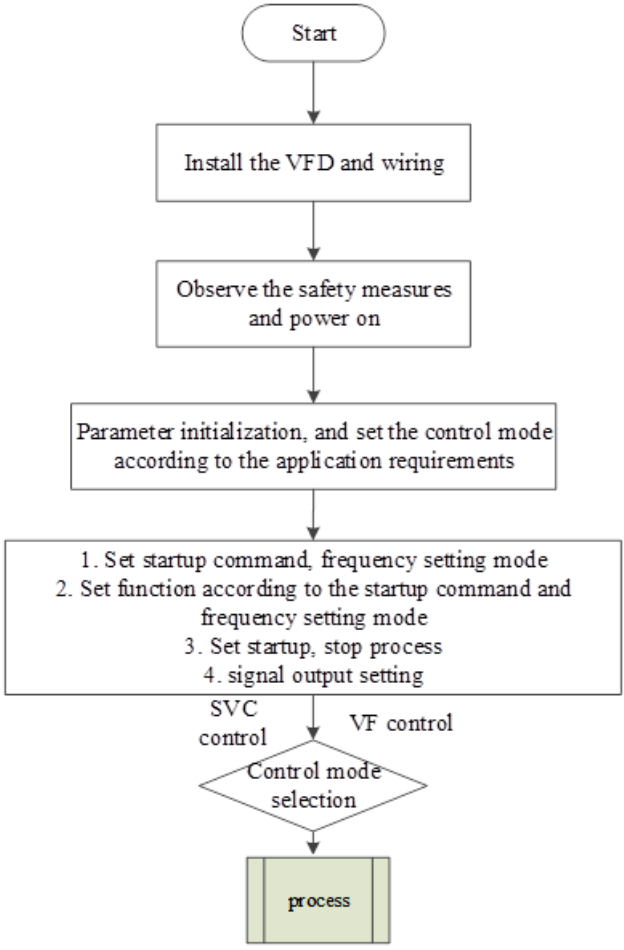
Please wiring according to the operation requirements provided in "EMC" of this manual.

3-2-2. Initial power on operation

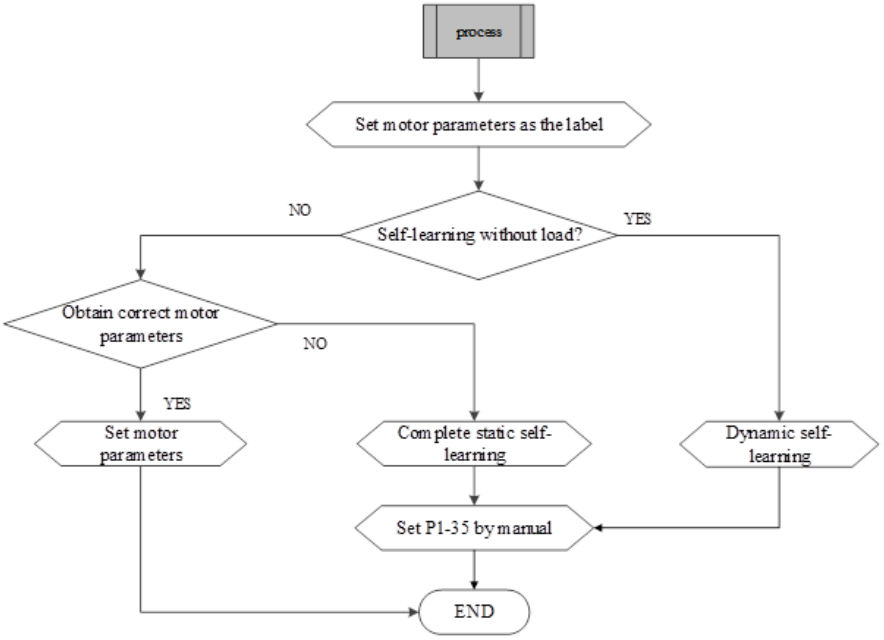
After checking the wiring and power supply, close the AC power switch on the input side of the frequency converter and power on the frequency converter. The LED on the operation panel of the frequency converter displays the dynamic picture of starting up, and the contactor pulls in normally. When the display character changes to the set frequency, it indicates that the frequency converter has been initialized. The initial power on operation process is shown in the figure below:


Start
Wiring as requirements
Wiring correct?
No
Yes
Input voltage normal?
No
Yes
Display power on screen?
No
Yes
Contactor Pull-in sound?
No
Yes
Display set frequency
No
Yes
Power on succeeded
Power on failed
Check the reason

3-2-3. Start to debug



3-2-4. Debugging process



3-3. Start stop of the VFD

3-3-1. Start stop signal

There are three kinds of start stop signal sources of frequency converter, which are panel start stop, terminal start stop and communication start stop. They are selected by function parameter P0-02.

3-3-1-1. Panel start stop

The key on the panel is used for command control, and the run key on the keyboard is pressed to start the operation of the frequency converter; while the frequency converter is running, the stop key on the keyboard is pressed to stop the operation of the frequency converter.

Parameter	Name	Setting value	Note
P0-02	Operation command channel	0	Operation panel command

3-3-1-2. Terminal start stop

VH5 inverter provides a variety of terminal control modes. The switch signal mode is determined by function code P2-10, and the input port of start stop control signal is determined by function code P2-00 ~ P2-09.

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

Parameter	Name	Setting value	Note
P0-02	operation command channel	1	Terminal command
P2-10	XI terminal command mode	0	Two-wire mode 1
P2-00	X1 function selection	1	Forward run
P2-01	X2 function selection	2	Reverse run

Example 2: 3-wire control, forward signal connected to X1, reverse signal connected to X2, stop signal connected to X3.

Parameter	Name	Setting value	Note
P0-02	operation command channel	1	Terminal command
P2-10	XI terminal command mode	2	3-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	3-wire mode run

3-3-1-3. Communication start stop

VH5 supports Modbus-RTU mode to communicate with the host computer. The built-in communication port of frequency converter is Modbus-RTU slave protocol, and the host computer must use Modbus-RTU master

protocol to communicate with it.

Example of communication parameter setting:

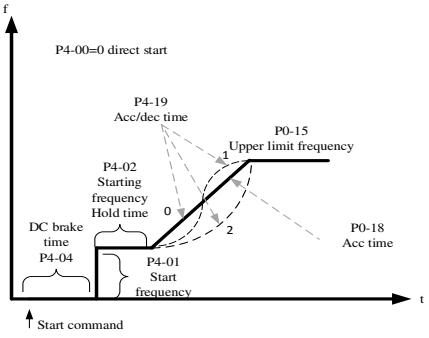
Parameter	Name	Setting value	Note
P0-02	operation command channel	2	Communication command
P9-00	Communication protocol selection	0	Modbus-RTU
P9-01	Local address	1	Station number 1
P9-02	Baud rate	6	19200BPS
P9-03	Data format	1	8-E-1

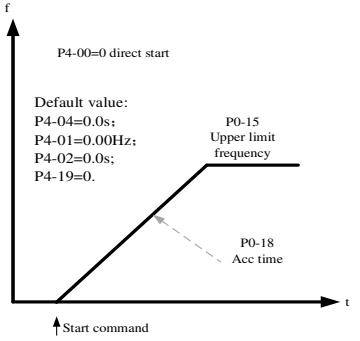
3-3-2. Start mode

There are three starting modes of frequency converter, which are direct starting, speed tracking restart and asynchronous machine pre-excitation starting. They are selected by function parameter P4-00.

3-3-2-1. Direct start

Parameter	Name	Setting value	Note
P4-00	Starting mode	0	Direct start mode is applicable to most small inertia loads. The frequency curve of start-up process is shown in the following figure. The "DC braking" function before startup is applicable to the driving of elevator and heavy load; the starting frequency is applicable to the equipment which needs to impact start, such as cement mixer equipment.

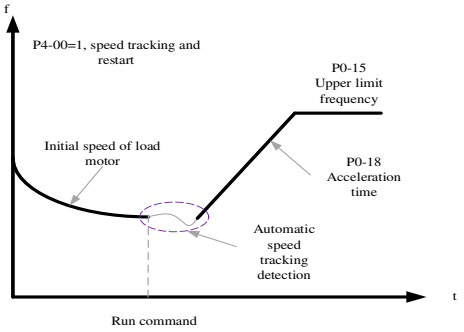


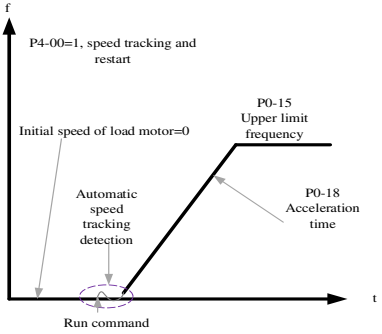


3-3-2-2. Speed tracking restart

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

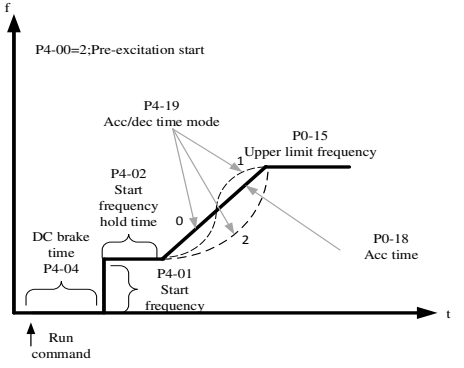
			restart can avoid the over-current.

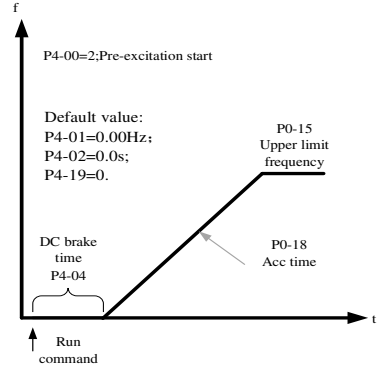




3-3-2-3. Pre-excitation start

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.



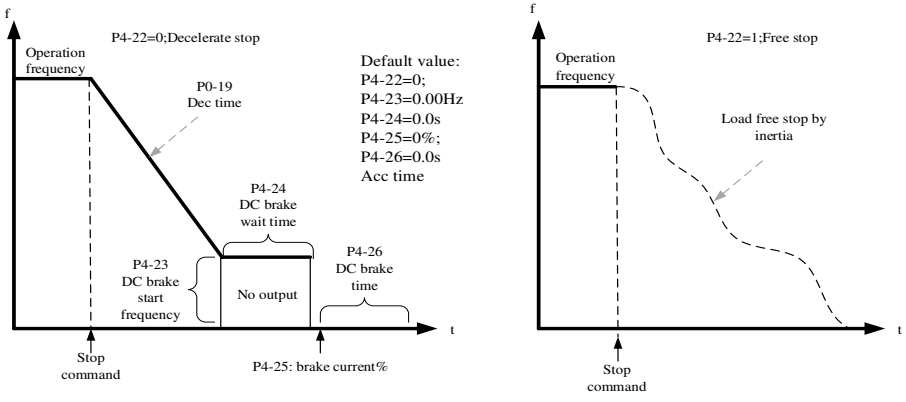


3-3-3. Stop mode

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



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 bit (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 bit (0~3)	0: A+B 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%

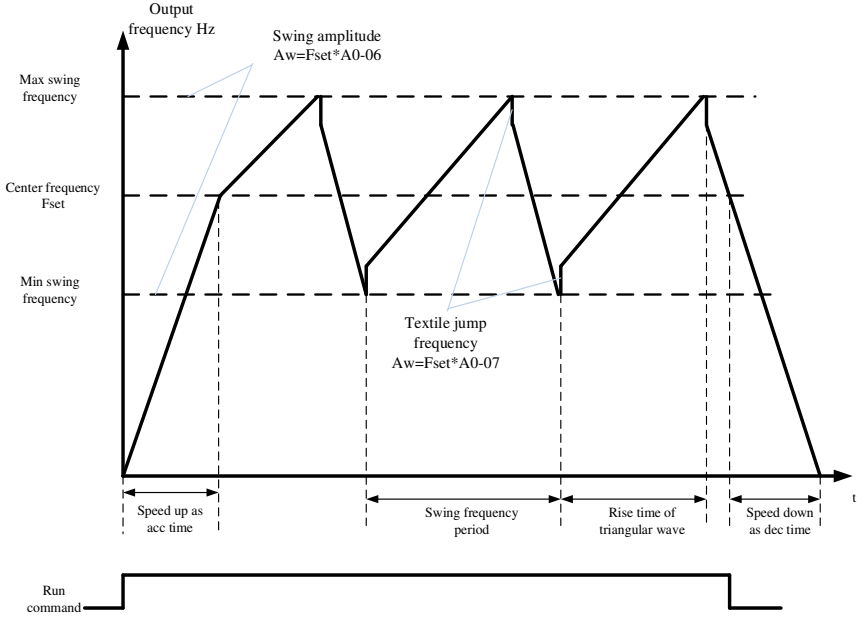
A0-07	Jump frequency amplitude	0.0%～50.0%
A0-08	Swing frequency period	0.1s～3600.0s
A0-09	Triangular rise time of swing frequency	0.1%～100.0%

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

0: relative to the center frequency (P0-05 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. Motor parameters and tuning

3-6-1. 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

3-6-2. 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	It is only suitable for asynchronous motor, where motor and load are difficult to separate and dynamic tuning operation is not allowed, P1-09 and P1-10 are not tuned.	Better
Manual input parameters	For asynchronous motors only. 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 of P1-00 ~ P1-10.	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 frequency converter (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	PA-00～PA-05: same to above definitions

Step 4: if it is an asynchronous motor, P1-35 (tuning selection, motor 2 corresponds to PA-35) please select 2 (dynamic tuning of asynchronous motor), 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	PA-06~PA-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.

3-7. Using method of terminal X

When out of factory, P2-16 = 0000, P2-17 = 0000. When X is short circuited, the signal is valid (logic 1); when X terminal is suspended, the signal is invalid (logic 0);

The user can also change the effective mode of the X terminal, that is, when the X terminal is short circuited, it is an invalid (logic 0) signal; when the X terminal is suspended, it is an effective (logic 1) signal. At this time, the corresponding bits of P2-16 and P2-17 need to be changed to 1.

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

For the X1-X3 input, the port signal delay function is specially provided to facilitate some applications requiring delay processing.

The functions of the above four X terminals can be defined in P2-00 ~ P2-03, and each X can be selected from 51 functions as required. Refer to the detailed description of P2-00 ~ P2-03 for details.

3-8. Using method of terminal Y

VH5 VFD has two channels of output, which are Y1 and TA/TB/TC, wherein Y1 is transistor output, which can drive 24VDC low-voltage signal circuit, TA/TB/TC is relay output, and can drive 220VAC control circuit and DC24V control circuit.

By setting the value of P3-01 to P3-05, output function of each channel can be defined. It can be used to indicate various working states and alarms of the inverter. There are about 40 function settings in total, so that the user can realize specific automatic control requirements. Please refer to the detailed description of group P3 parameters.

3-9. Using method of terminal AI

VH5 supports 1 channel of AI terminal.

Terminal	Input signal
AI1-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.

3-10. Using method of terminal AO

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

AO can be used to indicate the internal operation parameters in analog mode. The indicated parameter attributes can be modified through P3-13 before output. The modified characteristic curve Y = kX + b, where x is the operation parameter to be output, and the k and b of AO 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	Default value	Modify
P0-01	First motor control mode	0: VF control mode 1: No speed sensor vector control (SVC)	0	×
P0-02	Command source	0: Operation panel 1: Terminal operation 2: Serial port	0	○
P0-03	Main frequency source A selection	0: Digital setting (no memory when power off) 1: Digital setting (power down memory) 3: AI 6: MODBUS RTU setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation	0	×
P0-04	Auxiliary frequency source B selection	0: Digital setting (no memory when power off) 1: Digital setting (power down memory) 3: AI 6: Communication setting 7: Multi-segment command setting 8: PID setting 9: Simple PLC operation	0	×
P0-05	Frequency source superposition	Ones bit: frequency source selection 0: Main frequency source A	00	○

Group P0: basic operation parameters				
Parameter	Name	Setting range	Default value	Modify
	selection	1: Calculation results of main and auxiliary frequency sources 2: Switching between main frequency source A and auxiliary frequency source B Tens bit: 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	0	○
P0-07	Auxiliary frequency source B range	0%~150%	100%	○
P0-09	Digital setting of auxiliary frequency source offset	0.00Hz~max frequency P0-13	0.00Hz	○
P0-10	Preset frequency	0.00Hz~max frequency P0-13	50Hz	○
P0-12	Digital setting frequency memory selection	0: Not memory 1: Memory	0	○
P0-13	Maximum output frequency	50.00Hz~500.00Hz	50.00Hz	×
P0-14	Upper limit frequency source	0: Set by p0-15 2: AI setting 5: Communication setting	0	×
P0-15	Upper limit frequency	Lower limit frequency P0-17~Max output frequency P0-13	50.00Hz	○
P0-16	Upper limit	0.00Hz~ Max output frequency (P0-13)	0.00Hz	○

Group P0: basic operation parameters				
Parameter	Name	Setting range	Default value	Modify
	frequency offset			
P0-17	Lower limit frequency	0.00Hz~ Upper limit frequency P0-15	0.00Hz	○
P0-18	Acceleration time 1	0~65000 (PC-09=0) 0.0~6500.0 (PC-09=1) 0.00~650.00 (PC-09=2)	Model setting	○
P0-19	Deceleration time 1	0~65000 (PC-09=0) 0.0~6500.0 (PC-09=1) 0.00~650.00 (PC-09=2)	Model setting	○
P0-20	Operation direction	0: Running in the default direction 1: Run in the opposite direction from the default	0	○
P0-21	Reverse operation	0: Allow reverse 1: Reverse is prohibited	0	○
P0-22	Dead time of forward and reverse rotation	0.0s~3600.0s	0.0s	○
P0-23	Run time frequency command up/down reference	0: Operating frequency 1: Set frequency	0	×
P0-25	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	×

Group P1: first motor parameters

Group P1: first motor parameters				
Parameter	Name	Setting range	Default value	Modify
P1-00	Motor type selection	0: Common asynchronous motor	0	×
P1-01	Motor rated power	0.1kW~650.0kW	Model setting	×
P1-02	Motor rated voltage	1V~1200V	Model setting	×
P1-03	Motor rated current	0.01A~655.35A (VFD power ≤55kW) 0.1A~6553.5A (VFD power >55kW)	Model setting	×

Group P1: first motor parameters				
Parameter	Name	Setting range	Default value	Modify
P1-04	Motor rated frequency	0.01Hz~ max output frequency	Model setting	×
P1-05	Motor rated speed	1rpm~65535rpm	Model setting	×
P1-06	Asynchronous motor stator resistance	0.001Ω～65.535Ω (VFD power ≤55kW) 0.0001Ω～6.5535Ω (VFD power >55kW)	Tuning parameter	×
P1-07	Asynchronous motor rotor resistance	0.001Ω～65.535Ω (VFD power ≤55kW) 0.0001Ω～6.5535Ω (VFD power >55kW)	Tuning parameter	×
P1-08	Leakage inductance of induction motor	0.01mH ～ 655.35mH (VFD power ≤55kW) 0.001mH ～ 65.535mH (VFD power >55kW)	Tuning parameter	×
P1-09	Mutual inductance of induction motor	0.01mH ～ 655.35mH (VFD power ≤55kW) 0.001mH ～ 65.535mH (VFD power >55kW)	Tuning parameter	×
P1-10	No load current of asynchronous motor	0.01A～P1-03 (VFD power ≤55kW) 0.1A～P1-03 (VFD power >55kW)	Tuning parameter	×
P1-35	Self learning of motor parameters	0: No operation 1: Static self learning of asynchronous motor (part of parameters) 2: Asynchronous motor rotation self-learning	0	×

Group P2: Input terminal function parameters

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
P2-00	Input terminal X1 function selection	0: no function 1: FWD or run command	01	×

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
P2-01	Input terminal X2 function selection	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 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 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	02	×
P2-02	Input terminal X3 function selection		10	×
P2-03	Input terminal X4 function selection		00	×

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
		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 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	0	×
P2-11	XI terminal UP/DOWN changing rate	0.001Hz/s~50Hz/s	1.00Hz/s	○
P2-12	XI terminal filtering time	0.000s~1.000s	0.010s	○
P2-13	X1 delay time	0.0s~3600.0s	0.0s	×
P2-14	X2 delay time	0.0s~3600.0s	0.0s	×

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
P2-15	X3 delay time	0.0s~3600.0s	0.0s	×
P2-16	XI terminal effective state selection 1	0: high level valid 1: Low level effective Ones bit: X1 Tens bit: X2 Hundreds bit: X3 Thousands bit: X4	00000	×
P2-18	AI curve 1 min setting	0.00V~P2-20	0.00V	○
P2-19	AI curve 1 min setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-20	AI curve 1 max setting	P2-18～+10.00V	10.00V	○
P2-21	AI curve 1 max setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-22	AI curve 2 min setting	0.00V~P2-24	0.00V	○
P2-23	AI curve 2 min setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-24	AI curve 2 max setting	P2-22~+10.00V	10.00V	○
P2-25	AI curve 2 max setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-26	AI curve 3 min setting	0.00V~P2-28	0V	○
P2-27	AI curve 3 min setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-28	AI curve 3 max setting	P2-26~+10.00V	10.00V	○

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
P2-29	AI curve 3 max setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-30	AI curve 4 min setting	0.00V~P2-32	0.00V	○
P2-31	AI curve 4 min setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-32	AI curve 4 inflection point 1 setting	P2-30~P2-34	10.00V	○
P2-33	AI curve 4 inflection point 1 setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-34	AI curve 4 inflection point 2 setting	0.00V~P2-36	0.00V	○
P2-35	AI curve 4 inflection point 2 setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-36	AI curve 4 max setting	P2-34~+10.00V	10.00V	○
P2-37	AI curve 4 max setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-38	AI curve 5 min setting	-10.00V~P2-40	0V	○
P2-39	AI curve 5 min setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-40	AI curve 5 inflection point 1 setting	P2-38~P2-42	10.00V	○
P2-41	AI curve 5 inflection	-100.0%~+100.0%	100.0%	○

Group P2: Input terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
	point 1 setting corresponding frequency percentage			
P2-42	AI curve 5 inflection point 2 setting	P2-40~P2-44	0.00V	○
P2-43	AI curve 5 inflection point 2 setting corresponding frequency percentage	-100.0%~+100.0%	0.0%	○
P2-44	AI curve 5 max setting	P2-42~+10.00V	10.00V	○
P2-45	AI curve 5 max setting corresponding frequency percentage	-100.0%~+100.0%	100.0%	○
P2-54	AI curve selection	Tens bit: AI 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)	321	○
P2-55	AI below minimum input setting selection	Ones bit: AI below minimum input setting selection 0: Corresponding minimum input setting 1: 0.0%	000	○
P2-56	AI filter time constant	0.00s~10.00s	0.10s	○
P2-62	AI jump point	-100.0%~+100.0%	0.0%	○
P2-63	AI jump range	0.0%~100.0%	0.5%	○

Group P3: output terminal function parameters

Group P3: output terminal function parameters				
Parameter	Name	Setting range	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	01	○
P3-04	Relay 1 output function selection	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 20: Specified counting value reached 21: Ready for operation	02	○
P3-05	Relay 2 output function selection	23: AI1 input overrange 24: Under voltage state output 25: Cumulative power on time reached 26: Timing arrival output	00	○

Group P3: output terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
		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 arrived		
P3-06	Y1 output delay time	0.0s~3600.0s	0.0s	○
P3-09	Relay 1 output delay time	0.0s~3600.0s	0.0s	○
P3-11	Y terminal effective state selection	0: positive logic 1: negative logic Ones bit: Y1 Thousands bit: relay 1	00000	○
P3-13	AO 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 7: AI 10: Output speed 12: Communication control output	00	○
P3-15	AO zero bias	-100.0%~+100.0%	0.0%	○

Group P3: output terminal function parameters				
Parameter	Name	Setting range	Default value	Modify
	coefficient			
P3-16	AO gain	-10.00~+10.00	1.00	○

Group P4: start stop mode

Group P4: start stop mode				
Parameter	Name	Setting range	Default value	Modify
P4-00	Starting mode	0: direct start 1: Speed tracking restart 2: Pre-excitation starting (AC asynchronous motor)	0	○
P4-01	Starting frequency	0.00Hz~10.00Hz	0.00Hz	○
P4-02	Start frequency duration	0.0s~100.0s	0.0s	×
P4-03	Percentage of starting DC braking current and pre-excitation current	0%~100%	0%	×
P4-04	DC braking time / pre-excitation time at start-up	0.0s~100.0s	0.0s	×
P4-05	Start protection selection	0: No protection 1: Protection	0	×
P4-06	Speed tracking mode	0: Start from shutdown frequency 1: Starting from power frequency 2: Start at maximum output frequency	0	×
P4-07	Speed tracking speed	1~100	20	○
P4-10	Speed tracking closed loop current	30%~200%	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	0	×

		and deceleration		
P4-20	Time proportion at the beginning of the S curve	0.0%~ (100.0% - P2-21)	30.0%	×
P4-21	Time proportion at the end of the S curve	0.0%~ (100.0% - P2-20)	30.0%	×
P4-22	Stop mode	0: Deceleration stop 1: Free stop	0	○
P4-23	Starting frequency of DC braking during shutdown	0.00Hz~P0-13	0.00Hz	○
P4-24	DC braking time during shutdown	0.0s~100.0s	0.0s	○
P4-25	Percentage of DC braking current when shutdown	0%~100%	0%	○
P4-26	Waiting time of DC braking during shutdown	0.0s~100.0s	0.0s	○

Group P5: VF parameters

Group P5: VF parameters				
Parameter	Name	Setting range	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	00	×
P5-01	Multipoint VF frequency point F1	0.00Hz~P5-03	0.00Hz	×

Group P5: VF parameters				
Parameter	Name	Setting range	Default value	Modify
P5-02	Multipoint VF voltage point V1	0.0~100.0%	0.0%	×
P5-03	Multipoint VF frequency point F2	P5-01~P5-05	0.00Hz	×
P5-04	Multipoint VF voltage point V2	0.0~100.0%	0.0%	×
P5-05	Multipoint VF frequency point F3	P5-05~P1-04 (motor rated frequency)	0.00Hz	×
P5-06	Multipoint VF voltage point V3	0.0~100.0%	0.0%	×
P5-07	Torque boost	0.0% (automatical torque boost) 0.1%~30.0%	Model setting	○
P5-08	Cut-off frequency of torque boost	0.00Hz~ P0-13	50.00Hz	×
P5-09	VF separated voltage source	0: digital setting 1: AI 5: communication setting 6: multi-speed command 7: PID setting 8: simple PLC operation	0	○
P5-10	VF separated voltage source digital setting	0~motor rated voltage	0V	○
P5-11	VF separated voltage acceleration time	0.0s~1000.0s	0.0s	○
P5-12	VF separated voltage deceleration time	0.0s~1000.0s	0.0s	○
P5-13	VF separated stop mode selection	0: the frequency voltage reduced to 0 independently	0	○

Group P5: VF parameters				
Parameter	Name	Setting range	Default value	Modify
		1: When the voltage decreases to zero, the frequency begins to decrease again		
P5-14	VF slip compensation gain	0.0%~200.0%	0.0%	○
P5-15	Slip compensation time constant	0.1~10.0s	0.0%	○
P5-16	VF over excitation gain	0~200	64	○
P5-17	VF oscillation suppression gain	0~100	Model setting	○
P5-18	VF oscillation suppression mode selection	0~4	3	×
P5-19	VF over current stall action current	50~200%	150%	×
P5-20	VF over current stall suppression enable	0: invalid 1: valid	1	×
P5-21	VF over current stall suppression gain	0~100	20	○
P5-22	VF over current stall action current compensation coefficient	50%~200%	50	×
P5-23	Overvoltage stall action voltage	200.0V~2000.0V	Model setting	×
P5-24	Overvoltage stall enable	0: invalid 1: valid	1	×
P5-25	Over voltage stall	0~100	30	○

Group P5: VF parameters				
Parameter	Name	Setting range	Default value	Modify
	suppression frequency gain			
P5-26	Over voltage stall suppression voltage gain	0~100	30	○
P5-27	Limit of maximum rise frequency of over voltage stall	0~50Hz	5Hz	×

Group P6: Vector control parameters

Group P6: Vector control parameters				
Parameter	Name	Setting range	Default value	Modify
P6-00	Speed loop proportional gain 1	1~100	30	○
P6-01	Speed loop integration time 1	0.01s~10.00s	0.50s	○
P6-02	Speed loop proportional gain 2	1~100	20	○
P6-03	Speed loop integration time 2	0.01s~10.00s	1.00s	○
P6-04	Switching frequency 1	0.00~P6-05	5.00Hz	○
P6-05	Switching frequency 2	P6-04~ P0-13	10.00Hz	○
P6-06	Integral attribute of speed loop	Ones bit: integral separation 0: invalid 1: valid	0	○
P6-07	Vector slip compensation coefficient	50%~200%	100%	○
P6-08	SVC speed feedback filter time	0.000s~1.000s	0.050s	○

Group P6: Vector control parameters				
Parameter	Name	Setting range	Default value	Modify
P6-10	Speed control (drive) torque upper limit source	0: Set by P6-11 2: AI 5: communication setting	0	○
P6-11	Speed control (drive) torque upper limit digital setting	0.0%~200.0%	150.0%	○
P6-14	Proportional gain of excitation regulation	0 ~ 60000	2000	○
P6-15	Integral gain of excitation regulation	0 ~ 60000	1300	○
P6-16	Torque regulated proportional gain	0 ~ 60000	2000	○
P6-17	Integral gain of torque regulation	0 ~ 60000	1300	○

Group P7: Fault parameters

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
P7-00	Third time (last) 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	-	-

Group P7: Fault parameters				
Parameter	Name	Setting range	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	-	-
P7-02	First time fault type		-	-
P7-03	Third time (last time) fault frequency	-	-	-
P7-04	Third time (last time) fault	-	-	-

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
	current			
P7-05	Third time (last time) fault bus voltage	-	-	-
P7-06	Third time (last time) fault input terminal status	-	-	-
P7-07	Third time (last time) fault output terminal status	-	-	-
P7-08	Third time (last time) fault VFD status	-	-	-
P7-09	Third time (last time) fault power on time	-	-	-
P7-10	Third time (last time) fault operation time	-	-	-
P7-13	Second time fault frequency	-	-	-
P7-14	Second time fault current	-	-	-
P7-15	Second time fault bus voltage	-	-	-
P7-16	Second time fault input terminal status	-	-	-
P7-17	Second time fault output terminal status	-	-	-
P7-18	Second time fault VFD status	-	-	-
P7-19	Second time fault power on time	-	-	-
P7-20	Second time fault operation time	-	-	-
P7-23	First time fault frequency	-	-	-
P7-24	First time fault current	-	-	-
P7-25	First time fault bus voltage	-	-	-

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
P7-26	First time fault input terminal status	-	-	-
P7-27	First time fault output terminal status	-	-	-
P7-28	First time fault VFD status	-	-	-
P7-29	First time fault power on time	-	-	-
P7-30	First time fault operation time	-	-	-
P7-33	Motor overload protection mode selection	0: Forbidden 1: Allow	1	○
P7-34	Motor overload protection gain	0.20~10.00	1.00	○
P7-35	Motor overload warning coefficient	50%~100%	80%	○
P7-39	Input phase lacking/contactor closing protection selection	Ones bit: input phase lacking protection Tens bit: contactor closing protection selection 0: Forbidden 1: Allow	11	○
P7-40	Output phase lacking protection selection	0: Forbidden 1: Allow	1	○
P7-41	Power on short circuit protection towards the ground function	0: Forbidden 1: Allow	1	○
P7-42	Action selection of fault relay during automatic fault reset	0: no action 1: action	0	○
P7-43	Interval time of automatic fault reset	0.1s~60.0s	1.0s	○

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
P7-44	Number of automatic reset of faults	0~20	0	○
P7-45	Protection action selection 1 when fault	Ones bit: motor overload (Err 10) 0: free stop 1: stop as stop mode Tens bit: input phase lacking (Err11) 0: free stop 1: stop as stop mode Hundreds bit: output phase lacking (Err12) 0: free stop 1: stop as stop mode Thousands bit: 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	00000	○
P7-46	Protection action selection 2 when fault	Ones bit: external fault 1 (Err43) 0: free stop 1: stop as stop mode Tens bit: communication error (Err44) 0: free stop 1: stop as stop mode Hundreds bit: EEPROM read write error (Err45) 0: free stop 1: stop as stop mode Thousands bit: operation time reached	00000	○

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
		(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 selection 3 when fault	Ones bit: user defined fault 1 (Err48) 0: free stop 1: stop as stop mode Tens bit: user defined fault 2 (Err49) 0: free stop 1: stop as stop mode Hundreds bit: PID feedback lost in operation (Err50) 0: free stop 1: stop as stop mode Thousands bit: 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	00	○
P7-48	Protection action selection 4 when fault	Ones bit: motor overheat (Err54) 0: free stop 1: stop as stop mode	00	○
P7-52	Brake starting voltage	200.0V ~ 2000.0V	690V	○
P7-53	Utilization rate of brake	0 ~ 100%	100%	○

Group P7: Fault parameters				
Parameter	Name	Setting range	Default value	Modify
	resistor			
P7-55	Over voltage stall gain	0 ~ 100	30	○
P7-56	Overvoltage stall protection voltage	650V ~ 800V	760.0V	○
P7-63	Over speed detection value	0.0% ~ 50.0% (the unit is max output frequency P0-13)	20.0%	○
P7-64	Over speed detection time	0.0s~60.0s	1.0s	○
P7-65	Detection value of excessive speed deviation	0.0% ~ 50.0%(unit is max frequency P0-13)	20.0%	○
P7-66	Excessive speed deviation detection time	0.0s ~ 60.0s	5.0s	○
P7-67	Selection of instantaneous stop non-stop function	0: Transient power failure invalid 1: Deceleration in case of instantaneous power failure 2: Deceleration stop in case of instantaneous power failure	0	×
P7-68	Pause judgement voltage of transient stop action	80.0%~100.0%	85.0%	×
P7-69	Judgment time of instantaneous stop non-stop voltage rising	0.0s~30.0s	0.5s	×
P7-70	Judgement voltage of instantaneous stop non-stop action	60.0%~100.0% (bus voltage)	80.0%	○
P7-71	Proportional gain of instantaneous stop non-stop	0 ~ 100	40	○
P7-72	Integral coefficient of instantaneous stop non-stop	0 ~ 100	30	○
P7-73	Deceleration time of instantaneous stop non-stop	0 ~ 300.0s	20.0	×

Group P8: keyboard and display

Group P8: keyboard and display				
Parameter	Name	Setting range	Default value	Modify
P8-00	JOG/REV function selection	0: Menu switching 1: Forward and reverse switching 2: Forward jog 3: Reverse jog	0	×
P8-01	STOP/REST function	0: Only in keyboard operation mode, STOP key shutdown function is effective 1: In any operation mode, the STOP key is effective	1	○
P8-02	Parameter initialization	0: no operation 01: restore factory parameters, excluding motor parameters 02: clear record information	0	×
P8-03	User password	0~65535	00000	○
P8-05	Personalized parameter mode selection	Ones bit: 0: No display 1: Display user selected parameters Tens bit: 0: No display 1: Display user modified parameters	00	×
P8-06	Read only user password (whether the parameter can be modified)	0: Modifiable 1: Not modifiable	0	○
P8-07	LED operation display parameter 1 (low 16-bit)	The bit meaning 00: operating frequency 01: set frequency 02: bus voltage 03: output current	001F	○
P8-08	LED operation display parameter 2 (high		0000	○

Group P8: keyboard and display				
Parameter	Name	Setting range	Default value	Modify
	16-bit)	04: output voltage 05: output torque 06: output power 07: X input status 08: Y output status 09: AI1 voltage 10: AI2 voltage 14: PID setting 15: PID feedback 16: load speed display 17: feedback speed, the unit is 0.1Hz 18: actual feedback speed 19: line speed 20: PLC stage 23: main frequency A display 24: auxiliary frequency B display 25: communication setting value 27: voltage before AI correction 29: remaining running time 30: current power on time 31: current running time		
P8-09	LED stop display parameters	The bit meaning 0: set frequency 1: bus voltage 2: X input status 3: Y output status 5: AI voltage 8: PID setting 9: Load speed display 10: PLCStep	0033	○

Group P8: keyboard and display				
Parameter	Name	Setting range	Default value	Modify
P8-10	Accumulated running time	0h~65535h	-	-
P8-11	Cumulative power on time	0h~65535h	-	-
P8-12	Cumulative power consumption	0~65535 degree	-	-
P8-13	VFD type display	1: type G (Constant torque load model) 2: type P (Fan and water pump load model)	Model setting	-
P8-14	Product number	-	-	-
P8-15	Software version	-	-	-
P8-19	Inverter module radiator temperature	0.0℃~100.0℃	-	-
P8-20	Output power factor	0.00% ~ 200.0%	100.0	○

Group P9: communication parameters

Group P9: communication parameters				
Parameter	Name	Setting range	Default value	Modify
P9-00	Serial communication protocol selection	0: Modbus-RTU protocol 1: Extension card	0	×
P9-01	Local address	0: broadcast address 1 ~ 247 (Modbus valid)	1	○
P9-02	Communication baud rate	Ones bit: MODBUS 0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS	6	○

		8: 57600BPS		
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)	1	○
P9-04	Communication timeout	0.0: invalid 0.1~60.0s	0.0	○
P9-05	MODBUS response delay	0~20ms (Modbus valid)	2	○
P9-06	Communication interruption detection of expansion card	0.0~60.0s	0.0s	○

Group PA: process control closed-loop parameters

Group PA: process control closed-loop parameters				
Parameter	Name	Setting range	Default value	Modify
PA-01	Setting channel selection	0: PA-05 setting 2: AI 5: communication setting 6: multi-segment command setting	0	○
PA-02	Feedback channel selection	1: AI 6: communication setting	0	○
PA-03	PID feedback filter time	0.00s~30.00s	0.00s	○
PA-04	PID output filter time	0.00s~30.00s	0.00s	○
PA-05	PID value setting	0.0%~100.0%	50.0%	○
PA-06	PID setting change time	0.00s~300.00s	0.00s	○
PA-07	PID reverse cut-off frequency	0.00Hz~ max output frequency	0.00Hz	○
PA-08	PID deviation limit	0.0%~100.0%	0.0%	○
PA-09	PID differential limit	0.00%~100.00%	0.10%	○
PA-10	Proportional gain P	0.0~100.0	20.0	○
PA-11	Integral time I	0.01s~10.00s	2.00s	○
PA-12	Differential time D	0.000s~10.000s	0.000s	○
PA-13	PID parameter switching condition	0: do not switch 1: Switch through X terminal	0	○

Group PA: process control closed-loop parameters				
Parameter	Name	Setting range	Default value	Modify
		2: Switch automatically according to deviation 3: Switch automatically according to the operation frequency		
PA-14	PID parameter switching deviation 1	0.0%~PA-15	20.0%	○
PA-15	PID parameter switching deviation 2	PA-14~100.0%	80.0%	○
PA-16	PID proportional gain P2	0.0~100.0	20.0	○
PA-17	PID integral time I2	0.01s~10.00s	2.00s	○
PA-18	PID differential time D2	0.000s~10.000s	0.000s	○
PA-19	PID action direction	0: positive action 1: negative action	0	○
PA-20	PID given feedback range	0~65535	1000	○
PA-21	PID maximum deviation between two outputs	0.00%~100.00%	1.00%	○
PA-22	PID minimum deviation between two outputs	0.00%~100.00%	1.00%	○
PA-23	PID initial value	0.0%~100.0%	0.0%	○
PA-24	PID initial value holding time	0.00s~600.00s	0.00s	○
PA-25	PID operation mode (whether to operate when stop)	0: Not operation when stop 1: Operation during shutdown	0	○
PA-26	PID integral attribute	Ones bit: integral separation 0: invalid 1: valid Tens bit: whether to stop integration after output to limit value 0: continue to integral 1: Stop integral	00	○
PA-27	PID feedback lost detection value	0.0%: not judge the feedback lost 0.1%~100.0%	0.0%	○

Group PA: process control closed-loop parameters				
Parameter	Name	Setting range	Default value	Modify
PA-28	PID feedback lost detection time	0.0s~30.0s	0.0s	○

Group PB: multi-speed and simple PLC operation parameters

Group PB: multi-speed and simple PLC operation parameters				
Parameter	Name	Setting range	Default value	Modify
PB-00	Multi-segment frequency 0	-100.0%~+100.0%	0.0%	○
PB-01	Multi-segment frequency 1	-100.0%~+100.0%	0.0%	○
PB-02	Multi-segment frequency 2	-100.0%~+100.0%	0.0%	○
PB-03	Multi-segment frequency 3	-100.0%~+100.0%	0.0%	○
PB-04	Multi-segment frequency 4	-100.0%~+100.0%	0.0%	○
PB-05	Multi-segment frequency 5	-100.0%~+100.0%	0.0%	○
PB-06	Multi-segment frequency 6	-100.0%~+100.0%	0.0%	○
PB-07	Multi-segment frequency 7	-100.0%~+100.0%	0.0%	○
PB-08	Multi-segment frequency 8	-100.0%~+100.0%	0.0%	○
PB-09	Multi-segment frequency 9	-100.0%~+100.0%	0.0%	○
PB-10	Multi-segment frequency 10	-100.0%~+100.0%	0.0%	○
PB-11	Multi-segment frequency 11	-100.0%~+100.0%	0.0%	○
PB-12	Multi-segment frequency 12	-100.0%~+100.0%	0.0%	○
PB-13	Multi-segment frequency 13	-100.0%~+100.0%	0.0%	○
PB-14	Multi-segment frequency 14	-100.0%~+100.0%	0.0%	○
PB-15	Multi-segment frequency 15	-100.0%~+100.0%	0.0%	○
PB-16	Multi-segment 0 command setting mode	0: PB-00 setting 2: AI 5: PID setting 6: preset frequency P0-10	0	○
PB-17	Simple PLC segment 0 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-18	Simple PLC segment 0 acc/dec time	0~3	0	○
PB-19	Simple PLC segment 1 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-20	Simple PLC segment 1 acc/dec time	0~3	0	○
PB-21	Simple PLC segment 2 operation time	0.0~6500.0s(h)	0.0s(h)	○

Group PB: multi-speed and simple PLC operation parameters				
Parameter	Name	Setting range	Default value	Modify
PB-22	Simple PLC segment 2 acc/dec time	0~3	0	○
PB-23	Simple PLC segment 3 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-24	Simple PLC segment 3 acc/dec time	0~3	0	○
PB-25	Simple PLC segment 4 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-26	Simple PLC segment 4 acc/dec time	0~3	0	○
PB-27	Simple PLC segment 5 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-28	Simple PLC segment 5 acc/dec time	0~3	0	○
PB-29	Simple PLC segment 6 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-30	Simple PLC segment 6 acc/dec time	0~3	0	○
PB-31	Simple PLC segment 7 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-32	Simple PLC segment 7 acc/dec time	0~3	0	○
PB-33	Simple PLC segment 8 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-34	Simple PLC segment 8 acc/dec time	0~3	0	○
PB-35	Simple PLC segment 9 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-36	Simple PLC segment 9 acc/dec time	0~3	0	○
PB-37	Simple PLC segment 10 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-38	Simple PLC segment 10 acc/dec time	0~3	0	○
PB-39	Simple PLC segment 11 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-40	Simple PLC segment 11 acc/dec time	0~3	0	○
PB-41	Simple PLC segment 12 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-42	Simple PLC segment 12 acc/dec time	0~3	0	○
PB-43	Simple PLC segment 13 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-44	Simple PLC segment 13 acc/dec time	0~3	0	○
PB-45	Simple PLC segment 14 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-46	Simple PLC segment 14 acc/dec time	0~3	0	○
PB-47	Simple PLC segment 15 operation time	0.0~6500.0s(h)	0.0s(h)	○
PB-48	Simple PLC segment 15 acc/dec time	0~3	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	0	○

Group PB: multi-speed and simple PLC operation parameters				
Parameter	Name	Setting range	Default value	Modify
		operation 2: cycle all the time		
PB-50	Simple PLC operation time unit	0: second 1: hour	0	○
PB-51	Simple PLC power-off memory selection	Ones bit: power-off memory 0: not memory 1: memory Tens bit: stop memory 0: not memory 1: memory	00	○

Group PC: auxiliary operation parameters

Group PC: auxiliary operation parameters				
Parameter	Name	Setting range	Default value	Modify
PC-00	Jog frequency	0.00Hz~max output P0-13	2.00Hz	○
PC-01	Jog acceleration time	0.0s~6500.0s	20.0s	○
PC-02	Jog deceleration time	0.0s~6500.0s	20.0s	○
PC-03	acceleration time 2	0.1s~6500.0s	Model setting	○
PC-04	deceleration time 2	0.1s~6500.0s	Model setting	○
PC-05	acceleration time 3	0.1s~6500.0s	Model setting	○
PC-06	deceleration time 3	0.1s~6500.0s	Model setting	○
PC-07	acceleration time 4	0.1s~6500.0s	Model setting	○
PC-08	deceleration time 4	0.1s~6500.0s	Model setting	○
PC-09	The unit of acc/dec time	0: 1s 1: 0.1s 2: 0.01s	1	×
PC-10	The base frequency of acc/dec time	0: max frequency 1: setting frequency 2: 50Hz	0	×
PC-11	Switching frequency point between	0.00Hz~max output frequency	0.00Hz	○

Group PC: auxiliary operation parameters				
Parameter	Name	Setting range	Default value	Modify
	acceleration time 1 and acceleration time 2			
PC-12	Switching frequency point between deceleration time 1 and deceleration time 2	0.00Hz~ max output frequency	0.00Hz	○
PC-13	Jump frequency 1	0.00Hz~ max output frequency	0.00Hz	○
PC-14	Jump frequency 2	0.00Hz~ max output frequency	0.00Hz	○
PC-15	Jump frequency range	0.00Hz~ max output frequency	0.00Hz	○
PC-16	Whether the jump frequency is effective during acceleration and deceleration	0: invalid 1: valid (in vector condition)	0	○
PC-17	Frequency reaching detection range	0.00Hz~max frequency	50.00Hz	○
PC-18	Frequency detection value (FDT1 voltage level)	0.0%~100.0%	5.0%	○
PC-19	Frequency detection hysteresis value (FDT1 voltage level)	0.0%~100.0% (max output frequency)	0.0%	○
PC-20	Frequency detection value (FDT2 voltage level)	0.00Hz~ max output frequency	50.00Hz	○
PC-21	Frequency detection hysteresis value (FDT2 voltage level)	0.0%~100.0%	5.0%	○
PC-22	Frequency reached detection value 1	0.00Hz~ max output frequency	50.00Hz	○
PC-23	Frequency reached	0.0%~100.0% (max output	0.0%	○

Group PC: auxiliary operation parameters				
Parameter	Name	Setting range	Default value	Modify
	detection 1 range	frequency)		
PC-24	Frequency reached detection value 2	0.00Hz~ max output frequency	50.00Hz	○
PC-25	Frequency reached detection 2 range	0.0%~100.0% (max output frequency)	0.0%	○
PC-26	Timing function selection	0: invalid 1: valid	0	×
PC-28	Setting operation time	0.0Min~6500.0Min	0.0Min	×
PC-29	Present operation reached time	0.0Min~6500.0Min	0.0Min	×
PC-30	Setting power on reached time	0 ~ 65000h	0	×
PC-32	Setting operation reached time	0 ~ 65000h	0	×
PC-34	Current reached detection value 1	0.0%~300.0% (motor rated current)	100.0%	○
PC-35	Current reached detection 1 range	0.0%~300.0% (motor rated current)	0.0%	○
PC-36	Current reached detection value 2	0.0%~300.0% (motor rated current)	100.0%	○
PC-37	Current reached detection 2 range	0.0%~300.0% (motor rated current)	0.0%	○
PC-38	Zero current detection value	0.0%~300.0% (motor rated current)	5.0%	○
PC-39	Zero current detection delay time	0.01s~600.00s	0.10s	○
PC-40	Software overcurrent point	0：0.0% (not detect) 1 ： 0.1%~300.0% (motor rated current)	200.0%	○
PC-41	Software overcurrent detection delay time	0.00s~600.00s	0.00s	○

Group PC: auxiliary operation parameters				
Parameter	Name	Setting range	Default value	Modify
PC-42	AI1 input voltage lower limit	0.00V~PC-43	3.10V	○
PC-43	AI1 input voltage upper limit	PC-43~10.5V	6.80V	○
PC-44	Overvoltage point	200~810V	810V	×
PC-45	Undervoltage point	100~537V	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	0	○
PC-47	Module temperature reached	0℃~100℃	75	○
PC-48	Fan control	0: The fan runs during operation 1: The fan is running all the time	0	○
PC-49	Droop control	0.00Hz~10.00Hz	0.00Hz	○
PC-50	Terminal jog run priority	0: invalid 1: valid	0	○
PC-51	SVC optimization selection	1: Optimization mode 1 2: Optimization mode 2	2	○
PC-52	Dead area compensation mode	0: No compensation 1: Compensation mode 1	1	○
PC-54	Modulation mode	0: Asynchronous Modulation 1: Synchronous modulation	0	○
PC-55	DPWM switching upper limit frequency	5.00Hz~max output frequency	8.00Hz	○
PC-56	Random PWM	0: Random PWM invalid 1~10: PWM carrier frequency random depth	0	○
PC-57	Wake up frequency	Dormancy frequency	0.00Hz	○

Group PC: auxiliary operation parameters				
Parameter	Name	Setting range	Default value	Modify
		PC-58~max output frequency P0-13		
PC-58	Dormancy frequency	0.00Hz~wake up frequency PC-57	0.00Hz	○
PC-59	Wake up delay time	0.0s~6500.0s	0.0s	○
PC-60	Dormancy delay time	0.0s~6500.0s	0.0s	○
PC-61	Wave by wave current limiting enable	0: Not enable 1: Enable	1	○
PC-62	Current detection compensation	0~100	000	○
PC-65	Bus voltage reached value	Unit is 0.1V	500.0	○
PC-66	The bus voltage reached hysteresis value	Unit is 0.1V	50.0	○
PC-67	Carrier frequency	0.5K~16.0K	Model setting	○
PC-68	The carrier frequency is adjusted with temperature	0: invalid 1: valid	1	○

Group PE: user optional parameters

Group PE: user optional parameters				
Parameter	Name	Setting range	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	P0.00	○
PE-01	User optional parameters 1	Same to PE-00	P0.00	○
PE-02	User optional parameters 2	Same to PE-00	P0.00	○
PE-03	User optional parameters 3	Same to PE-00	P0.00	○
PE-04	User optional parameters 4	Same to PE-00	P0.00	○
PE-05	User optional parameters 5	Same to PE-00	P0.00	○
PE-06	User optional parameters 6	Same to PE-00	P0.00	○
PE-07	User optional parameters 7	Same to PE-00	P0.00	○

Group PE: user optional parameters				
Parameter	Name	Setting range	Default value	Modify
PE-08	User optional parameters 8	Same to PE-00	P0.00	○
PE-09	User optional parameters 9	Same to PE-00	P0.00	○
PE-10	User optional parameters 10	Same to PE-00	P0.00	○
PE-11	User optional parameters 11	Same to PE-00	P0.00	○
PE-12	User optional parameters 12	Same to PE-00	P0.00	○
PE-13	User optional parameters 13	Same to PE-00	P0.00	○
PE-14	User optional parameters 14	Same to PE-00	P0.00	○
PE-15	User optional parameters 15	Same to PE-00	P0.00	○
PE-16	User optional parameters 16	Same to PE-00	P0.00	○
PE-17	User optional parameters 17	Same to PE-00	P0.00	○
PE-18	User optional parameters 18	Same to PE-00	P0.00	○
PE-19	User optional parameters 19	Same to PE-00	P0.00	○
PE-20	User optional parameters 20	Same to PE-00	P0.00	○
PE-21	User optional parameters 21	Same to PE-00	P0.00	○
PE-22	User optional parameters 22	Same to PE-00	P0.00	○
PE-23	User optional parameters 23	Same to PE-00	P0.00	○
PE-24	User optional parameters 24	Same to PE-00	P0.00	○
PE-25	User optional parameters 25	Same to PE-00	P0.00	○
PE-26	User optional parameters 26	Same to PE-00	P0.00	○
PE-27	User optional parameters 27	Same to PE-00	P0.00	○
PE-28	User optional parameters 28	Same to PE-00	P0.00	○
PE-29	User optional parameters 29	Same to PE-00	P0.00	○
PE-30	User optional parameters 30	Same to PE-00	P0.00	○
PE-31	User optional parameters 31	Same to PE-00	P0.00	○

Group PF: torque control

Group PF: torque control				
Parameter	Name	Setting range	Default value	Modify
PF-00	Torque control	0: speed control 1: torque control	0	×
PF-01	Upper limit source of	0: digital setting	0	×

Group PF: torque control				
Parameter	Name	Setting range	Default value	Modify
	driver torque	2: AI 5: communication setting (the full scale of option 1-7 correspond to PF-02 digital setting)		
PF-02	Driver torque upper limit	-200.0%~200.0%	150.0%	○
PF-03	Torque control forward direction max frequency	0.00Hz~max output frequency	50.00Hz	○
PF-04	Torque control reverse direction max frequency	0.00Hz~ max output frequency	50.00Hz	○
PF-05	Torque acceleration time	0.00s~650.00s	0.00s	○
PF-06	Torque deceleration time	0.00s~650.00s	0.00s	○

Group A0: Textile

Group A0: textile				
Parameter	Name	Setting range	Default value	Modify
A0-05	Swing frequency setting mode	0: relative to center frequency 1: relative to the maximum frequency	0	○
A0-06	Swing frequency range	0.0%~100.0%	0.0%	○
A0-07	Jump frequency amplitude	0.0%~50.0%	0.0%	○
A0-08	Swing frequency period	0.1s~3600.0s	10.0s	○
A0-09	Triangular wave rise time of swing frequency	0.1%~100.0%	50.0%	○

Group A1: virtual IO

Group A1: virtual IO				
Parameter	Name	Setting range	Default value	Modify
A1-00	Function selection of virtual X1 terminal	0~51: See group P2 physical X input selection	00	×
A1-01	Function selection of virtual X2 terminal		00	×
A1-02	Function selection of virtual X3 terminal		00	×

Group A1: virtual IO				
Parameter	Name	Setting range	Default value	Modify
A1-03	Function selection of virtual X4 terminal		00	×
A1-04	Function selection of virtual X5 terminal		00	×
A1-05	Virtual X terminal effective state source	Ones bit: 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 bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5	00000	×
A1-06	Virtual X terminal status setting	0: invalid 1: valid Tens bit: virtual X1 Tens bit: virtual X2 Hundreds bit: virtual X3 Thousands bit: virtual X4 Ten thousands bit: virtual X5	00000	×
A1-07	Function selection of AI terminal as X terminal	0~51	00	×
A1-10	Selection of effective mode when AI is used as X terminal	Ones bit: AI 0: high level valid 1: low level valid	000	×
A1-11	Virtual Y1 output function selection	0: connect with physical X1 inside 1~42: see group P3 physical Y output selection	00	
A1-12	Virtual Y2 output function selection	0: connect with physical X2 inside 1~42: see group P3 physical Y output selection	00	○

Group A1: virtual IO				
Parameter	Name	Setting range	Default value	Modify
A1-13	Virtual Y3 output function selection	0: connect with physical X3 inside 1~42: see group P3 physical Y output selection	00	○
A1-14	Virtual Y4 output function selection	0: connect with physical X4 inside 1~42: see group P3 physical Y output selection	00	○
A1-15	Virtual Y5 output function selection	0: connect with physical X5 inside 1~42: see group P3 physical Y output selection	00	○
A1-16	Virtual Y1 output delay time	0.0s ~ 3600.0s	0.0s	○
A1-17	Virtual Y2 output delay time	0.0s ~ 3600.0s	0.0s	○
A1-18	Virtual Y3 output delay time	0.0s ~ 3600.0s	0.0s	○
A1-19	Virtual Y4 output delay time	0.0s ~ 3600.0s	0.0s	○
A1-20	Virtual Y5 output delay time	0.0s ~ 3600.0s	0.0s	○
A1-21	Virtual Y terminal effective state selection	Ones bit: virtual Y1 0: positive logic 1: negative logic Tens bit: virtual Y2 Hundreds bit: virtual Y3 Thousands bit: virtual Y4 Ten thousands bit: virtual Y5	00000	○

Group A2: second motor parameters

Group A2: second motor parameters				
Parameter	Name	Setting range	Default value	Modify
A2-00	Motor type selection	0: Common asynchronous motor	0	×
A2-01	Motor rated power	0.1kW~650.0kW	Model setting	×

Group A2: second motor parameters				
Parameter	Name	Setting range	Default value	Modify
A2-02	Motor rated voltage	1V~1200V	Model setting	×
A2-03	Motor rated current	0.01A~655.35A (VFD power ≤55kW) 0.1A~6553.5A (VFD power >55kW)	Model setting	×
A2-04	Motor rated frequency	0.01Hz~max output frequency	Model setting	×
A2-05	Motor rated speed	1rpm~65535rpm	Model setting	×
A2-06	Asynchronous motor stator resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	Tuning parameters	×
A2-07	Asynchronous motor rotor resistance	0.001Ω~65.535Ω (VFD power ≤55kW) 0.0001Ω~6.5535Ω (VFD power >55kW)	Tuning parameters	×
A2-08	Leakage inductance of asynchronous motor	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×
A2-09	asynchronous motor mutual inductance	0.01mH~655.35mH (VFD power ≤55kW) 0.001mH~65.535mH (VFD power >55kW)	Tuning parameters	×
A2-10	asynchronous motor current without load	0.01A~P1-03 (VFD power ≤55kW) 0.1A~P1-03 (VFD power >55kW)	Tuning parameters	×
A2-35	Motor 2 parameter self-learning	0: No operation 1: Static self-learning of asynchronous motor (some parameters) 2: Self-learning of asynchronous motor rotation	0	×
A2-36	Motor 2 control mode	0: VF control 1: no speed sensor vector control (SVC)	0	×
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	0	○
A2-38	Motor 2 torque boost	0.0%: Automatic torque boost 0.1%~30.0%	Model setting	○
A2-40	Motor 2 oscillation suppression gain	0~100	Model setting	○

Group A2: second motor parameters				
Parameter	Name	Setting range	Default value	Modify
A2-41	Speed loop proportion gain 1	1~100	30	○
A2-42	Speed loop integral time 1	0.01s~10.00s	0.50	○
A2-43	Speed loop proportion gain 2	1~100	20	○
A2-44	Speed loop integral time 2	0.01s~10.00s	1.00	○
A2-45	Switching frequency 1	0.00~A2-46	5.00	○
A2-46	Switching frequency 2	P2-45~max output frequency (P0-13)	10.00	○
A2-47	Speed loop integral property	Ones bit: integral separation 0: invalid 1: valid	0	○
A2-48	Slip gain of vector control	50%~200%	100%	○
A2-49	SVC speed feedback filter time	0.000s~1.000s	0.015	○
A2-51	Torque upper limit source under speed control mode	0: parameter setting (A2-52) 2: AI 5: communication setting Full scale of option 1-7, corresponding to A2-53 digital setting	0	○
A2-52	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	150.0%	○
A2-55	Proportional gain of excitation regulation	0 ~ 60000	2000	○
A2-56	Integral gain of excitation regulation	0 ~ 60000	1300	○
A2-57	Torque regulation proportional gain	0 ~ 60000	2000	○

Group A2: second motor parameters				
Parameter	Name	Setting range	Default value	Modify
A2-58	Integral gain of torque regulation	0 ~ 60000	1300	○

Group AD: AIAO correction

Group AD: AIAO correction				
Parameter	Name	Setting range	Default value	Modify
AD-04	AI measured voltage 1	0.500V~4.000V	Factory calibration	○
AD-05	AI display voltage 1	0.500V~4.000V	Factory calibration	○
AD-06	AI measured voltage 2	6.000V~9.999V	Factory calibration	○
AD-07	AI display voltage 2	6.000V~9.999V	Factory calibration	○
AD-12	AO1 target voltage 1	0.500V~4.000V	Factory calibration	○
AD-13	AO1 measured voltage 1	0.500V~4.000V	Factory calibration	○
AD-14	AO1 target voltage 2	6.000V~9.999V	Factory calibration	○
AD-15	AO1 measured voltage 2	6.000V~9.999V	Factory calibration	○

Group U0: monitor parameters

Group U0: monitor parameters		
Parameter	Name	Min unit
U0-00	Operation frequency (Hz)	0.01Hz
U0-01	Setting frequency (Hz)	0.01Hz
U0-02	Bus voltage (V)	0.1V
U0-03	Output current (A)	0.01A
U0-04	Output voltage (V)	1V
U0-05	Output torque (%) Percentage output value of motor rated torque	0.1%
U0-06	Output power (kW)	0.1kW
U0-07	X input state	1
U0-08	Y output state	1
U0-10	AI voltage (V)/current (mA)	0.01V/0.01mA
U0-14	PID setting	1
U0-15	PID feedback	1
U0-16	Load speed display	1
U0-17	Feedback speed (Hz)	0.01Hz

Group U0: monitor parameters		
Parameter	Name	Min unit
U0-18	Actual feedback speed (Hz)	0.01Hz
U0-19	Line speed	1m/Min
U0-20	PLC stage	1
U0-23	Main frequency A display	0.01Hz
U0-24	Auxiliary frequency B display	0.01Hz
U0-25	Communication setting	0.01%
U0-27	AI voltage before calibration (V)/current (mA)	0.001V/0.01mA
U0-29	Remaining running time	0.1Min
U0-30	Present power on time	1Min
U0-31	Present operation time	0.1Min
U0-32	VFD state	1
U0-33	Present fault	1
U0-34	Fault information	1
U0-35	Target torque (%)	0.1%
U0-36	Torque upper limit	0.01%
U0-40	Motor temperature	1°C
U0-41	Power factor angle	0.1°
U0-42	Setting frequency (%)	0.01%
U0-43	Operation frequency (%)	0.01%
U0-44	VF separate target voltage	1V
U0-45	VF separate output voltage	1V
U0-46	Z signal counter	1
U0-47	Motor serial number	0: motor 1 1: motor 2
U0-48	Check any memory address value	1
U0-65	Sending value of point-to-point communication	0.01%
U0-66	Slave machine number	1
U0-67	Communication expansion card model	
U0-68	Communication expansion card version	Display range
U0-69	Communication expansion card VFD state	Bit0: in

Group U0: monitor parameters		
Parameter	Name	Min unit
		operation Bit1: operation direction Bit2: fault
U0-70	Speed of transmission DP card /0.01Hz	0.00 ~ max frequency
U0-71	Speed of transmission DP card /RPM	0-65535
U0-72	Special current display for communication card	Display range
U0-73	Communication card error status	Display range
U0-74	Motor actual output torque	-300% ~ 300%

5. EMC

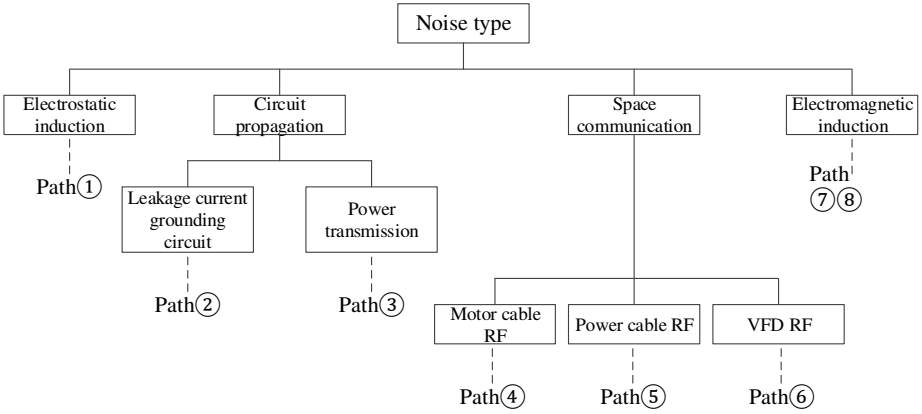
5-1. EMC compliant installation guidelines

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

Noise propagation path	Solution
	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

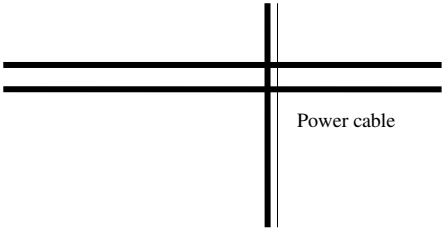
1. The cable (U, V, W terminal outgoing line) from the frequency converter to the motor should avoid parallel wiring with the power line (R, S, T or L, N terminal input line) as far as possible. Keep a distance of more than 30cm.

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.



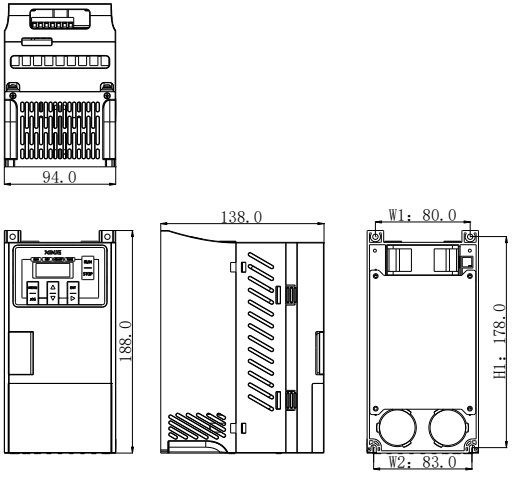
6. Weak current grounding wires such as control signals and sensors must be grounded independently from strong current grounding wires.

7. It is forbidden to connect other devices on the power input terminal (R, S, T or L, N) of frequency converter.

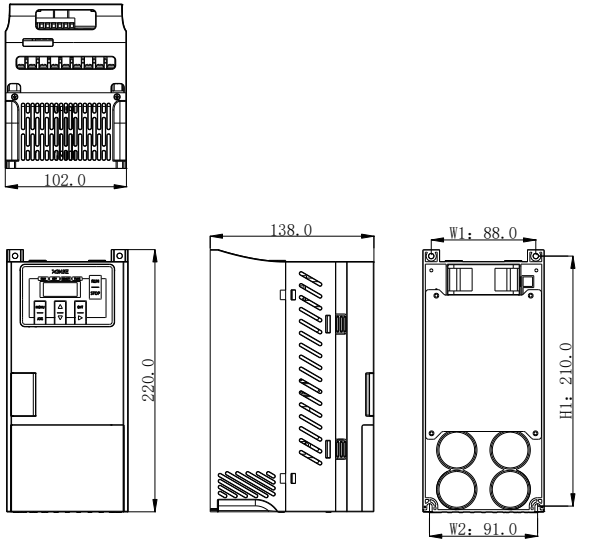
6. Model and dimension

6-1. VH5 series VFD dimension

- VH5-20P7-B/VH5-21P5-B/ VH5-22P2-B
  VH5-40P7-B/VH5-41P5-B/VH5-42P2-B/VH5-43P7-B Unit: mm



- VH5-45P5-B Unit: mm



Note: the installation screw is M4.

6-2. Accessories selection guide

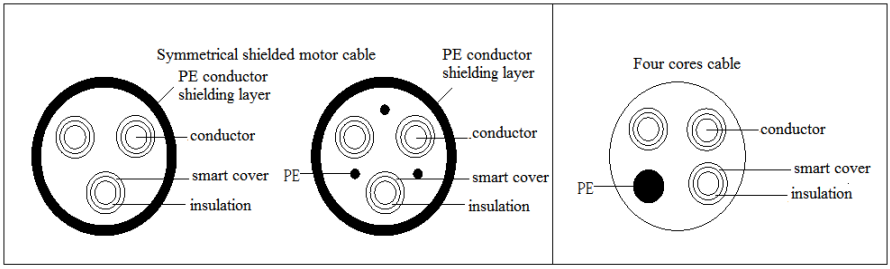
6-2-1. Accessories functions

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.

6-2-2. Cable selection

Power cable

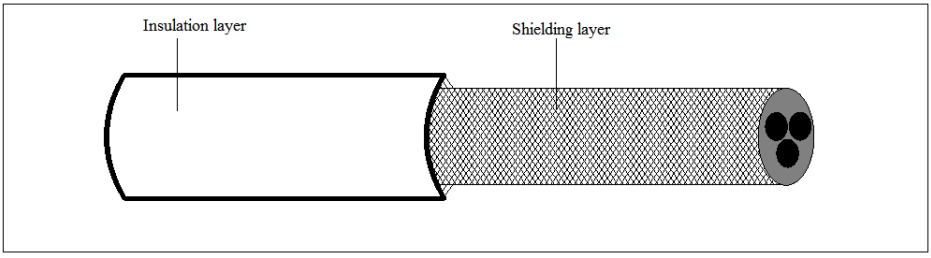
- The size of input power cable and motor cable shall comply with local regulations;
- The input power cable and motor cable must be able to withstand the corresponding load current;
- The maximum rated temperature margin of motor cable under continuous working condition should not be lower than 70℃;
- 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.



Note: 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.

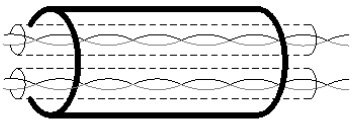
In order to effectively suppress the emission and conduction of radio frequency interference, the conductivity of the shielding wire must be at least 1/10 of that of the phase conductor. For copper or aluminum shielding, this requirement is very easy to meet. The minimum requirements of inverter motor 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.



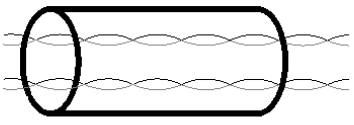
Control cable

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.



Multi twisted pair double shielded cable



Multi twisted pair single shielded cable

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.

Note:

(1) Analog and digital signals are routed separately using different cables.

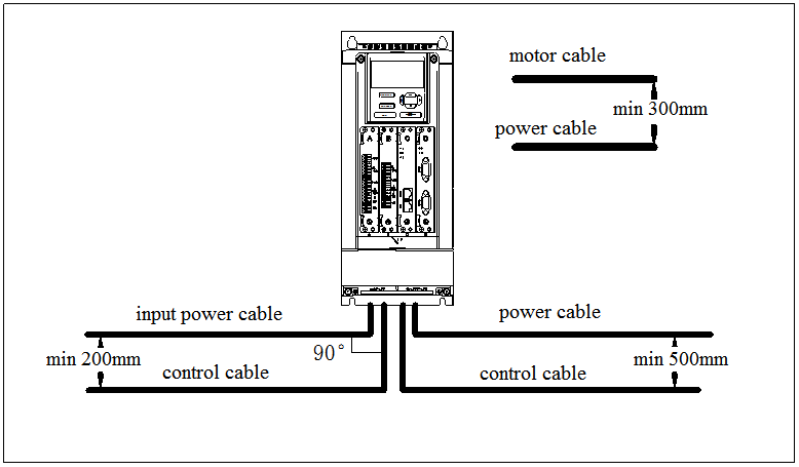
(2) Before connecting the input power cable of the inverter, check the insulation of the input power cable according to the local regulations.

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.



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.

6-2-3. 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)
VH5-20P7-B	16	12	2.5

VH5-21P5-B	25	18	4.0
VH5-22P2-B	32	25	4.0
VH5-40P7-B	6	9	6.0
VH5-41P5-B	10	9	10
VH5-42P2-B	10	9	10
VH5-43P7-B	16	12	16
VH5-45P5-B	20	18	20

Note: 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.

6-2-4. Reactor selection guide

- In order to prevent the instantaneous large current from flowing into the input power circuit and damaging the rectifier components when the power grid is under high voltage input, AC reactor should be connected to the input side, which can also improve the power factor of the input side.
- When the distance between the inverter and the motor is more than 50 meters, the leakage current is large due to the parasitic capacitance effect of the long cable to the ground, and the inverter is prone to over-current protection. At the same time, in order to avoid the insulation damage of the motor, the output reactor must be added for compensation. When a frequency converter is equipped with multiple motors, the sum of the cable length of each motor is considered as the total length of the motor cable. When the total length is greater than 50m, the output reactor must be added at the output side of the frequency converter.

VFD model	Input reactor	Output reactor
VH5-40P7-B	ACLSG-5A/4.4V	OCLSG-5A/2.2V
VH5-41P5-B	ACLSG-6A/4.4V	OCLSG-6A/2.2V
VH5-42P2-B	ACLSG-6A/4.4V	OCLSG-6/2.2V
VH5-43P7-B	ACLSG-10A/4.4V	OCLSG-10A/22V
VH5-45P5-B	ACLSG-15A/4.4V	OCLSG-15A/2.2V

Note: the above options are of Zhengtai brand; users can purchase them according to the model.

6-2-5. 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. 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.

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 VH6 series inverter is 700V, which can be adjusted through P7-59),

Pb ---Braking power.

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

Note: 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.

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%

Brake resistor models

VFD model	Recommended brake resistor specifications			
	Specification	Brake resistor (Ω)	Brake resistor power (W)	Brake resistor quantity
VH5-40P7-B	Built-in	≥300	≥150	1
VH5-41P5-B	Built-in	≥220	≥150	1
VH5-42P2-B	Built-in	≥200	≥250	1
VH5-43P7-B	Built-in	≥130	≥300	1
VH5-45P5-B	Built-in	≥90	≥500	1
VH5-20P7-B	Built-in	≥150	≥200	1
VH5-21P5-B	Built-in	≥100	≥320	1
VH5-22P2-B	Built-in	≥60	≥530	1

Note:

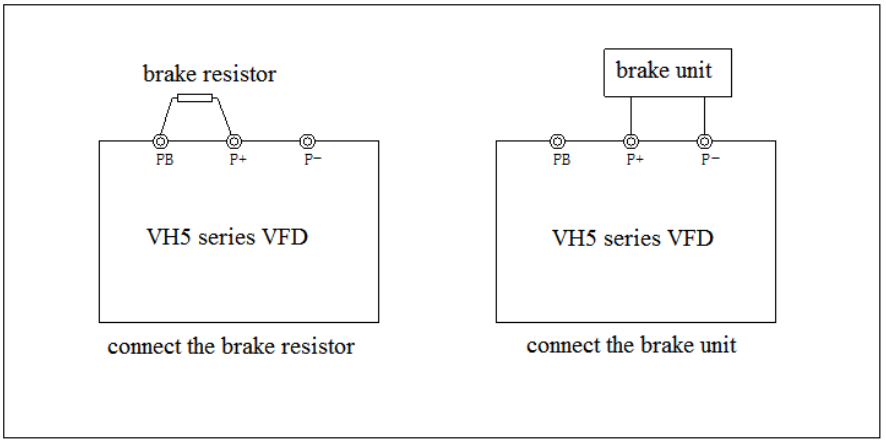
(1) The values in the table are guidance data. Users can choose different resistance values and power according to the actual situation (but the resistance value must not be less than the recommended value in the table, and the power can be larger). The selection of braking resistance needs to be determined 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.

(2) The brake resistance cable shall be shielded cable.

(3) All resistors must be installed in a well ventilated place.

(4) 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.

(5) 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.

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	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

Code	Name	Reason	Solution
		8. The selection of frequency converter is too small	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
Err05	Deceleration overvoltage	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	1. Adjust the voltage to the normal range

Code	Name	Reason	Solution
		external force to drive the motor	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	1. Remove peripheral faults 2. Check whether the three-phase winding of the motor is normal and remove the fault

Code	Name	Reason	Solution
		3. Abnormal drive board 4. Module is abnormal	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
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	Re-determine the motor parameters, focusing on whether the motor rated

Code	Name	Reason	Solution
		large	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
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

Code	Name	Reason	Solution
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.

7-2. Fault record query

This series of frequency converter records the fault codes and operation parameters of the frequency converter 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:

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

(2) Set any terminal of X1-X4 to reset stop input for external fault, and then disconnect from com terminal after closing.

(3) Cut off the power supply.

Note:

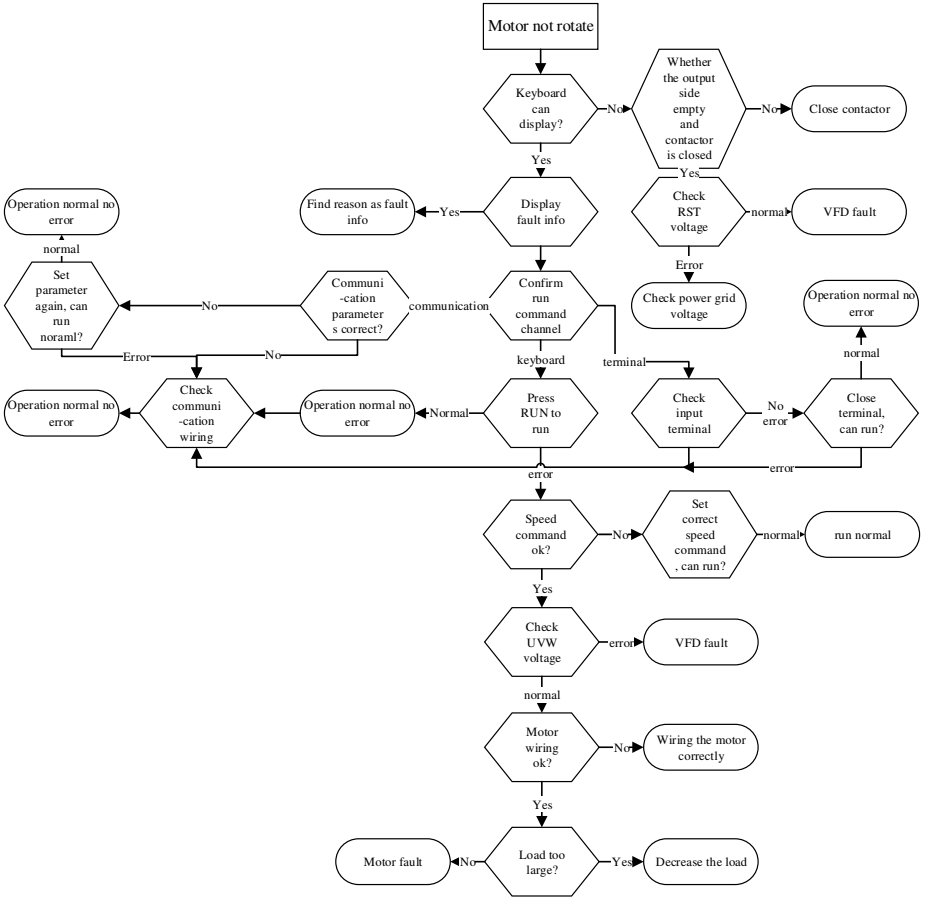
(1) Before reset, the reason of the fault must be thoroughly identified and eliminated, otherwise, the permanent damage of the frequency converter may be caused.

(2) If the fault cannot be reset, check the reason, and the continuous reset will damage the inverter.

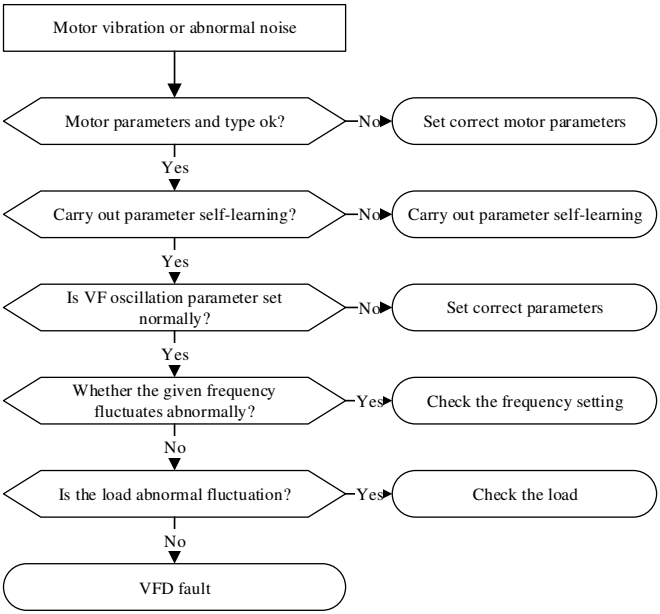
(3) When overload and overheating protection acts, it shall be reset 5 minutes later.

7-4. VFD common fault analysis

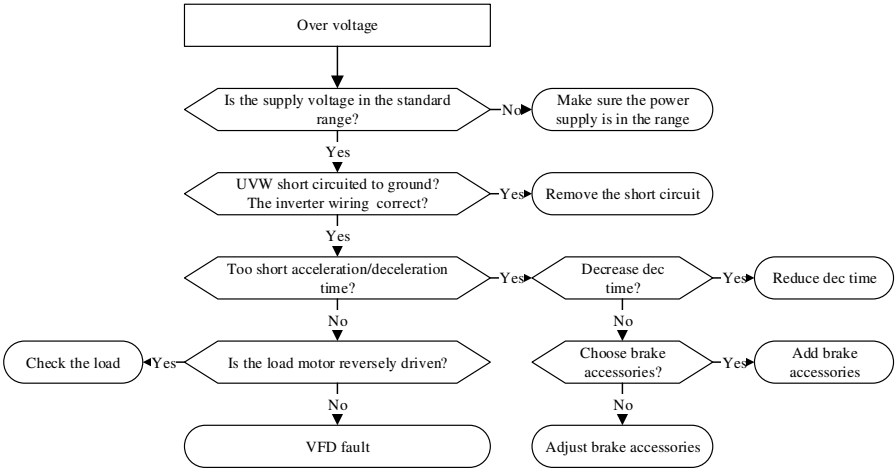
7-4-1. Motor not rotate



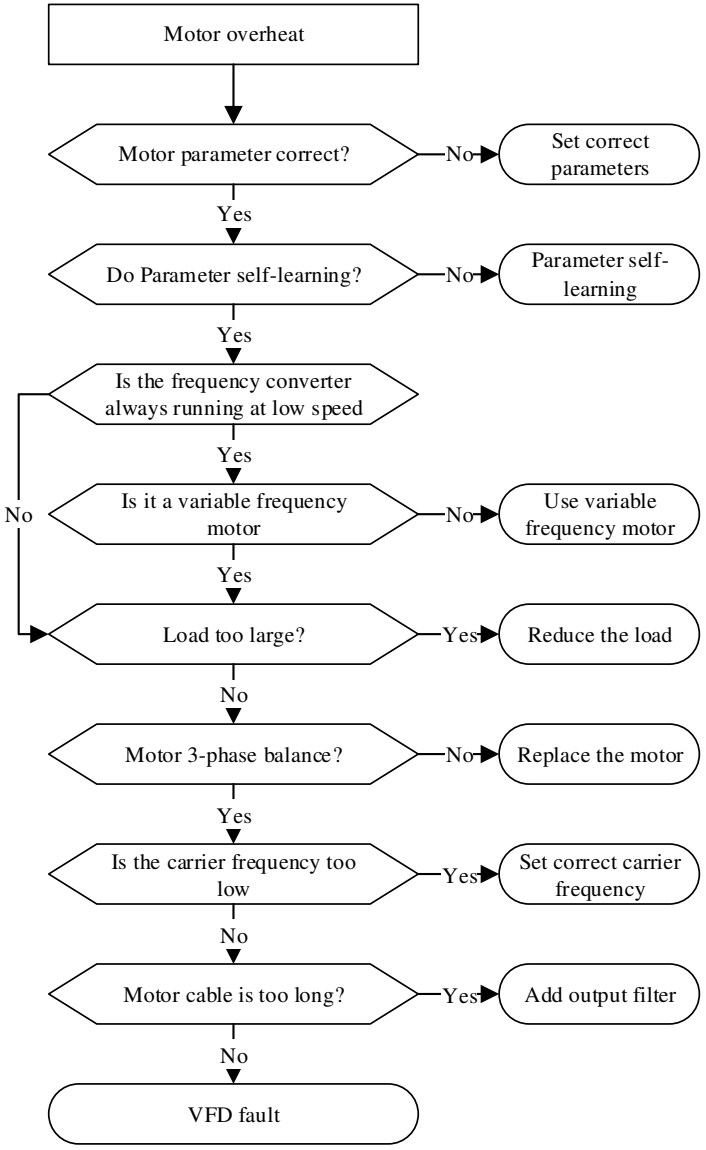
7-4-2. Motor vibration



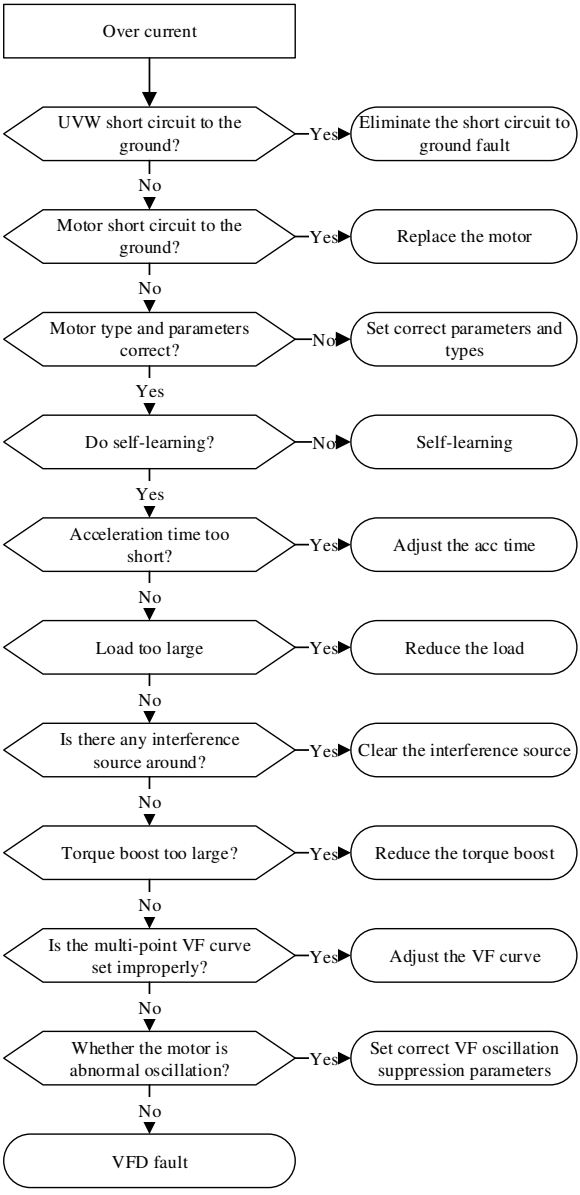
7-4-3. Over voltage



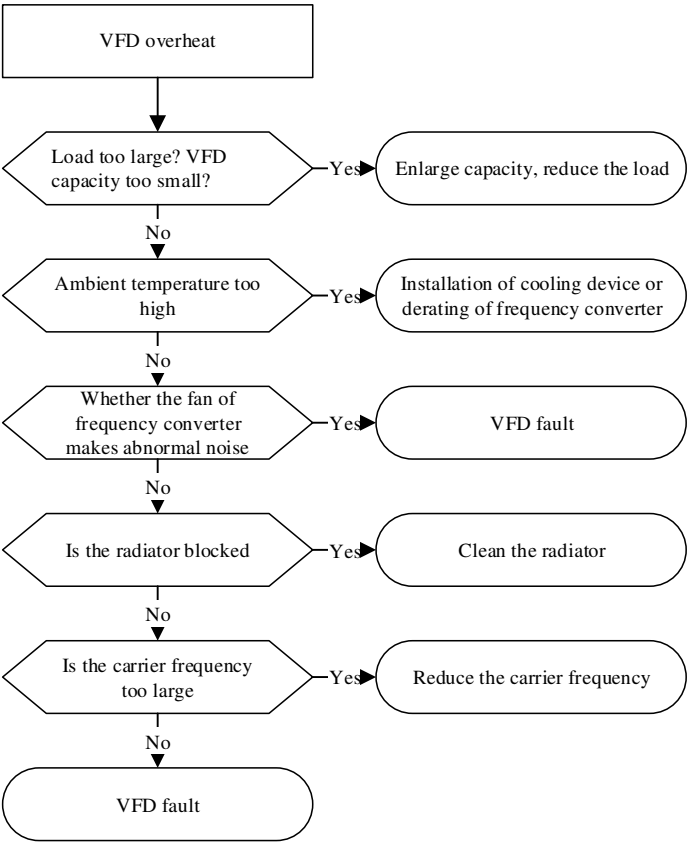
7-4-4. Motor overheat



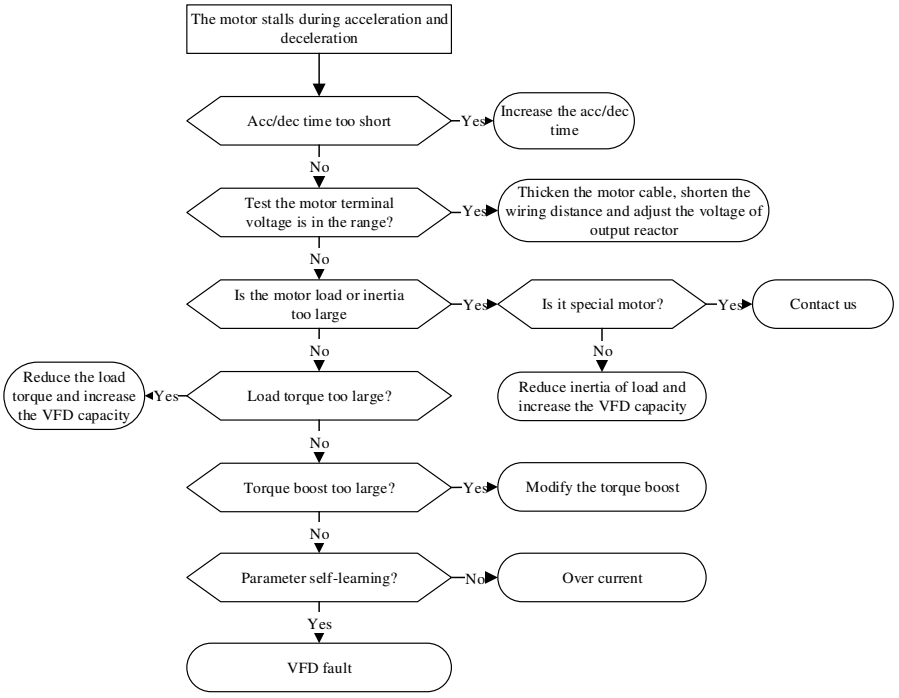
7-4-5. Motor current



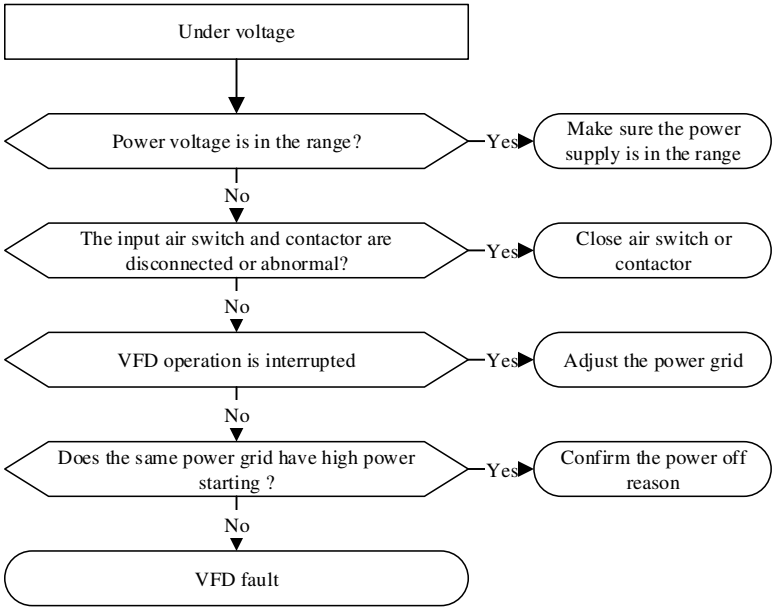
7-4-6. VFD overheat



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



7-4-8. Under voltage



8. 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. 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

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

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. Extension card

VH5 series frequency converter can support fieldbus expansion cards. This chapter describes the installation and use of each expansion card.

VFD model	Extension card	Function	Using model
VH5-CC100	EtherCAT card	Support EtherCAT protocol	VH5 series models
VH5-CN100	CANopen card	Support CANopen protocol	VH5 series models

Appendix A-1. Extension card functions

Appendix A-1-1. VH5-CC100 EtherCAT card

(1) Overview

EtherCAT is an open architecture fieldbus system based on Ethernet. It sets a new standard for the real-time performance and topology flexibility of the system. At the same time, it also meets or even reduces the use cost of fieldbus. VH5-CC100 is an extended card specially designed for EtherCAT protocol by Xinje company, which is specially suitable for Xinje frequency converter, Through this card, the Xinje frequency converter can be connected to the international standard EtherCAT network and exist as a slave station.

(2) Pin definition

VH5-CC100 card has two Ethernet port, the pin definition is shown as the following:

Terminal no.	Name	Function
1	TX A+	Data send +
2	TX A-	Data send -
3	RX A+	Data receive +
4	Vacant	
5	Vacant	
6	RX A-	Data receive -
7	Vacant	
8	Vacant	

Appendix A-1-2. VH5-CN100 Canopen card

(1) Overview

CANopen complies with CANopen application layer protocol of CAN Fieldbus international standard. VH5-CN100 is an extended card specially designed for CANopen protocol by Xinje company, which is specially suitable for Xinje frequency converter. Through this card, Xinje frequency converter can be

connected to CANopen network and exist as a slave station.

(2) Pin definition

VH5-CN100 card has two Ethernet port, the pin definition is shown as the following:

Terminal no.	Name	Function
1	CAN_H	Connect to CAN+
2	CAN_L	Connect to CAN-
3	CGND	Connect to CAN ground
4~10	Vacant	Vacant

Appendix B. Communication protocol

Appendix B-1. Communication protocol overview

VH5 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 B-2. Communication protocol explanation

Appendix B-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 B-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 B-3. Modbus-RTU protocol

Appendix B-3-1. Character structure

(1－8－2, no parity)

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

(1－8－1, odd parity)

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

(1－8－1, even parity)

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

(1－8－1, no parity)

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

Appendix B-3-2. Communication data structure

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

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).

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) 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 wil be received.

Appendix B-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 function parameter, communication address is 0x0010, 00 represents the function parameter of group P0, and 10 represents the hexadecimal data format of function code 16 in function group.

A0-15 function parameter, communication address is 0xA00F, A0 represents A0 group function parameter, 0F represents hexadecimal data format of function code in function group serial number 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 write EPPROM, its communication address is 0x0010;

When the EPPROM needs to be written, its communication address is 0x3010;

For group A function code data, 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 EPPROM is not needed, its communication address is 0xA00F;

When the EPPROM needs to be written, its communication address is 0x400F.

(2) Non function code

Definition	Modbus address	Function	Note
Communication setting	1000H	Communication frequency	Write
Control command	1100H	1: Forward running	Write

Definition	Modbus address	Function	Note
		2: Reverse operation 3: Forward jog 4: Reverse jog 5: Deceleration stop 6: Free stop 7: Fault reset	
Digital output terminal control	1101H	bit0: Y1 output control bit1: Y2 output control bit2: reserved bit3: RELAY1 output control bit4: RELAY2 output control	Write
Analog output AO	1103H	0~7FFF represents 0%~100%	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	Read

Definition	Modbus address	Function	Note
		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 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 (P0-02=2),

$$Frequency(\mathrm{Hz}) = \frac{Data \times \mathrm{P0-13}}{10000},$$

Data can be register or value, user can calculate the Data value according to the above formula when the frequency is set by communication.

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

XINJE

XINJE Wechat

WUXI XINJE ELECTRIC CO., LTD.
No.816, Jianzhu West Road, Binhu District,
Wuxi City, Jiangsu Province, China
214072
Tel: 400-885-0136
Fax: 86-510-85111290
www.xinje.com