VFD-M Series Mini Type Sensor-less Vector Frequency Inverter

Operation Manual

Material Version：V1.1

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Company Standard**:** Q/0300SSC 001-2012

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Content

Chapter 1 Safety and Notes

1.1 Safety Definition

In this manual, safety precautions divide the following two categories:

⚠Danger

Operations without following instructions can cause personal injury or death.

⚠Attention

Operations without following instructions can cause personal injury or damage to product or other equipment.

1.2 Safety Notes

	⚠ Danger	⚠ Attention
Before Installations	1. Please don't operate the damaged and incomplete drive, otherwise there is a danger of human injury 2. Please use the insulation motor which class is above B, otherwise, there is electric shock danger.	NO
Installing	1. Please install the drive on fire-retardant material, reserve the drive away from combustible materials, otherwise, it would cause fire alarm!	2.If more than two drives are parked in the same cabinet, in order to the cooling effect of Drive, please note that installation position and refer to chapter 3 which is mechanical and electrical installation. 3. Don't allow Conductors and screws to fall inside the drive, otherwise there is a danger of damage.

	⚠Danger	⚠ Attention
Wiring	1. Only the electrical engineering personnel shall wire the drive, otherwise, there is electric shock danger. 2. Between the drive and power must have circuit a breaker, otherwise, it would cause fire alarm! 3. Never wire the drive unless the input AC supply is totally disconnected, otherwise, there is electric shock danger. 4. The drive must be properly earthed to reduce electrical Accident.	5. Don's connect the input power supply to output terminals U, V and W, otherwise, it would cause the damage of frequency inverter. 6. Wiring must Accord with EMC requirements and the region safety standards. Please refer to the manual that advised about using wire line diameter. Otherwise Accidents may occur. 7. Braking resistance cannot be directly connected into DC between bus (+) and bus (-) terminals. Otherwise there is a danger of fire.
Before power on	1. Reserve supply voltage and rated voltage of the drive in the same level, make sure the input and output wiring correct and check buffer circuit. Otherwise, the drive may be damaged. 2. Before power on, please make sure that the cover is installed. Otherwise, can lead to electric shock.	3. The products already have done a penetrative test, if redone, it may cause Accident. 4. Please refer this manual provided circuit to correct connection peripheral Accessories, to reduce electrical Accident.

	⚠Danger	⚠ Attention
After power on	1. After power on, please don’t open the cover of the drive, in order to avoid electric shock. 2. Don’t touch the drive and peripheral circuit with wet hands. 3. Don't touch the drive’s terminals including the control terminals with bare hands. 4. Initial power on, the drive is checking the safety of its external circuit with strong electric, so please don't touch the drive’s terminals U、V、W and the motor’s terminals.	5. When the motor is running, please carefully identify parameters. Otherwise Accidents may occur. 6. Please don't randomly change the factory parameters of the drive, otherwise, will damage the drive.

	⚠Danger	⚠ Attention
Operating	1. Please Reserve far away from it, if restart the drive. Otherwise there is human injury. 2. Don't touch the cooling fans and discharge resistance with bare hands to test temperature. Otherwise, has burn dangerous. 3. Amateur technicians do not detect the signal during operating. or it may cause a personal injury or damaged.	4. Don't allow matters to fall inside the running drive, otherwise it may be damaged; 5. Please don't use contactor to control drive start-stop, in order to reduce the damage.
Maintaining	1. Please don't charge for equipment repair and maintenance. Otherwise, have shocking danger; 2. Perform the maintenance and repair job after confirming that the DC Bus voltage is below 36V, in order to avoid electric shock. 3. Unprofessional trained personnel do not charge the repair and maintenance job. Otherwise caused human injury or damaged.	NO

1.3 Notes

A. Insulation checking of motors

Before using the drive, the insulation of the motors must be checked, especially, if it is used for the first time, if it has been stored for a long time or regularly check. This is to reduce the risk of the drive from being damaged by the poor insulation of the motor. When checking ,must make sure the motors and the drive is separated, Please use 500V insulation tester to measure the insulating resistance. It should not be less than 5MΩ.

B. Motor thermal protection

If the ratings of the driven motor are not in compliance with the drive, especially, the drive rated power more than motor rated power, be sure to adjust the protective threshold or to install thermal relay before the motor to ensure the motor is properly protected.

C. Operate above power frequency

This drive can provide 0Hz~600Hz output frequency. If the user need to run the motor above rated frequency, please consider the affordability of mechanical devices.

D. The mechanical device resonance

The drive system may encounter mechanical resonance with the load when operating within certain band of output frequency. Skip frequencies have been set to avoid it.

E. Motor heat and noise

The output voltage is in PWM wave with some harmonics. Therefore, temperature rise, noise and vibration of motor are higher than 50Hz.

F. Varistor in the output side and capacitors used to improve the power factor

Don't connect any varistor or capacitor to the output terminals of the drive,

because the drive's output voltage waveform is PWM, otherwise tripping or damaging of components may occur; in addition, don't install circuit breaker or contactor at the output side of the drive.

G. Circuit breakers connected to the input/output of the drive

If contactor is connected between the input power supply and the motor, Please don't use contactor to control drive start-stop. If it must be done, interval time should not less than one-hour. If frequently charging and discharging, the life of the internal capacitance of the drive will be reduced. If circuit breaker or contactor needs to be connected between output side of the drive and the motor, be sure to operate these circuit breakers or contactor when the drive has no output, to avoid damaging of the drive.

H. Using outside the range of rated voltage

The drive is unsuitable to be used out of the specified range of operation voltage; otherwise, it may be damaged. If need, please use suitable voltage regulation device.

I. Change from 3-phase to 2-phase

It is not recommended to change the drive from 3-phase input to 2-phase input. Otherwise it will lead to failure or damaged.

J. Protection against lightning strike

There are transient surge suppressors inside the Drive which protects it against lighting strike. Department for frequent thunder and lightning, users should install the drive front-end protection.

K. Derating due to altitude

Derating must be considered when the drive is installed at high altitude, greater than 1000m. Because of the thin air, the cooling effect of drive is deteriorated. Please contact our technical advice in this case.

L. Special usage

If users need the wiring diagram, such as common DC bus, without in the

manual, Please consult our company.

M. Disposing unwanted drive

The capacitors may explode when they are burnt. Poisonous gas may be generated when the plastic parts like front covers are burnt. Disposing method: Please dispose the Drive as industrial waste.

Adaptive motor

1) If the motor isn't the four-pole squirrel-cage asynchronous induction motor. Please select the drive According to the rated current of the motor. If you choose the permanent magnet synchronous motor, please consult our company.

2) Because the cooling fan of non-inverter motor is coaxial connection with its rotor shaft connection, if the speed of the motor is reduced, the cooling effect of the fan is deteriorating, if the motor may become overheating in the situation, please change to inverter motor or install another fan.

3) The drive has built-in adaptive motor standard parameters, According to the actual situation, identify parameters or modify default of the motor to meet the actual value as far as possible; otherwise, it will affect the operating results and the protection of property.

4) Because the cable or the inside motor short circuit can cause the drive alarm, and even explosion. Therefore, the initial installing motor and cable must be done insulating short-circuit test. Note, when doing the test, make sure the drive and the tested part be completely disconnected.

5) If the wire of the motor is over 50 meters, we advice to add output smoothing reactor. Otherwise, the motor insulation is easily damaged.

Chapter 2 Specifications and Selection

2.1 Naming Rule

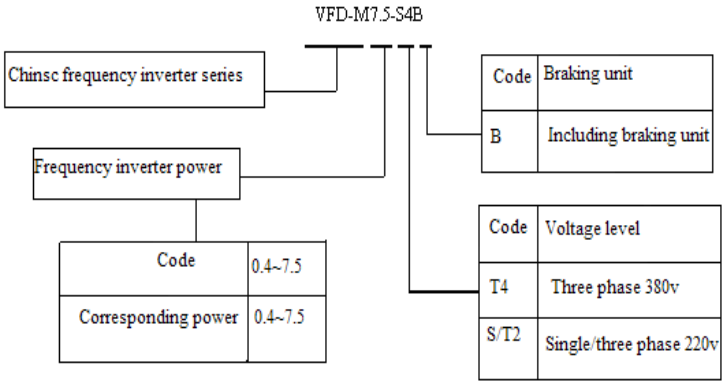


Figure 2-1 Naming rule

Figure 2-2 Nameplate

2.3 Model and Technical Parameters

Table2-1 VFD-M frequency inverter model and technical parameters

MODEL	Input voltage	Output current (A)	Adopter motor KW
VFD-M0.4-S2B	Single or three phase 220V ±15%	2.5	0.4
VFD-M0.75-S2B		5	0.75
VFD-M1.5-S2B		7	1.5
VFD-M2.2-S2B		9.6	2.2
VFD-M3.7-S2B		17	3.7
VFD-M0.4-S4B	Three phase 380V±15%	1.2	0.4
VFD-M0.75-S4B		2.5	0.75
VFD-M1.5-S4B		3.7	1.5
VFD-M2.2-S4B		5	2.2
VFD-M3.7-S4B		8.8	3.7
VFD-M5.5-S4B		12.8	5.5
VFD-M7.5-S4B		17	7.5

2.4 Technical Specification

Table2-2 VFD-M Frequency Inverter Technical Specifications

Item		Specification
Input	Rated voltage Frequency	S4 series: Three phase 380v, ±15% S2 series: Three/single phase 220V, ±15%
		50/60Hz ±5%
Output	Voltage Frequency	S4 series: Three phase 0-380V S2 series: Three phase 0~220v
		0-400Hz
	Overload ability	150% rated current for 30s; 180% rated current for 1s;
Heat Dissipation	Cooling type	Forced Cooling
	Temperature protection	Heatsink temperature >85℃ trip protection against overheat
	Fan control	Heatsink temperature> 50℃, fan forced operation, frequency inverter continue work

Control Performance	Control mode	Open-loop vector control, V/F control
	Start torque	Open-loop vector control: 0.5Hz 180%; VF control: 0.5Hz 150%
	Speed range	Open-loop vector control:1:150; VF control: 1:100
	Speed control precision	Open-loop vector control: ±0.2%; VF control: ±0.5%
Function	Channel of operation command	Keyboard control , terminal control ,communication control
	Start mode	Direct start, DC injection braking before start, speed tracking before start
	DC injection braking	Start DC injection braking, stop DC injection braking
	Dynamic braking	Built-in braking unit
	Frequency source choice	Keyboard digital frequency setting, analog AVI setting, analog ACI setting, Keyboard

		potentiometers setting, Multiple speed operation setting, PID control setting, telecommunications setting, PLC program operation setting, UP/DW terminal increasing/Decreasing setting
	Main and auxiliary frequency combination set	Select the main frequency setting or auxiliary frequency setting through terminal change
	Frequency resolution	Keypad setting:0.01Hz; Analog setting: 0.1%
	Carrier frequency	1Khz~12Khz,
	Acc/Dec time	0.1~6000.0s or 0.01 ~ 600.00s
	Built-in PID	Built-in PID controller, apply to process control occasion such as water or gas supply. Meanwhile with the sleep wake up function. Frequency inverter could save energy to the great extent possible.
	Common	Speed tracking, Cut-off restart,

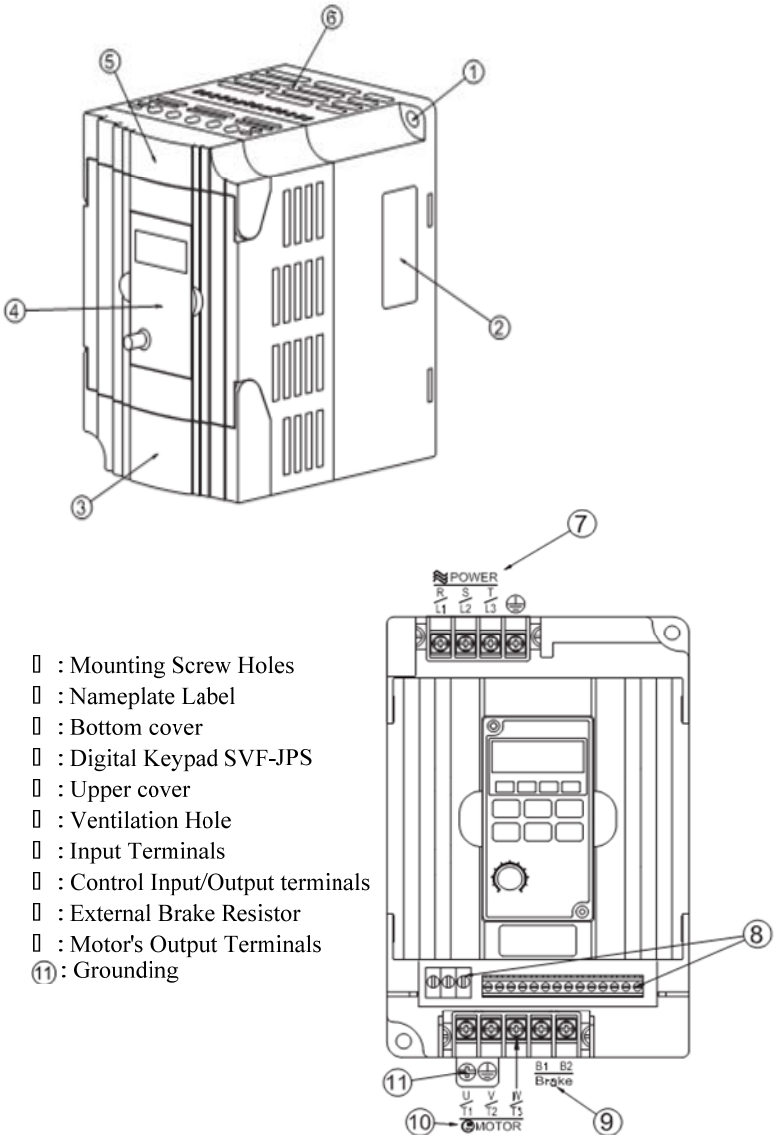
	function	fault recovery, Automatic torque promotion, Pendulum frequency operation, hopping frequency, UP/DOWN control, AVR, Overvoltage stalling protection, Rapid current-limiting, Instant power down and drop frequency operation
Input Output Signal	Analog input	AVI:0~10V ACI:4~20mA Keyboard potentiometer input: 0~10V
	Analog output	AFM:0~10V or 0~20mA, Select through JP1 jumper
	Digital input	A total of 28 kinds of function could be selected from S0 ~S5.
	Digital output	1 channel open collector output(MO1-MCM) 1 channel relay output(TA-TC normally open, TB-TC normally closed;
Communication Port	Communication protocol	Based on RS485 hardware, support standard MODBUS

		protocol.
Display Functions	Four digital tube display	Can monitor the operation state of frequency inverter flexibly and conveniently.
Protection Function	Various protection functions	Including overvoltage, over-current, overheat, overload, under-voltage, short circuit, ground fault, input and output default phase, protect the frequency inverter running reliably all-round.
Installation Environment	Ambient temperature	-10 ℃ ~+40 ℃ (ambient temperature is within 40 ℃ ~50 ℃ , derating use is required), not allow to contact direct sunlight.
	Humidity	Less than 90%RH, without Condensation
	Application environment	Non-corrosive, flammable, explosive, dust absorbent material, all kinds of lint does not Accumulate.

Requirement	Vibration	Less than0.6G
	Elevation	0~1000m, reduce the rated specification 10% when lift 1000m for each.
	Storage temperature	-20～60℃
Structure	Defend degree	IP20

2.5 Product Outline and Installation Hole Sizes

2.5.1 Product outline



: Mounting Screw Holes
: Nameplate Label
: Bottom cover
: Digital Keypad SVF-JPS
: Upper cover
: Ventilation Hole
: Input Terminals
: Control Input/Output terminals
: External Brake Resistor
: Motor's Output Terminals
⑪: Grounding

Figure 2- 3Product appearance

2.5.2 Remove settlement

1) Take out the keyboard

Firstly, we should loosen and take out the screws on the keyboard with screwdriver, and press the two side of the keyboard gently and pull up. Refer to Figure 2-4

2) Open the cover of the input terminal side (R.S.T side)

Press the cover gently and we could open the input side terminal

3) Open the cover of the output terminal side (U.V.W side)

Press the cover gently and we could open the output side terminal

2.5.3 Installation space

We need to promise the frequency inverter have the following space, Refer to 2-5, 2-6, 2-7

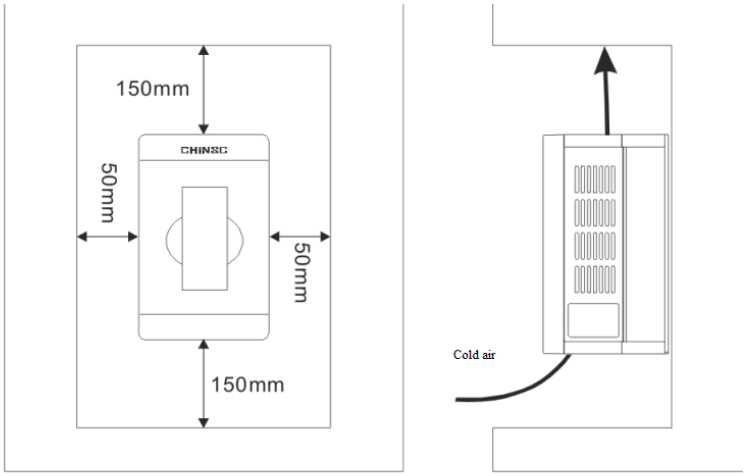


Figure 2-5 Installation space

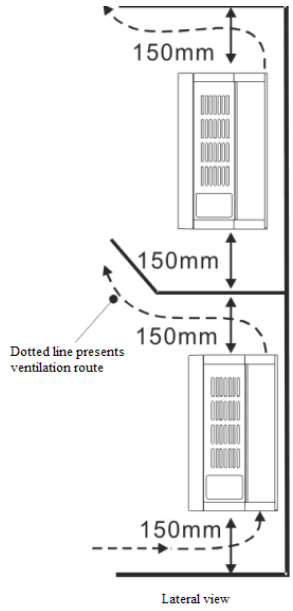


Figure 2-6 Partition set figure

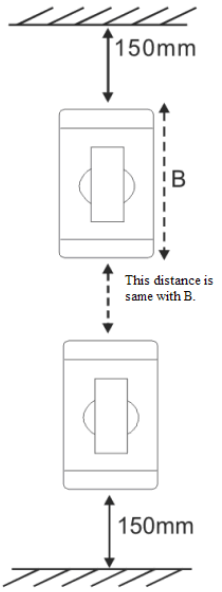


Figure2-7 Without a partition set figure

Notice:

- Mount the AC motor drive vertically on a flat vertical surface object by screws. Other directions are not allowed.
- The AC motor drive will generate heat during operation. Allow sufficient space around the unit for heat dissipation.
- The heat sink temperature may rise to 90°C when running. The material on which the AC motor drive is mounted must be noncombustible and be able to withstand this high temperature.
- When AC motor drive is installed in a confined space (e.g. cabinet), the surrounding temperature must be within 10 ~ 40°C with good ventilation. DO NOT install the AC motor drive in a space with bad ventilation.

- Prevent fiber particles, scraps of paper, saw dust, metal particles, etc. from adhering to the heatsink.
- When installing multiple AC more drives in the same cabinet, they should be adjacent in a row with enough space in-between. When installing one AC motor drive below another one, use a metal separation between the AC motor drives to prevent mutual heating.

2.5.4 Product size (mm)

Product outline 1 size refer to 2-8

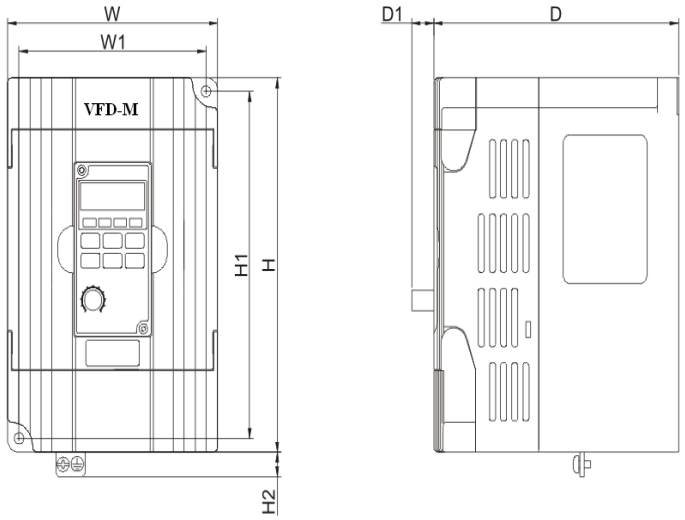


Figure2-8 product outline 1 size marking

Table 2-3 VFD-M Frequency inverter outline 1 size

Frequency inverter model	W	W1	H	H1	H2	D	D1	Installation hole size

VFD-M0.4-S2B	85	74	141.5	130.5	10	113.0	10	Φ5
VFD-M0.75-S2B								
VFD-M1.5-S2B								
VFD-M0.4-S4B	100	89	151	140	10	116.5	10.5	Φ5
VFD-M0.75-S4B								
VFD-M1.5-S4B								
VFD-M2.2-S4B								
VFD-M2.2-S2B								

VFD-M Frequency inverter outline 2 size

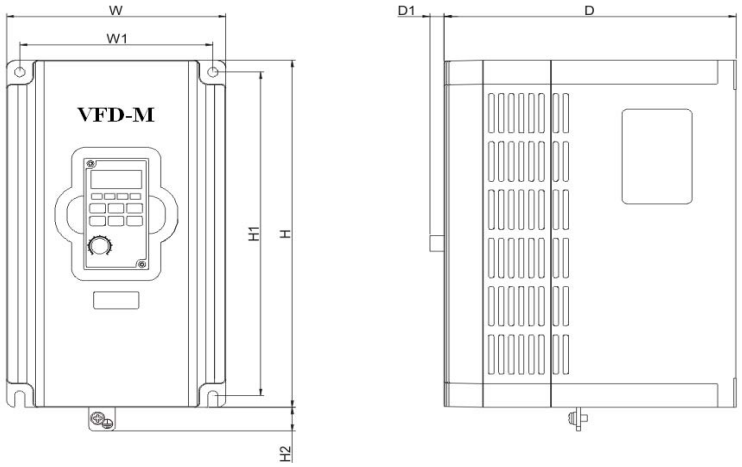


Figure 2-9 Frequency inverter outline 2 size marking

Table 2-4 VFD-M frequency inverter outline 1 size

Model	W	W1	H	H1	H2	D	D1	Installation hole size
VFD-M3.7-S2B	125	110	220	205	15	166.3	8.2	Φ6
VFD-M3.7-S4B								
VFD-M5.5-S4B								
VFD-M7.5-S4B								

2.6 Selection of Braking Package

☞Note: Table 2-5 is the guide data, According to the actual situation, the user clan chooses different resistance and power (the resistance must not be greater than the recommended value in the table, but the power could.). The motor's power in the practical application system, determine the braking resistor, which have relationship with system inertia, Deceleration time, potential energy of the load, the customer should select According to the actual situation. The greater the system inertia, the shorter the time required Deceleration, braking the more frequent, the braking resistor should have the greater power and the smaller resistance.

Table 2-5 Selection of SVF-MN VFD Braking Package

VFD Model	Recommended Braking Resistor TYPE	Braking Resistor Quantity	Braking Resistor Power (W)	The Minimum Equivalent Resistance
VFD-M0.4-S2B	SC-BR700-W100	1	100	≥300
VFD-M0.75-S2B				≥200
VFD-M1.5-S2B	SC-BR300-W300	1	300	≥100
VFD-M2.2-S2B	SC-BR100-W500	1	500	≥70
VFD-M3.7-S2B	SC-BR100-W500	1	500	≥40
VFD-M0.4-S4B	SC-BR700-W100	1	100	≥500
VFD-M0.75-S4B				
VFD-M1.5-S4B	SC-BR300-W300	1	300	≥200
VFD-M2.2-S4B				
VFD-M3.7-S4B	SC-BR100-W500	1	500	≥95
VFD-M5.5-S4B				≥75
VFD-M7.5-S4B	SC-BR70-W1000	1	1000	≥50

2.7 Frequency Inverter Daily Maintenance

2.7.1 Daily Maintenance

Many factors such as ambient temperature, humidity, dust, vibration will cause the internal components aging and give rise to the occurrence of potential faults or lessen the service life of the VFD. Therefore, it is necessary to conduct routine maintenance to the VFD.

⚠Attention
The high voltage still exist in the filter capacitor when the power is off, so maintenance to the VFD couldn't be performed immediately, it could be performed if the Busbar voltage (the voltage between terminals (+) and (-))measured by multi-meter after 5 minutes is below 36V.

Daily inspection items:

1) When running, whether the motor has abnormal sound.

2) When running, whether the motor generates vibration.

3) Whether the installation environment of the VFD changes.

4) Whether the cooling fan of the drive is working properly.

5) Whether the VFD is overheating

Daily cleaning:

1) Reserve the drive in a clean state.

2) Effectively remove the dust on the surface of the inverter to prevent dust entering the inside of the inverter, especially the metal dust.

3) Effectively clear the oil from the cooling fan.

2.7.2 Routine Checking

Check regularly the place which is difficult to check when the drive is running, routine checking items:

1) Check the air duct, and regularly clean.

2) Check whether the screws are loose.

3) Check whether the drive is corroded.

4) Check whether the terminals have arc traces.

5) Check whether the main circuit is insulation.

Notes: When using a DC 500V Mega-Ohm-Meter to test insulating resistance, please make sure the main circuit and the frequency inverter is disconnected. Please don't use the insulation resistance meter to test the insulation of the control circuit. High voltage test don’t need to be done (it has already been conducted before delivery).

2.7.3 Replacing of Quick-wearing Parts

The quick-wearing parts of the frequency inverter mainly include cooling fan and electrolytic capacitors for filters. Their lifetime

depends largely on their application environment and maintenance condition. Normally, lifetime is:

Components	Life
Fan	2~3 years
Electrolyte capacitor	4~5 years

The user can decide the replace age limit According to the running time.

1. Cooling fan

Possible cause of damages: wear of the bearing, aging of the fan vanes.

Criteria: Check if there is crack on fan vanes and other parts. When the inverter is switched on, check if there is any abnormal vibration.

2. Filtering Electrolytic capacitors

Possible cause of damages: the quality of input power is bad, the ambient temperature is high, frequent loading jump and aging of electrolyte.

Criteria: Check if there is any leakage of liquids; Check if the safety valve protrudes; Measurement of static capacitance and insulation resistance.

2.7.4 Storage

After buying the inverter, when store for temporarily and long-term, the following notes are important:

1) As far as possible store into the original packaging.

2) Long-term storage will cause the deterioration of electrolytic capacitors. Therefore, the inverter must be powered within 2 years, and the conduction time is at least for 5 hours. The input voltage must be boosted gradually to the rated value by the voltage regulator.

2.7.5 Warranty Instructions

Our company would offer the after sales if the following conditions occur to the frequency inverter:

1) Free warranty is only confined to the frequency inverter itself;

2) Under normal use condition, if there are any faults or damages, our company will take the responsibility of 12 months defects liability period for under the normal operation conditions (from the manufacturing delivery day on, and subject to the machine bar code). After 12 months, reasonable maintenance will be charged;

3). Even within 12 months, maintenance fee would be charged under the following conditions:

 Damages incurred to the inverter due to incorrect operation,

which are not in compliance with “User Manual”;

 Damages incurred to the inverter due to fire, flood, abnormal voltage and so on;

 Damages incurred to the inverter due to the improper use of inverter functions;

4. Related service fee will be calculated According to the unified standards of the manufacturer. If there are any maintenance contracts, the contract prevail.

2.8 Selection Guide

When selecting the frequency inverter, firstly, you must not only be clear on the technical requirements the system to the frequency inverter, the using situations, the specific load characteristics, but also take other factors such as adapter motor, output voltage and rated output current into consideration, then you can select the models which meet your requirements and make sure the mode of operation.

Basic principles: the motor rated load current must not exceed the rated current of the frequency inverter. Generally, choose According to the matched motor capacity stipulated by the instructions, please pay attention to compare the rated current of the motor and the frequency inverter. The overload capacity of the inverter is designed aimed at the short time overload in the process of starting and braking process. For constant torque load or the applications

where the load is a little heavy, if there is overload situation in the process of running, it will exceed the output ability of the frequency inverter, so please consider to amplifying a grade.

Chapter 3 Keyboard Operation and Electrical Wiring

⚠ Warning

To guarantee safe and reliable run and operation of the machine, proper installation and operation should be performed under the guidance of professional qualified personnel. High voltage working instructions and standards should be paid attention to.

3.1 Description of Operation Keyboard

The display function of VFD-M Series is the operation keyboard.

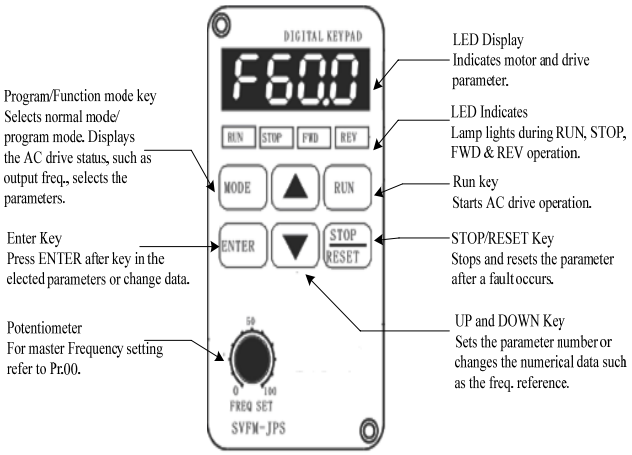


Figure 3-1 Description of operation keyboard

3.1.1 Description of function display

1. Normal display

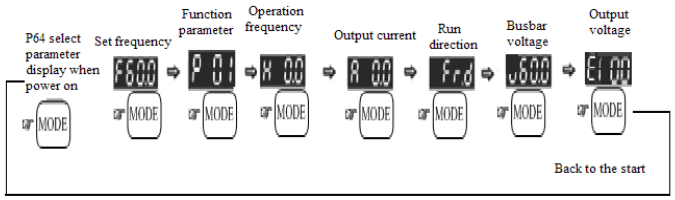
Displayed Message	Descriptions
	Show current setting frequency
	Show the frequency actually outputted to motor from inverter.
	Show the output current of U, V, W output terminals of inverter.
	Show parameter items
	Show parameter content
	Show that the inverter is in the state of forward run.
	Show that the inverter is in the state of reverse run.
	If reading message from the display area to End takes about 1 second (show as the left figure), it shows that the info has been Accepted and stored into internal memory bank automatically.
	“Err” will show if the set info don’t be Accepted or the value exceeds.

2. Fault Display

	Flash shows busbar under voltage state.
	Flash shows busbar under voltage fault during run.

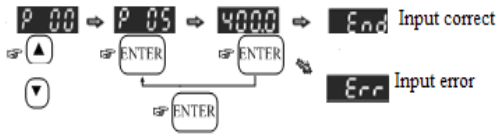
3.1.2 Keyboard Operation Process

1. Selection mode



2. Parameter setting

In menu selection mode, press ENTER to enter into parameter setting.

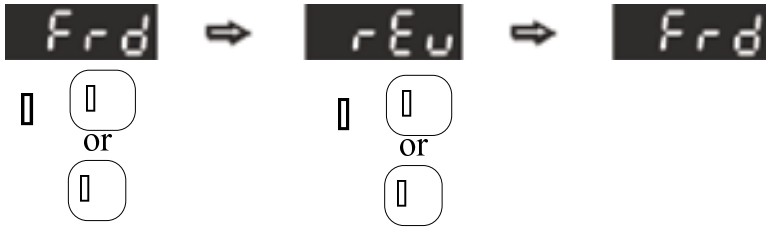


In parameter setting mode, you can press MODE to return to the selection mode.

3. Up and Down Modify of Keyboard Digital Frequency

4. Run Direction Setting

When the run order source comes from digital operation panel, the run direction could be modified through up and down keys.



3.1.3 Operation Keyboard Size and Installation

1. Schematic diagram of operation keyboard overall dimension

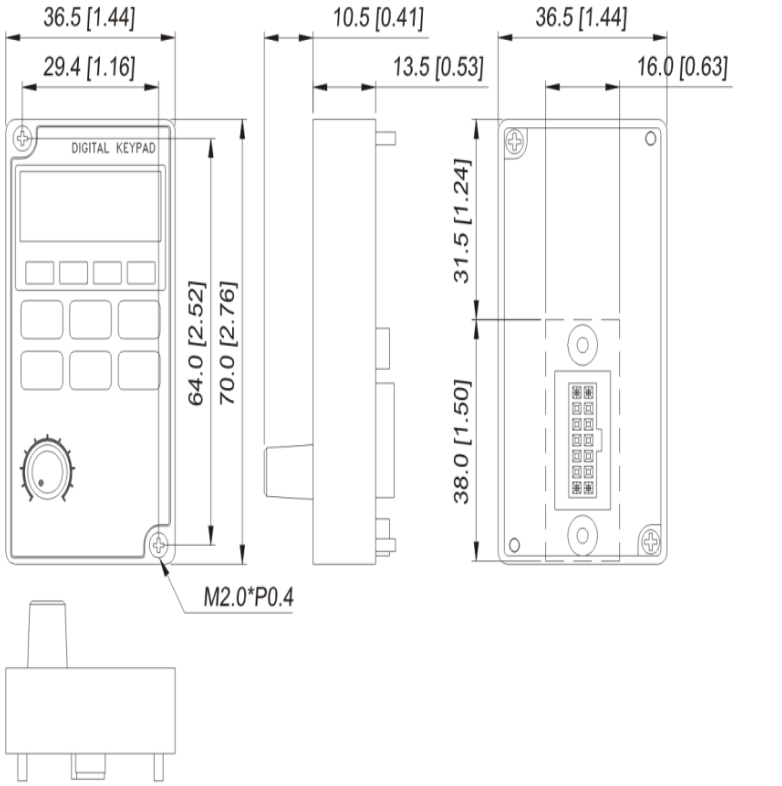


Figure 3-2 Schematic diagram of operation keyboard overall dimension

2. Operation Keyboard External Indicator

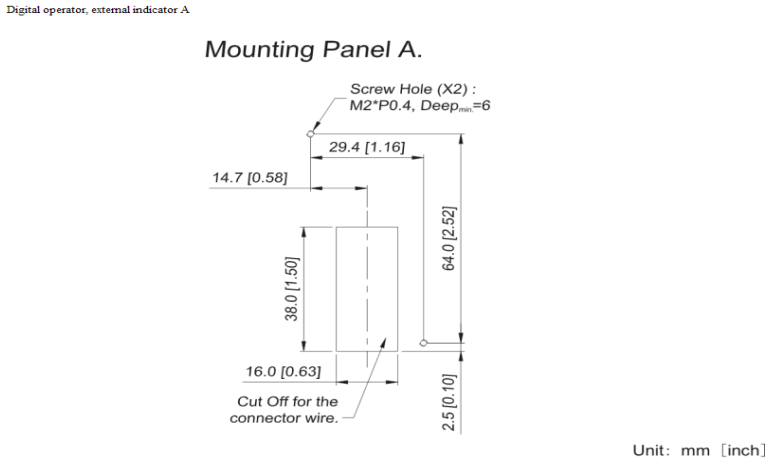


Figure 3-3 External Indicator A

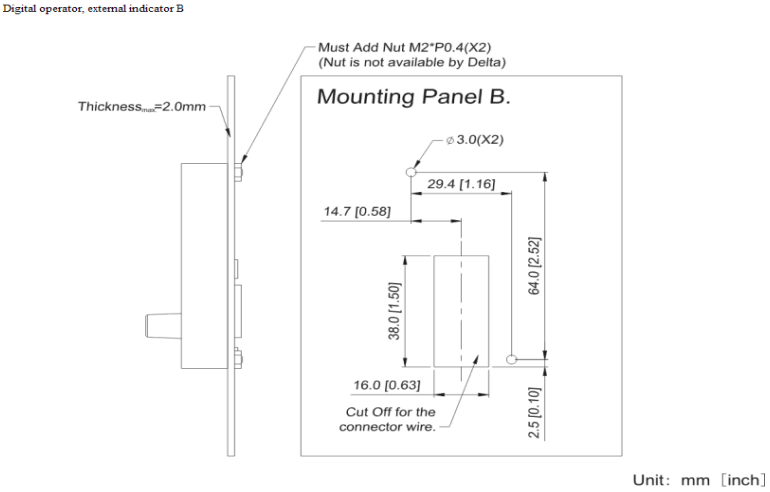


Figure 3-4 External Indicator B

3.2 Electrical Installation

3.2.1 External Electrical Component Selection Guidance

Table 3-1 VFD-M frequency inverter external electrical component selection

VFD Model	Air Switch(A) (MCCB)	Recommendation Contactor (A)	Recommendation Main Circuit Wire(mm^2)	Recommendation Control Circuit Wire
VFD-M0.4-S2B	10	10	2.5	1
VFD-M0.75-S2B	16	10	2.5	1
VFD-M1.5-S2B	25	16	4	1
VFD-M2.2-S2B	32	25	4	1
VFD-M3.7-S2B	40	32	4	1
VFD-M0.4-S4B	10	10	2.5	1
VFD-M0.75-S4B	10	10	2.5	1
VFD-M1.5-S4B	16	10	2.5	1
VFD-M2.2-S4B	16	10	2.5	1
VFD-M3.7-S4B	25	16	4	1
VFD-M5.5-S4B	32	25	4	1

VFD-M7.5-S4B	40	32	4	1

3.2.2 Instructions for External Electrical Components

Table 3-2 Instructions for VFD-M series VFD external electrical components

Accessory Name	Installation Site	Function
Air switch MCCB	Front of input circuits	When downstream devices is over current, breaking the power.
Contactor	Between the air switch and the input side of frequency inverter	The frequency inverter power on and off, should avoid frequently operating through the contactor or doing direct start-up operation.
AC Reactor	Input side of the frequency inverter	1) Improve the power factor of input side 2) Suppress the higher harmonics of the input side effectively; prevent damage of the other equipment because of the voltage waveform distortion.

Accessory Name	Installation Site	Function
EMC Input Filter	Input side of the frequency inverter	1) Reduce the transmission of the frequency inverter and radiation disturbance. 2) Reduce the transmission interference flowing from the power to the drive, and improve the anti-interference ability of the drive.
AC Output Reactor	Between the output side of the frequency inverter and motor. Install near the frequency inverter	The output side of the frequency inverter generally contains more the higher harmonics. When the distance between the frequency inverter and the motor is far, there is large distributed capacitance in the line, the higher harmonics may produce resonance in loop, bring two influences: 1) Destroy motor insulation performance, might damage the motor for a long time. 2) Generate a greater leakage current and cause frequent protection of frequency inverter. Generally, when the cables from the frequency inverter to motor are longer than 50m, an output AC reactor should be installed.

3.2.3 Mode of Connection

1. Illustration of Frequency Inverter Wiring Terminal

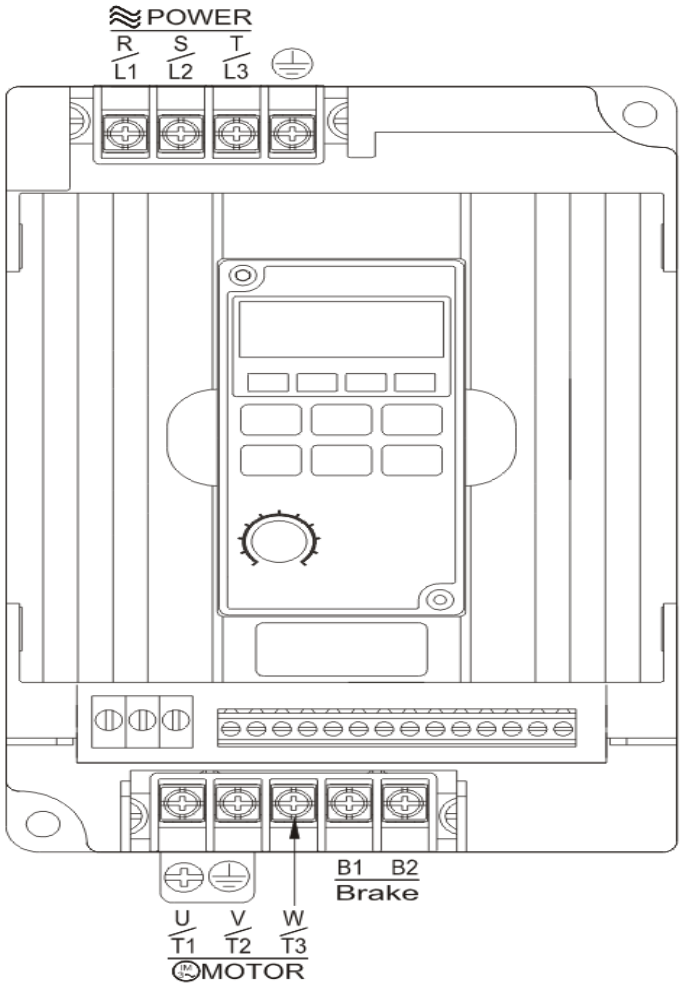


Figure3-5 Illustration of Frequency Inverter Wiring Terminal

2．Frequency Inverter Mode of Connection

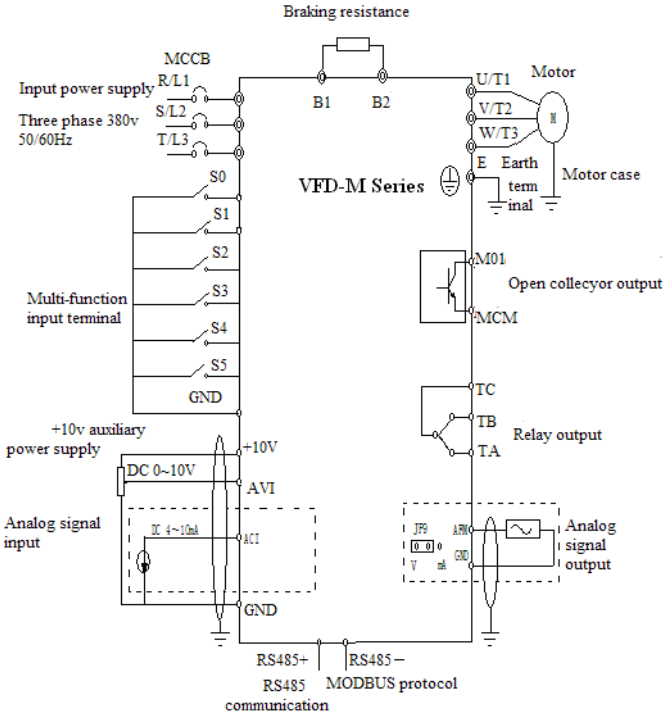


Figure3-6 Illustration of VFD-M Frequency Inverter Wiring

3.2.4 Main Circuit Terminals and Wiring

⚠Danger
1. Before wiring, make sure the power switch is OFF, otherwise, this can lead to electric shock. 2. Only trained professionals can do wiring, so as to avoid the risk of

the drive damage and the personal Injury. 3. The drive must be properly earthed to reduce electrical Accident and fire.
⚠Attention
1. Ensure that the input power supply is identical with the rated value of frequency inverter before using it, otherwise, damage would cause to the inverter! 2. Confirm the motor and the drive is adapted, otherwise, otherwise, damage would cause to motor or cause frequency inverter protection! 3. Power supply couldn't be connected to U, V, W terminals, otherwise, damage would cause to frequency inverter!

1) Introduction of main circuit terminals of the 3-phase frequency inverter

Terminal Sign	Name	Description
R/L1 、 S/L2 、 T/L3	3-phase power supply input terminals	AC 3-phase 380V power supply connections
B1, B2	Brake resistor wiring terminals	Connect to brake resistor connections
U/T1 、 V/T2 、 W/T3	The frequency inverter output terminals	Connect 3-phase motor
⏚	Earth terminal	Earth terminal

2）Wiring Notes:

1. Input Power Supply R/L1、S/L2、T/L3：

Requirement of no phase order towards input side wiring of frequency inverters.

2. Check after power off

☞Notice：There is residual voltage with DC busbar terminal when power off, then waiting for at least 5mins and confirming the voltage between DC bus terminals plus and minus is below 36V, otherwise, there is electric shock danger.

3. Brake resistor wiring terminals B1, B2:

Selection of braking resistor should refer to the recommended value, and wiring distance should be less than 5m so as to reduce the risk of the drive damage.

4. Frequency Inverter Output Side U/T1、V/T2、W/T3：

The capacitors or surge absorbers can not be connected to the output side of the drive. Otherwise cause the frequency inverter to trip frequently or even damaged.

When motor cable is too long, the impact of distributed capacitance is easy to cause electrical resonance, which led to the damage of the motor insulation, cause a greater leakage current and make frequency inverter over-current protection. When motor cables are longer than 50m, a AC input reactor should be installed.

5. Earth Terminal ⏚

The terminal must be properly earth connected, ground resistance must be less than 0.1Ω. Otherwise, lead to equipment abnormal operation or damaged.

☞Notice：It is prohibited to share the earth terminal E and the power zero line terminal N.

3.2.5 Control Terminal and Wiring

1）VFD-M main control circuit terminals drawing

TA	TB	TC	S0	S1	S2	S3	S4	S5	GND	AFM	ACI	+10V	AVI	GND	MCM	MO1

2）Function of the control terminals

Table 3-3 VFD-M Frequency inverter control terminal introduction

The main control loop terminals			
Type	Terminal Symbol	Terminal Name	Function
Power supply	+10V-GND	+10v power supply	Provide +10V power supply for outside, Normally used as working power of the external potentiometer, potentiometer resistance range: 1KΩ ~ 10KΩ Max output current: 10mA
Analog input	AVI-GND	Voltage Analog input terminal	1.Input voltage range: DC 0V~10V 2. Input resistance: 20KΩ
	ACI-GND	Current Analog input terminal	1. Input range: 0~20mA 2. Input resistance: 250Ω.
Digital input	S0-GND	Multi-function digital input terminal 0	Function could be set refer to P38-P42,valid when close, and invalid when disconnect

The main control loop terminals			
Type	Terminal Symbol	Terminal Name	Function
	S1-GND	Multi-function digital input terminal 1	
	S2-GND	Multi-function digital input terminal 2	
	S3-GND	Multi-function digital input terminal 3	
	S4-GND	Multi-function digital input terminal 4	
	S5-GND	Multi-function digital input terminal 5	
Analog output	AFM-GND	Analog output	Output voltage or current could be selected by the JP1 jumper of the control board. Output voltage range: DC 0V~10V Output current range: DC 0~20mA

The main control loop terminals			
Type	Terminal Symbol	Terminal Name	Function
Digital output	MO1-MCM	Digital output 1	Open collector output Output voltage range: DC 0V~30V Max output current 50Ma
Relay output	TC-TB TC-TA	Normal close/ open terminals	Relay output, TC-TB normal close, TC-TA normal open Contact capacity: AC 250V/3A, DC 30V/1A

Explain of jumper

Jumper No.	Description
JP1	Analog output AFM signal type selection Choose DC 0V ~ 10V or 0 ~ 20mA output

4）Control terminals wiring description

A. Analog signal input terminals(AVI,ACI)

Analog signal is particularly vulnerable to external noise disturbance, so it is generally necessary to use as short as possible shielded cable, wiring is less than 20m. The outside cable of shielded cable should be earthed basically, but if induction noise is big, the effect connecting to GND terminal will be good.

When connect outer analog signal follower, malfunction would be

caused due to the disturbance of analog signal follower or AC motor drive sometimes, when this situation happens, capacitor or ferrite core could be connected to outer analog follower side, shown as following:

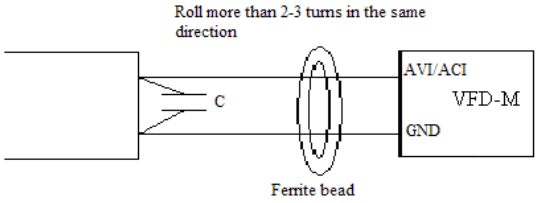


Figure 3-7 Analog signal wiring diagram

B. Digital input terminals

It is generally necessary to use as short as possible shielded cable, less than 20m

C. Digital output terminals

When the digital output terminals need to drive the relay, the absorb diode should be installed on both sides of the relay's coil. Otherwise it will cause damage of the DC 24V power.

☞Note: The polarity of the absorb diode must be installed properly, shown in fig.3-8. Otherwise, when the digital output terminal has output signal, immediately the 24V DC power supply will burn out.

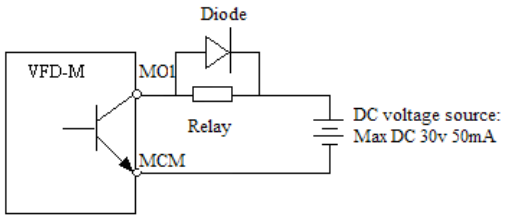


Figure 3-8 Digital output terminal treatment wiring diagram

D. Output terminals of the relay:

When the relay output terminals need to control AC contactors and other inductive load, we should add resistance-capacitance absorption device in the two sides of the contactor (over-voltage suppressors, which can be bought from the AC contactor manufacturers or our company. Over-voltage suppressor is low cost ideal absorption device) should be used on both sides of the contactor's coils. Otherwise the drive is easily disturbed and tripping. Refer to Fig.3-9.

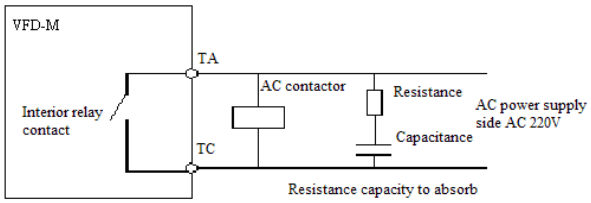


Figure 3-9 Relay output terminal treatment wiring diagram

E. Others：

The wiring of control terminal should be away from the wiring of main circuit. Otherwise, malfunction would be arisen noise disturbance. If the wiring of control terminal should be intersected with the wiring of main circuit, please intersect them with 90degree;

The control wiring within the AC motor driver should be fastened suitably, it couldn’t touch the live part of main circuit directly (for example: main circuit).

Please don’t connect or dismantle any wiring when it displays “operation keyboard”

Chapter4 Function Parameter Description

√ indicates the parameter can be modified, no matter the drive runs or stops; "×" means the parameter can not be modified while the drive is running.

○ indicates the parameter can only be read.

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P00	Selection of the main frequency source	00: Keyboard digital setting 01: Analog signal 0 ~ 10V input (AVI) 02: Analog signal 4 ~ 20mAinput (ACI) 03: Communication setting (RS-485) 04: Keyboard potentiometer setting 05: UP/DW terminals increase by degrees and Decrease by degrees setting	4	√
P01	Run channel source	00: Keyboard control	0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	setting	01: External terminal control, STOP key is valid. 02: External terminal control, STOP key is invalid 03: Communication input control, STOP key is valid. 04: Communication input control, STOP key is invalid.		
P02	Halt mode	00: Dec to stop 01: Coast to stop	0	√
P03	Highest output frequency	50.00 ~ 400.0Hz	50.00	×
P04	Motor rated frequency	10.00 Hz ~ P03	50.00	×
P05	Motor rated voltage	220V: 0.1 ~ 250.0V 380V: 0.1 ~	220.0 380.0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		440.0V		
P06	Intermediate frequency	P08 ~ P04	10.00	√
P07	Intermediate voltage	220V: P09 ~ P05 380V: P09 ~ P05	44.0 76.0	√
P08	Lowest output frequency	0.10 Hz ~ P06	5.00	√
P09	Lowest output voltage	220V: 0.1 ~ P07 380V: 0.1 ~ P07	22.0 38.0	√
P10	1st Acceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.00s	10.0	√
P11	1st Deceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.00s	10.0	√
P12	2nd Acceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.00s	10.0	√
P13	2nd Deceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.00s	10.0	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P14	Digital frequency setting	0.00 ~ P03	0.00	√
P15	Jog Acc. and Dec. time	0.1 ~ 6000.0s or 0.01 ~ 600.00s	10.0	√
P16	Job run frequency	0.00 ~ P03	6.00	√
P17	1st stage freq. setting	0.00 ~ P03	0.00	√
P18	2nd stage freq. setting	0.00 ~ P03	0.00	√
P19	3rd stage freq. setting	0.00 ~ P03	0.00	√
P20	4th stage freq. setting	0.00 ~ P03	0.00	√
P21	5th stage freq. setting	0.00 ~ P03	0.00	√
P22	6th stage freq. setting	0.00 ~ P03	0.00	√
P23	7th stage freq. setting	0.00 ~ P03	0.00	√
P24	Reversal	0: Reversal	0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	function set forbidden	01: Reversal forbidden		
P25	Overvoltage limit movement level	650 ~ 800Vdc	710	√
P26	Current limit level during Acc.	110 ~ 200%	160	√
P27	Current limit level during run	150 ~ 200%	180	√
P28	DC braking current setting	0.0 ~ 100.0%(frequency inverter rated current)	50.0	√
P29	DC braking time setting when start	0.0 ~ 10.0s	0.0	√
P30	DC braking time setting when stop	0.0 ~ 20.0s	0.0	√
P31	DC braking starting frequency when stop	0.00 ~ 50.00Hz	0.00	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P32	Revolve select when power cut instantly	0: Don't operate when power cut instantly 1: Continue to operate when power cut instantly	0	√
P33	The allowed longest time that it could start again after power cut instantly	0.3 ~ 5.0s	2.0	√
P34	Braking torque level	70 ~ 150%	90	√
P35	Retain			
P36	Output frequency upper limit setting	P37 ~ P03	50.00	√
P37	Output frequency lower limit setting	0.00Hz ~ P36	0.00	√
P38	Multi-function input terminal (S0, S1) function	0: S0 forward/stop, S1 reversal/stop (During reversal	0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	selection	forbidden, S1 is also forward) 1: S0 run/stop , S1 forward/reversal 2: S0 、 S1 、 S2 three-wire run control		
P39	Multi-function input terminal S2 function selection(when P38 is 2, S2 is fixed as run control terminal)	00: No function 01: Coast to stop control 02: UP-DW frequency clear 03: DC braking control 04: External fault input 05: Terminal fault reset 06: Multi-step speed 1 07: Multi-step speed 2 08: Multi-step speed 3 09: Forward jog	5	×
P40	Multi-function input terminal S3 function selection		6	×
P41	Multi-function input terminal S4 function selection		7	×
P42	Multi-function input		8	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	terminal S5 function selection	10: Reversal jog 11: Select Acc. And Dec. time 2 12: Pendulous frequency run input 13: Pendulous frequency state reset 14: UP frequency increase by degrees 15: Down frequency Decrease by degrees 16: PLC run input 17: PLC state reset after stop 18: Counter trigger signal input (Valid only for S5 terminal) 19: Counter reset 20 ~ 27: Retain 28: Open 2rd freq. source		

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P43	Analog output signal AFM setting	0: Output freq. (0~max. output freq.) 1: Output current (0 ~ 250% rated current) 2: PID feedback signal(0 ~ 10.00V) 3: Output voltage(0 ~ 100%)	0	√
P44	Analog output AFM gain setting	0 ~ 200%	100	√
P45	Multi-function output terminal(MO1) setting	00: Indication in operation 01: Freq. arrival 02: Zero-speed run 03: Freq. level detection 04: External fault 05: Under-voltage stop 06: Retain 07: Fault	0	×
P46	Multifunction output relay TA, TB, TC setting		7	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		indication 08: Random freq. arrival 09: Freq. arrive upper limit 10: Run completion indication within a phase 11: Mode run completion indication 12: Freq. arrival lower limit 13: Setting count value arrival 14: Appoint count value arrival 15: Pendulous freq. upper and lower limit 16 ~ 20: Retain		
P47	Random arrival freq. setting	0.00 ~ 400.0Hz	0.00	√
P48	Freq. arrival detection	0.00 ~ 20.00Hz	5.00	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	amplitude			
P49	FDT(Freq. level) setting	0.00 ~ 400.0Hz	10.00	√
P50	FDT output delay time	0.1 ~ 200.0s	2.0	√
P51	Under-voltage protection level	350 ~ 500Vdc	390	√
P52	Motor rated current setting	0.1 ~ 100.0A	Model related	×
P53	Motor no-load current setting	（0.25 ~ 0.75）*P52	Model related	×
P54	Manual operation torque compensation	0 ~ 200	0	√
P55	Slip compensation gain	0.00 ~ 1.50	0.30	√
P56	Drive rated voltage	Read-only	Model related	○

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	indication			
P57	Drive rated current indication	Read-only	Model related	○
P58	Motor overload ratio	50 ~ 120%(motor rated current)	100	√
P59	Pendulous freq. run mode setting	0: Pendulous freq. function close 1: Pendulous freq. function valid 2: Pendulous freq. function condition valid	0	×
P60	Pendulous freq. start mode after stop	0: Start According to the state before stop 1: Restart	0	×
P61	Pendulous freq. run mode	0: Change swing 1: Fixed swing	0	×
P62	Pendulous freq. preset freq.	0.00Hz ~ P03	10.00	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P63	Pendulous freq. preset freq. hold time	0.0 ~ 600.0s	0.0	√
P64	Display frame selection when start up	00: Show actual operating freq.(H) 01: Motor speed (The right most Decimal point light when exceed 9999) 02: Show output voltage(E) 03: Show main circuit DC dc voltage(u) 04: Retain 05: Display count value(c) 06: Display setting freq. (F) 07: Display parameter setting menu (P) 08: Inverter temperature 09: Display motor	6	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		run current(A) 10: Forward/Reverse (Frd/Rev) 11: External terminal state(T) 12: AVI(U) 13: ACI(U) 14: AFM(U) 15: Keyboard potentiometer(U) 16: PID setting (U) 17: PID feedback (U) 18: Running mode (U) (0: Routine operation,1: Job operation, 2: Pendulous freq. operation, 3: PID operation, 4: PLC operation, 5: Multi-speed operation) 19: PLC operation speed (U) 20: Multi-segment		

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		speed(U)		
P65	Motor speed display ratio	0.01 ~ 20.00	1.00	√
P66	Communication freq. setting	0.00 ~ P03	0.00	√
P67	Forbidden set freq. I	0.00 ~ 400.0Hz	0.00	√
P68	Forbidden set freq. II	0.00 ~ 400.0Hz	0.00	√
P69	Forbidden set freq. III	0.00 ~ 400.0Hz	0.00	√
P70	Forbidden freq. width set	0.10 ~ 20.00Hz	0.00	√
P71	Carrier freq. setting	1 ~ 12 kHz	8	√
P72	Fault automatic reset times	00 ~ 10	0	√
P73	Nearest 1st time exception record	E000: No fault E001: IGBT short circuit protect	0	○

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P74	Nearest 2nd time exception record	E004: Acceleration over-current E005: Deceleration over-current E006: Constant speed over-current E007: Accelerate overvoltage E008: Deceleration overvoltage E009: Constant speed overvoltage E010: Busbar under-voltage fault E011: Motor overload E012: Frequency converter overload E013: Retain E014: Retain E015: IPM fault E016: IGBT module overheat fault E017: External	0	○
P75	Nearest 3rd time exception record		0	○

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		fault E018: Retain E019: Current detection fault or outputted fault loss E020: Motor parameter auto-learning fault E021: EEPROM operating trouble E022: Retain E023: Retain E024: Temperature sensor fault		
P76	Parameter lock/reset set	0: No operation 1: Parameter initialization(including clearance fault record) 2: Only clear fault record	0	×
P77	Fault automatic reset time interval	0.1 ~ 100.0s	5.0	√
P78	PLC running mode	0: Single cycle	0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	selection	1: Single cycle stop mode 2: Continuous loop 3: Continuous loop stop mode 4: Keep final value 5: End value stop mode		
P79	Mode run direction selection	0 ~ 127	0	×
P80	PLC action selection	0: Inaction 1: Action 2: Conditional action	0	×
P81	1st stage run time setting	0.0 ~ 6000.0s	0.0	√
P82	2nd stage run time setting	0.0 ~ 6000.0s	0.0	√
P83	3rd stage run time setting	0.0 ~ 6000.0s	0.0	√
P84	4th stage run time setting	0.0 ~ 6000.0s	0.0	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P85	5th stage run time setting	0.0 ~ 6000.0s	0.0	√
P86	6th stage run time setting	0.0 ~ 6000.0s	0.0	√
P87	7th stage run time setting	0.0 ~ 6000.0s	0.0	√
P88	RS-485 communication address	0 ~ 247	1	√
P89	Data transmission speed	0: 4800bps 1: 9600bps 2: 19200bps	1	√
P90	Transmission error handling, stop mode	0: Continue to run 1: Stop	0	√
P91	Communication transmission overtime detection	0.0: No transmission overtime detection 0.1 ~ 120.0s	0.0	√
P92	Communication data form	3: Modbus RTU mode , no verification	3	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		<8,N,1> 4: Modbus RTU mode，even parity check<8,E,1> 5: Modbus RTU mode，odd parity check<8,O,1>		
P93	Start freq.	0.0～10.00Hz	0.00	√
P94	Start freq. duration time	0.0～20.0s	0.0	√
P95	Automatic energy-saving operation	0:Invalid 1:Valid	0	√
P96	Set count value	0～9999	0	√
P97	Appoint count value	0～9999	0	√
P98	Cumulative boot time	Hours		○
P99	Freq. lower than lower limit freq. selection	0: Run in zero freq. 1: Run in lower freq.	1	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P100	Software version	Read only		○
P101	Dead zone compensation correction	0 ~ 20	0	√
P102	Automatic stabilivolt output regulation AVR	0: Invalid 1: Dynamic valid 2: Static valid	0	√
P103	Motor parameter measure	0: No measurement function 1: Measurement motor resistance value R1 at a time	0	×
P104	Motor resistance R1 at a time	1 ~ 65535milliohm	Model determination	×
P105	Control mode	0: V/F control 1: Vector control	0	×
P106	Motor rated slip	0.00 ~ 10.00Hz	Model determination	×
P107	Start	0: Invalid	1	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	pre-excitation selection	1: Valid		
P108	Start pre-excitation time	0.10 ~ 2.00	0.30	×
P109	Zero-speed control function	0: No output 1: Normal output	1	√
P110	Retain			
P111	UP/DOWN terminal freq.	0.00Hz ~ P03	0.00	√
P112	Start mode when restart after power cut	0: Start from 0hz 1: Rotate speed track start	0	√
P113	Normal start mode selection		0	√
P114	Cooling fan start selection	0: Fan revolve when the drive run, fan stop when the drive stop 1: Always run	0	√
P115	PID goal	0: Without PID	0	×

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	source setting	function 1: Keyboard potentiometer setting 2: AVI（0～10V）setting 3: ACI（4～20mA）setting 4: PID setting address（refer to P125）		
P116	PID feedback source selection	0: AVI（0～10V） 1: Keyboard potentiometer 2: ACI（4～20mA）	0	×
P117	Proportional gain（P）	0.0～50.0	10.0	√
P118	Integral time（I）	0.10～50.00s	1.00	√
P119	Close loop preset freq.	0.00～50.00Hz	0.00	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P120	Close loop preset freq. hold time	0.0 ~ 600.0s	0.0	√
P121	Mini PID fixed variable	0.0 ~ 10.00V	0.0	√
P122	Max PID fixed variable	0.0 ~ 10.00V	10.00	√
P123	Min PID feedback variable	0.0 ~ 10.00V	0.0	√
P124	Max PID feedback variable	0.0 ~ 10.00V	10.00	√
P125	PID digital setting	0.00 ~ 10.00V	0.00	√
P126	Deviation allowed limit	0.0 ~ 20.0%	0.0	√
P127	PID freq. output upper limit	0.00 ~ P03	50.00	√
P128	Zero freq. corresponding AVI input	0.0 ~ 10.0V	0.0	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	voltage			
P129	Max freq. corresponding AVI input voltage	0.0 ~ 10.0V	10.0	√
P130	Reverse AVI selection	0: No reverse 1: Reverse	0	×
P131	Zero freq. corresponding ACI input current value	0.0 ~ 20.0mA	4.0	√
P132	Max freq. corresponding ACI input current value	0.0 ~ 20.0mA	20.0	√
P133	Reverse ACI selection	0: No reverse 1: Reverse	0	×
P134	Analog input filter time	0.01 ~ 1.00s	0.10	√
P135	Sleep delay time	0 ~ 600s	120	√
P136	Awake delay time	0 ~ 600s	30	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
P137	Sleep frequency	0.00Hz ~ P03 0.00Hz non-dormant	0.00	√
P138	Awake threshold value	0.0 ~ 10.00V	0.00	√
P139	Process mode when counter arrives	0: Remain in operation 1: Freely stop and display external fault	0	√
P140	UP/DW terminal modification rate	0.01 ~ 100.0Hz/s	1.00	√
P141	Storage setting freq. selection	0: Don't storage freq. before power off 1: Storage freq. before power off	1	√
P142	2nd freq. instruction source setting	0: Keyboard digital setting 1: Analog signal 0 ~ 10V input	0	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
		（AVI） 2: Analog signal 4 ~ 20mA input （ACI） 3: Communication setting（RS-485） 4: Keyboard potentiometer setting 5: UP/DW terminal increase by degrees, Decrease by degrees setting		
P143	Dynamic braking starting voltage	630 ~ 760Vdc	700	√
P144	Dynamic braking ratio	10 ~ 100%	50	√
P145	Waiting time if restart after power cut	0.0 ~ 20.0s	1.0s	√
P146	Restart after power cut	0: Revolve	1	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	setting	available 1: Revolve prohibited		
P147	Ace. and Dec. unit time selection	0: Ace. and Dec. unit is 1 Decimal point (0.1s) 1: Ace. and Dec. unit is 2 Decimal point (0.01s)	0	×
P148	Motor pole number	2 ~ 20	4	×
P149	Triangle wave ascending & descending time	0.1 ~ 1000.0s	10.0	√
P150	Kick freq.	0.0 ~ 80.0%	10.0	√
P151	Pendulous freq. amplitude	0.0 ~ 50.0%	10.0	√
P152	Pendulous freq. center freq. setting	0.0 ~ P03	10.00	√
P153	Rotate speed estimated	10 ~ 500	20	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	factor			
P154	Rotate speed closed-loop gain	10 ~ 150	30	√
P155	Shock compensating factor(rotate speed closed-loop integral time constant)	10 ~ 1000	200	√
P156	Communication response delay time	0 ~ 1000ms	5	√
P157	Communication mode selection	0: Retain 1: Modbus	1	√
P158	Current sensor fault valid	1valid 0 invalid	1	√
P159	PWM mode	0: PWM mode 0 1: PWM mode 1	0	√
P160	Zero-frequency correspondin	0.0 ~ 10.0V	0.5	√

Parameter Code	Parameter Function	Setting Scope	Factory defaults	Modify
	g keyboard potentiometer voltage			
P161	Max freq. corresponding keyboard potentiometer voltage	0.0 ~ 10.0V	9.5	√
P162	Reverse keyboard potentiometer selection	0: No reverse 1: Reverse	0	×

Chapter 5 Function Parameter Detail

P00	Main frequency source setting	0 ~ 5	4

Set frequency inverter main frequency source

0: Keyboard digital setting

It could be set through P14 or ▲、▼ keys.

1: Analog signal 0 ~ 10V input (AVI)

Running frequency is set by external analog voltage signal AVI(0.0 ~ 10.0V), related characteristics, please refer to the description of P128、P129 and P130 parameters.

2: Analog signal 4 ~ 20mAinput (ACI)

Running frequency is set by external analog current signal ACI(0.0 ~ 20.0mA), related characteristics, please refer to the description of P131、P132 and P133 parameters.

3: Communication setting (RS-485)

Accept the frequency of upper computer or host machine setting instruction through serial communication RS485 interface.

4: Keyboard potentiometer setting

Frequency is set by the potentiometer knob on the operation keyboard, related characteristics, please refer to the description of P160、P161 and P162 parameters.

5: UP/DW terminals increase by degrees and Decrease by degrees setting

Initial value could be set through P111, frequency could be increased and Decreased by degrees by external UP/DOWN terminal,

corresponding S2~S5 terminals should be selected and set P39 ~ P42

to be UP frequency increase by degrees, DOWN frequency Decrease by degrees function.

P01	Run channel source setting	0 ~ 4	0

This function parameter is used to select the run command source of the drive.

0：Keyboard control

RUN key in the operation keyboard is used to start the drive and STOP key is used to stop the drive.

1：External terminal control, STOP key is valid

Start the drive by close S0 or S1, stop the drive by disconnect S0 or S1.

In terminal control run state, press STOP key, the drive would stop urgently, and alarm external equipment fault.

2：External terminal control, STOP key is invalid

Start the drive by close S0 or S1, stop the drive by disconnect S0 or S1.

In terminal control run state, there is no response with STOP key.

3：Communication input control, STOP key is valid

Via RS485 hardware, based on MODBUS communication protocol, start and stop the drive by communication mode.

In communication control run state, press STOP key, the drive would stop urgently, and alarm external equipment fault.

4：Communication input control, STOP key is invalid

Via RS485 hardware, based on MODBUS communication protocol, start and stop the drive by communication mode.

In communication control run state, there is no response with STOP key.

P02	Halt mode	0 ~ 1	0

0：Dec to stop

When the drive stops, it would slow down step by step According to the set Dec. time, it would stop until the output freq. to be zero.

1：Coast to stop

When the stop command is valid, the drive would stop output immediately and block output signal, the motor would run freely and stop.

P03	Max output frequency	50.00 ~ 400.0Hz	50.00

Set the max output frequency of the drive, it is the basis of freq. set and Acc. and Dec. speed.

P04	Motor rated freq.	10.00 ~ P03	50.00
P05	Motor rated voltage	220V: 0.1 ~ 250.0V 380V: 0.1 ~ 400.0V	220.0 380.0

This parameter should be set According to the rated frequency and rated voltage on the motor nameplate.

P06	Intermediate frequency	P08 ~ P04	10.00
P07	Intermediate voltage	220V: P03 ~ P05 380V: P03 ~ P05	44.0 76.0

This parameter is used to set the intermediate frequency and intermediate voltage of random V/F curve.

P08	Lowest output frequency	0.10 ~ P06	5.00
P09	Lowest output voltage	220V：0.1 ~ P07 380V：0.1 ~ P07	22.0 38.0

This parameter is used to set the lowest frequency and voltage values of random V/F curve.

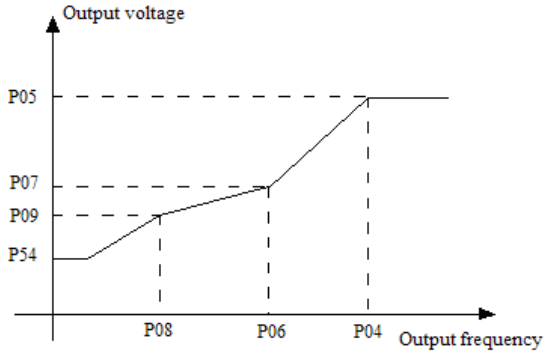


Figure 5-1 VF curve diagram

P10	1stAcceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.0s	10.0
P11	1st Deceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.0s	10.0

P12	2ndAcceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.0s	10.0
P13	2nd Deceleration time	0.1 ~ 6000.0s or 0.01 ~ 600.0s	10.0

Acc. Time is the time that the output freq. of the drive needs from 0Hz to max operation freq. (P03).

Dec. time is the time that the output freq. of the drive needs from max operation freq. (P03) to 0Hz.

If using 2nd Acc. And Dec. time, one terminal from S2~S5 need to be selected, and set it to selection Acc. And Dec. time 2. If this terminal is on, then select 2nd Acc. time and Dec. time, if off, then select 1st Acc. and Dec. time.

P14	Digital frequency settings	0.00 ~ P03	0.00

When keyboard digital settings (P00=0) is selected as frequency source, this function code value is regarded as the initial value of drive digital given frequency.

P15	Jog Acc. and	0.1 ~ 600.0s or 0.01 ~	10.0

	Dec. time	600.00s	
P16	Job run frequency	0.00Hz ~ P03	6.00

Jog run time refer to the time that the drive needed from 0Hz to max output frequency or from max output frequency to 0Hz.

P17	1st stage freq. settings	0.00 Hz ~ P03	0.00
P18	2nd stage freq. settings	0.00 Hz ~ P03	0.00
P19	3rd stage freq. settings	0.00 Hz ~ P03	0.00
P20	4th stage freq. settings	0.00 Hz ~ P03	0.00
P21	5th stage freq. settings	0.00 Hz ~ P03	0.00
P22	6th stage freq. settings	0.00 Hz ~ P03	0.00
P23	7th stage freq. settings	0.00 Hz ~ P03	0.00

Set multi-stage freq. or PLC run state freq. Multi-stage speed is selected by external input terminal S2~S5, related parameter of terminal function selection please refer to P38~P42. PLC run related parameter please refer to P78~P87.

P24	Reversal forbidden function settings	0 ~ 1	0

0：Reversal

1：Reversal forbidden

If this parameter is set to reversal forbidden, REV reversal command of operation keyboard, communication and external terminal is invalid

Forbid drive reversal run is suitable for using in specific reversal forbidden run situation.

P25	Overvoltage limit movement level	650 ~ 800Vdc	710

This parameter stipulates the threshold value of voltage stall protection during motor slowdown. When the drive slow down, under the effect of motor load inertia, the motor would produce rebound energy to the drive, pump voltage would arise to dc side, when the drive detect that the pump voltage is higher than P25 set value, the drive would stop slow down (output frequency stay the same), the drive would begin to slow down till the dc inside voltage is lower than the set value.

P26	Current limit level during Acc.	110 ~ 200%	160
P27	Current limit level during run	150 ~ 200%	180

P26, P27 parameter stipulates respectively the allowed max output current in Acceleration and run process of the drive. The percentage related to drive rated current is regarded as setting unit. When output current of the drive exceeds the value stipulated by this parameter, it would adjust the output frequency automatically to make the current within a prescribed limit to avoid trip due to over-current.

P28	DC braking current setting	0.0 ~ 100.0%	50.0

This parameter set the dc braking current value from the drive to motor when start and stop, it is set According to the percentage of dc braking current and drive rated current, that is the set value is 100% corresponding to drive rated current. So when set this parameter, be sure that it increases slowly from little till getting enough braking torque, pay special attention that when the adaptor motor is smaller than the capacity of the drive, please set dc braking current cautiously, it couldn't exceed motor rated current.

P29	DC braking time setting when start	0.0 ~ 10.0s	0.0

This parameter sets the dc braking current duration time from the drive to motor when the drive start. This parameter is only valid for VF control, but in vector control mode, pre-excitation parameter could be set, it could get equal effect.

P30	DC braking time setting when stop	0.0 ~ 20.0s	0.0

This parameter set the dc braking current duration time from the drive to motor when the drive stop. If dc braking is needed when stop, then select parameter as stop mode, this function come into effect when set P02 to Dec. stop (P02=0).

P31	DC braking starting frequency when stop	0.00 ~ 50.00Hz	0.00

This parameter is used to set dc braking start frequency when the drive slow down till stop. When output frequency is lower than this set parameter, start dc braking function, dc braking time is set by P30 when stop.

Dc braking function before run is usually applied in situation that the load is mobile after stop, such as fan and pump. The loads would usually keep the motor in free run mode before the drive start, and

the run direction is indefinite, this way, dc brake could be performed before start, and then start the motor.

Dc braking stop function during stop is applied to situation that hope to stop the motor soon, or as positioning control, such as crown block, cutting machine.

When dc braking time is set to 0.0 during start or stop, start or stop dc braking function is invalid.

P32	Revolve select when power cut instantly	0 ~ 2	0

This parameter is used to set the frequency inverter movement situation when network voltage power cut instantly, but there is still electric with the frequency inverter busbar and the network voltage recovering.

0：Don't operate when power cut instantly

Clear operation command automatically, including panel control command, external terminal control command and communication control command. When network voltage recovers, it needs to run according to new command state.

1：Continue to operate when power cut instantly, track start

The run valid order before power down would be kept if the power grid cut instantly, and there is residual voltage with the drive busbar voltage, within allowed max power cut time (P33 set value), run According to the state before power cut instantly again.

2：Continue to operate when power cut instantly, routine start

P33	The allowed longest time that it could start again after power cutting instantly	0.3 ~ 5.0s	2.0

If it couldn't recover power supply within time set by P33 when power grid cuts instantly, the drive wouldn't continue to run after power cut instantly.

P34	Braking torque level	70 ~ 150%	90

This parameter is used to set the allowed output level of torque current when the drive is in braking state, it is set According to the percentage of output torque current and rated current. For occasion that the braking requirement is higher, external brake resistor needed to be connected to consume feedback energy. When braking torque level is high, braking effect is obvious. But in situation without external braking resistor, the frequency inverter is liability to overvoltage protection due to quick energy feedback.

P35	Retain		

P36	Output frequency upper limit setting	P37 ~ P03	50.0
P37	Output frequency lower limit setting	0.00 ~ P36	0.00

Upper limit of drive output frequency, it should be lower or equal to max output freq.

Lower limit of drive output frequency, it should be lower than output freq. upper limit.

Relation between the three: max output frequency ≥ upper limit frequency ≥ lower limit frequency

P38	Multi-function input terminal (S0, S1) function selection	0 ~ 2	0

0：S0 forward/stop, S1 reversal/stop (During reversal forbidden, S1 is also forward)

Control mode, refer to figure 5-2.

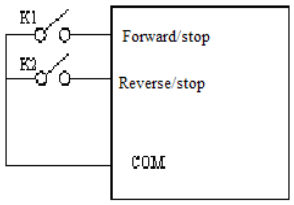


Figure 5-2 Two-wire running mode illustration 1

K1	K2	Run command
0	0	Stop
1	0	Forward
0	1	Reverse
1	1	Stop

1：S0 run/stop，S1 forward/reversal

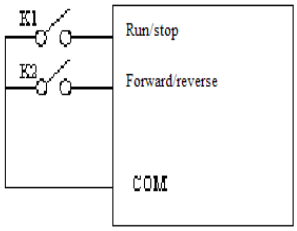


Figure 5-3 Two-wire running mode illustration 2

K1	K2	Run command
0	0	Stop
0	1	Stop
1	0	Forward
1	1	Reverse

2：S0、S1、S2 three-wire run control

Three-wire control mode run control terminal is fixed to S1, switch

function description is as follow:

1. SW1 ——Frequency inverter stop trigger switch
2. SW2 —— Forward trigger switch
3. SW3 —— Reverse trigger switch

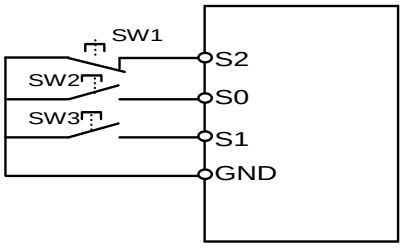


Figure 5-4 Three wire wiring diagram control mode

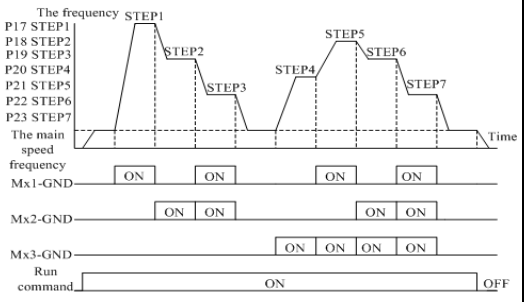
When parameter P38 is set to 02, besides wiring according to the above figure, any function is set by P39 become invalid at once. When P38 isn't set to 02, the original settings function is set by P39 come back.

P39	Multi-function input terminal S2 function selection(when P38 is 2, S2 is fixed as run control terminal)	00 ~ 28	5
P40	Multi-function input terminal S3 function selection		6
P41	Multi-function input terminal S4 function		7

	selection		
P42	Multi-function input terminal S5 function selection		8

Parameter P39 ~ P42 function list

Set value	Function	Description
00	No function	This terminal is without any function.
01	Coast to stop control	If close the terminal corresponding with this parameter, the drive would block output, the motor would coast to stop, when this terminal is disconnected, the drive would start According to rotate speed track restart mode.
02	UP-DW frequency clear	When select UP/DW terminal to set run frequency, terminal defined by this parameter could achieve forcing UP/DW frequency clear.
03	DC braking control	When the drive stop, if terminal defined by this parameter close, then when output frequency is lower than dc braking start frequency, dc braking function would be started until this terminal is disconnected.

Set value	Function	Description
04	External fault input	When terminal set by this parameter close, it indicates that fault occur to external equipment, for the sake of the equipment safety at this moment, the drive would block output, external fault signal E017 is displayed through digital operator at the same time.
05	Terminal fault reset	When abnormal phenomenon occurs to the drive and corresponding fault is alarmed, this terminal could be used to reset the drive after the fault reason is removed, RESET key on other operation keyboard is with the same function.
06	Multi-step speed 1	7-step speed could be combined by switch combination of this three terminals, 9-step speed function could be achieved by coordinating main frequency source and auxiliary frequency source. The related coordination parameter is P17~P23. 
07	Multi-step speed 2	
08	Multi-step speed 3	

Set value	Function	Description
09	Forward jog	When run command channel select external terminal valid, this parameter define the input terminal of external job signal.
10	Reversal jog	
11	Select Acc. And Dec. time 2	When terminal which is used to set this function is disconnected, the Acc. and Dec. speed of the drive would run According to the Acc. and Dec. speed time set by P10 and P11. When it close, the Acc. and Dec. speed of the drive would run According to the Acc. and Dec. speed time set by P12 and P13.
12	Pendulous frequency run input	
13	Pendulous frequency state reset	
14	UP frequency increase by degrees	During this set function terminal switch motion, the frequency set of the drive would increase or Decrease a unit, when switch motion is keeping, the output frequency would increase by degrees or Decrease by degrees According to the rate(UP/DW terminal modified rate) set by P140. This UP/DOWN function terminal could only be used as run frequency setting (couldn't modify other parameters).
15	DOWN frequency Decrease by degrees	

Set value	Function	Description
16	PLC run input	When selecting programmable PLC program run function, external terminal defined by this parameter could achieve the input and resection of PLC program run.
17	PLC state reset after stop	When programmable PLC program run function stop, external terminal defined by this parameter could achieve forced state reset function.
18	Counter trigger signal input (Valid only for S5 terminal)	This parameter stipulate counting movement of internal counter, the clock terminal of the counter is selected by P42. (only S5 could be selected as clock input side) When the count value that the counter to external clock get the value stipulated by P96, width outputted from corresponding multi-function output terminal is equal to effective signal of external clock periodic. When the count value that the counter to external clock get the value stipulated by P97, valid signal is outputted from corresponding multi-function output terminal, further count, when exceed value stipulated by P96 and cause counter clear, the output valid signal is cancelled. The clock period of the counter should be larger than 6ms, and the min pulse width is 3ms.

Set value	Function	Description
19	Counter reset	When this function terminal switch is on, the current count display value would be cleared, recover to show c00 until this function terminal is disconnected, then the drive could Accept trigger signal and counter again.
20	Retain	
21	Retain	
22	Retain	
23	Retain	
24	Retain	
25	Retain	
26	Retain	
27	Retain	
28	Open 2rd freq. source	The function terminal set by this parameter could be used to start 2nd frequency source (parameter P142), that is to achieve mutual switch of two frequency source (setting value of P00 and P142). It is convenient that customer could choose different frequency command source in different mode.

When we set the above multi-function terminals, the value settings by each terminal couldn't be repeated.

P43	Analog output signal AFM settings	0 ~ 3	0

0：Output freq. (0~max. output freq.)

1：Output current (0 ~ 250% rated current)

2：PID feedback signal(0 ~ 10.00V)

3：Output voltage(0 ~ 100%)

P44	Analog output AFM gain settings	0 ~ 200%	100

P45	Multi-function output terminal(MO1) settings	0 ~ 20	0
P46	Multifunction output relay TA, TB, TC settings	0 ~ 20	7

P45、P46 function list:

Set value	Function	Description
00	Indication in operation	When the drive is in run state, it outputs valid signal, and in stop state, it outputs invalid signal.
01	Freq. arrival	When the output frequency of the drive approaches the scope of setting frequency (this scope is confirmed by

Set value	Function	Description
		P48), it outputs valid signal, otherwise, it output invalid signal.
02	Zero-speed run	When the setting frequency of the drive is lower than the mini start frequency setting, and the run indication is valid, the output frequency is 0Hz, the selected terminal would output valid signal.
03	Freq. level detection	When the output frequency of the drive exceeds the set value (P49) of FDT (frequency level), via FDT output delay time set value (P50), valid signal is outputted. When the output frequency is lower than FDT (frequency level), it outputs invalid signal via the same delay time.
04	External fault	When external fault input signal is valid and cause the drive to stop, this port output valid signal, otherwise, it outputs invalid signal.
05	Under-voltage stop	When dc side voltage of the drive is lower than specified value, the drive stop, the port outputs valid signal at the same time, otherwise, it outputs invalid signal.
06	Retain	
07	Fault	When the drive is in fault state, this port output valid signal, it output

Set value	Function	Description
	indication	invalid signal when the drive is without any fault.
08	Random freq. arrival	When the output frequency of the drive get random setting frequency, the selected output terminal outputs valid signal until that it makes the output frequency fall to the scope of plus-minus detection range (frequency arrival detection range is Decided by P48), then it could be removed.
09	Freq. arrive upper limit	When the output frequency of the drive arrive upper limit frequency, the selected output terminal output valid signal.
10	Run completion indication within a phase	When PLC program automatic run function is valid, each time after finish a stage, selected port would output valid signal, but only maintains 500ms, and then recover
11	Mode run completion indication	When the executive program of the drive revolve automatically and finish all stages, this junction will be close, but only maintain 500ms.
12	Freq. arrival lower limit	When the output frequency of the drive arrive upper limit frequency, the selected output terminal outputs valid signal.

Set value	Function	Description
13	Setting count value arrival	When the drive execute external counter, when count value is equal to P96 set value, the selected output terminal output valid signal.
14	Appoint count value arrival	When the drive execute external counter, and when the counter is equal to P97 set value, the selected output terminal output valid signal.
15	Pendulous freq. upper and lower limit	When parameter setting of pendulous frequency run result in that the pendulous freq. run freq. exceeds upper and lower limit frequency limit, valid signal (low level) is outputted.
16	Retain	
17	Retain	
18	Retain	
19	Retain	
20	Retain	

Note:

For the selected multi-function output terminal (MO1), signal valid refers that it is low level between the junction, signal invalid refers that it is high configuration between the junction; but for selected multi-function output relay TA, TB, TC, signal valid refers that the corresponding contact close, signal invalid refers that the corresponding contact disconnect. In application, both of them could

be regarded as close and disconnect of contact, it should be paid attention that the bearing current (or voltage) is different.

P47	Random arrival freq. setting	0.00 ~ 400.0Hz	0.00

This parameter is used to set frequency value randomly. When the output frequency of the drive is within the plus-minus detection range (P48) of random setting frequency (P47), the selected output terminal output valid signal.

P48	Freq. arrival detection amplitude	0.00 ~ 20.00Hz	5.00

This parameter is used to set the defined output terminal frequency arrival detection range, when the output frequency of the drive is within the plus-minus detection amplitude of the set frequency, the selected output terminal output valid signal.

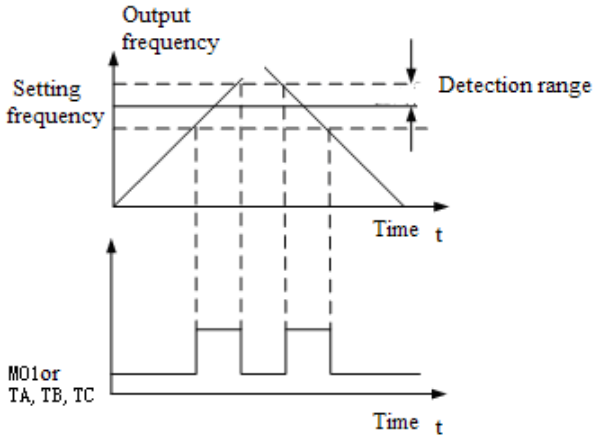


Figure 5-5 Illustration of frequency arrival detection range

P49	FDT(Freq. level) settings	0.00 ~ 400.00Hz	10.00
P50	FDT output delay time	0.1 ~ 200.0s	2.0

This parameter set is used to set frequency detection level, when output frequency is higher than FDT set value, after setting delay time, the output terminal output valid signal.

P51	Under-voltage protection level	350 ~ 500Vdc	390

This parameter stipulates the lower limit voltage allowed by dc side when the drive work regularly, for situation where the power grid is low, under-voltage protection level could be lowered properly to guarantee the drive work normally.

P52	Motor rated current settings	0.1 ~ 100.0A	Model related

This parameter should be set According to the motor nameplate and specification, the set value before delivery is set automatically According to the rated power of the drive, this parameter could be used to restrict the output current of the drive to prevent motor overheat (motor no-load current<motor rated current<driver rated current).

The set value before delivery is the rated full-load current of the drive, the value displayed by this parameter is the actual current value, customers don't need to calculate, they could input the current on the nameplate directly.

Notes: In vector control mode, be sure to set this parameter.

P53	Motor no-load current settings	(0.25 ~ 0.75) *P52	Model related

Setting motor no-load current parameter would effect the slip compensation directly. When motor rated current P52 is modified, the parameter becomeP53=P52*0.375 automatically, customers could input no-load current manually during motor no-load run.

P54	Manual operation torque compensation	0 ~ 200	0

This parameter could set that the drive output extra voltage automatically during run to get higher torque. This parameter is only valid for VF control.

P55	Slip compensation gain	0.00 ~ 1.50	0.30

When the inverter drive asynchronous motor, the load increase, slip frequency would increase, this parameter could compensate rotate speed, reduce slip frequency, and make the running speed could approach asynchronous speed when the motor is in rated current. This parameter is only valid for VF control.

P56	Drive rated voltage indication	Read-only	Model related
P57	Drive rated current indication	Read-only	Model related

This parameter set is used to display rated voltage and rated current of the drive respectively.

P58	Motor overload ratio	50 ~ 120%(motor rated current)	100

It is used to set motor overload ratio, protection is based on P52 motor rated current and this parameter.

P59	Pendulous freq. run mode setting	0 ~ 2	0

Pendulous freq. run function run mode is set by this parameter.

0：Pendulous freq. function close

Pendulous freq. is invalid.

1：Pendulous freq. function valid

When the inverter get run command, it could run According to pendulous freq. preset frequency P62, when it gets stipulated time P63, it is switched to pendulous freq. run mode.

2：Pendulous freq. function condition valid

When external pendulous freq. input terminal (pendulous freq. input terminal is selected by P39~P42) is valid, run in pendulous freq. mode, when external input terminal is invalid, run in pendulous freq. preset frequency P62.

P60	Pendulous freq. start mode after stop	0 ~ 1	0

0：Start According to the state before stop

The inverter storage state before stop, it would be back to breakpoint state automatically after start (state before stop), and continue to run.

1：Restart

The inverter don't storage state before stop, it restarts to run after start.

P61	Pendulous freq. run mode	0 ~ 1	0

0：Change amplitude

1：Fixed amplitude

During realizing pendulous freq. function, this parameter is used to set run mode, and coordinate with other parameter to get different pendulous freq. effect. Please refer to the detailed description of the

related parameter P149~P152。

P62	Pendulous freq. preset freq.	0.00Hz ~ P03	10.00

Presetting frequency refers to the running frequency before the inverter inputs pendulous freq. run mode, or breaks away from pendulous freq. running mode. The running mode of presetting frequency is decided by pendulous freq. function enabled way.

When selecting pendulous freq. function (P59=01), the inverter enters into pendulous freq. preset frequency when it starts, after passing preset frequency retain time (P63), it enters into pendulous frequency run state.

When selecting pendulous freq. function (P59=02), the inverter enters into pendulous freq. When pendulous freq. input terminal is valid after the inverter starts. When pendulous freq. input terminal is invalid, the inverter outputs preset frequency (P62 set value).

P63	Pendulous freq. preset freq. hold time	0.0 ~ 600.0s	0.0

This parameter is used to set the retain time of preset frequency when pendulous freq. function (P59=0) is valid.

P64	Display frame selection when start up	0 ~ 22	6

P64 function list:

set value	Function	Set value	Function

00	Display actual run frequency (H)	01	Motor speed (The right most Decimal point light when exceed 9999)
02	Display output voltage(E)	03	Show main circuit DC dc voltage(u)
04	Retain	05	Display count value(c)
06	Display setting frequency(F)	07	Display parameter setting menu (P)
08	Inverter temperature (d)	09	Display motor run current(A)
10	Forward/reverse (Frd/Rev)	11	External terminal state(T)
12	AVI (U)	13	ACI (U)
14	AFM (U)	15	Keyboard potentiometer(U)
16	PID setting (U)	17	PID feedback (U)
18	Running mode (U) (0: Routine operation 1 Job operation, 2 Pendulous freq. operation 3 PID operation 4 PLC operation 5 Multi-speed	19	PLC operation speed (U)

	operation)		
20	Multi-segment speed(U)		

P65	Motor speed display ratio	0.01 ~ 20.00	1.00

Motor speed adjustment ratio: show value=motor speed*P65, if show “9999”, the actual value is “9999”, if show “9999”, the actual value is 10 times of show value.

P66	Communication freq. settings	0.00Hz ~ P03	0.00

When frequency source is communication input, this parameter is the initial value of communication frequency.

P67	Forbidden set freq. I	0.00 ~ 400Hz	0.00
P68	Forbidden set freq. II	0.00 ~ 400Hz	0.00
P69	Forbidden set freq. III	0.00 ~ 400Hz	0.00

These three parameters is used to set forbidden set frequency, combining with forbidden set width (P70), actual output frequency of the inverter would skip these frequency scope, but the output frequency displayed on operation keyboard change continuously, the jump process couldn’t be distinguished.

P70	Forbidden freq. width settings	0.10 ~ 20.00Hz	0.00

When the frequency is set within the scope of hopping frequency, the actual running frequency would run in hopping frequency boundary which is near to setting frequency, please refer to figure 5-6.

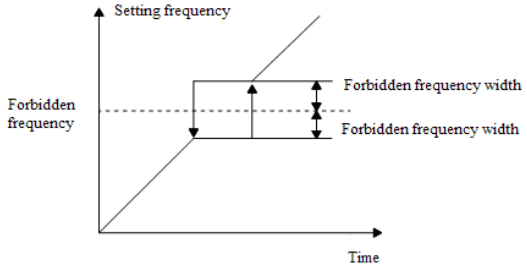


Figure 5-6 Illustration of hopping frequency

The drive could keep away from equipment resonance point of the load by setting hopping frequency. The inverter could set a hopping frequency point. If set hopping frequency to 0, this function would lose effect.

P71	Carrier freq. setting	1 ~ 12 kHz	8

This parameter is used to set the carrier frequency outputted by PWM.

This function is used to adjust the carrier frequency of the inverter. By adjusting carrier frequency, motor noise could be lowered, resonance point of mechanical system could be avoided, leakage current that the line to ground could be decreased and interference caused by inverter could also be lowered. When carrier frequency is lower, output current ultra harmonics component increase, loss of machine increase, temperature rise in electric motors increases. When carrier frequency is higher, the loss of machine will be

decreased, temperature rising in electric motors will be decreased too; but the loss of inverter will be increased, the inverter temperature rising will be increased, and interference increase. The effect caused by carrier frequency to equipment and environment are as the following table:

Carrier frequency↑	Motor noise↓
	Temperature rise in electric motors high↓
	Output current smoothness↑
	Inverter temperature rise↑
	Leakage current↑
	Radiated disturbance↑

P72	Fault automatic reset times	00 ~ 10	0

This parameter is used to set the allowed automatic reset times when fault occurs to the inverter, fault automatic reset time interval is decided by P77. When P72 is set to 00 or actual fault reset times exceed P72 set value, automatic reset function will not be executed after fault, and it is in fault protection state, reset by hand until fault is removed. When fault automatic reset is achieved, the inverter would restart in rotate speed track restart mode when restart executing again.

P73	Nearest 1st time exception record	0 ~ 24	0
P74	Nearest 2nd time exception record		
P75	Nearest 3rd time exception record		

P73 ~ P75 function list:

Set value	Function	Set value	Function
E000	No fault	E014	Retain
E001	IGBT short circuit protect	E015	IPM fault
E004	Acceleration over-current	E016	IGBT module overheat fault
E005	Deceleration over-current	E017	External fault
E006	Constant speed over-current	E018	Retain
E007	Accelerate overvoltage	E019	Current detection fault or outputted fault loss fault
E008	Deceleration overvoltage	E020	Motor parameter auto-learning fault
E009	Constant speed	E021	EEPROM operating trouble

Set value	Function	Set value	Function
	overvoltage		
E010	Busbar under-voltage fault	E022	Retain
E011	Motor overload	E023	Retain
E012	Frequency converter overload	E024	Temperature sensor fault
E013	Retain		

P73～P75 only record abnormal info of the last three times, and P73 is the latest abnormal record.

P76	Parameter lock/reset set	0～2	0

0：No operation

1：Parameter initialization (including clearance fault record)

If abnormal movement is caused due to parameter fault operation or error of commission, set this parameter to 01, reset to factory and adjust again.

2：Only clear fault record

If set this parameter to 02, the last three times abnormal info of the inverter could be cleared.

P77	Fault automatic reset time interval	0.1 ~ 100.0s	5.0

This parameter is used to set the time interval between the twice fault resetting after fault occurs to the inverter.

P78	PLC running mode selection	0 ~ 5	0

0: Single cycle mode

1: Single cycle stop mode

2: Continuous cycle

3: Continuous cycle stop mode

4: Keep final value

5: End value stop mode

The application of this parameter is the running program control of general small machinery, foodstuff processing machinery and washing machine. It could in place of some control circuit like traditional relay, switch and timer. There are many related parameter setting when using this function, mistakes couldn't occur to each detail.

0: Single cycle mode

The inverter set frequency run as 1st stage speed, and output frequency step by step According to set run time. If the set run time of a certain stage of speed is 0, then skip this stage of speed, the inverter stop output after finishing running a cycle, it need to input an effective run command again to start another cycle process.

1: Single cycle stop mode

Basic running mode is the same with Mode 0, the different is that the inverter output next stage frequency after the output frequency

Decreased to 0 According to designed Dec. time after the inverter finish each stage of running.

2: Continuous cycle mode

The inverter operates 8th stage speed in cycle, that is the inverter would start to run in cycle from 1st stage after it finish 8th stage speed.

3: Continuous cycle stop mode

Basic running mode is the same with Mode 2, the different is that the inverter output next stage frequency after the output frequency Decreased to 0 According to designed Dec. time after the inverter finish each stage of running.

4: Keep final value

Basic running mode is the same with Mode 0, the inverter won't stop after finishing single cycle, it would run according to the last stage speed which the time is not set to 0, other process is the same with mode 1.

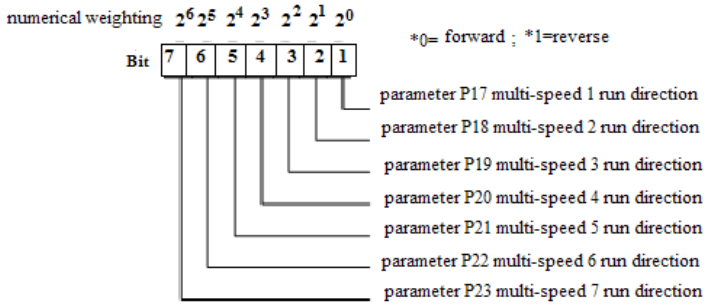
5: End value stop mode

Basic running mode is the same with Mode 4, the difference is that the inverter output next stage frequency after the output frequency decreased to 0, according to designed Dec. time after the inverter finish each stage of running.

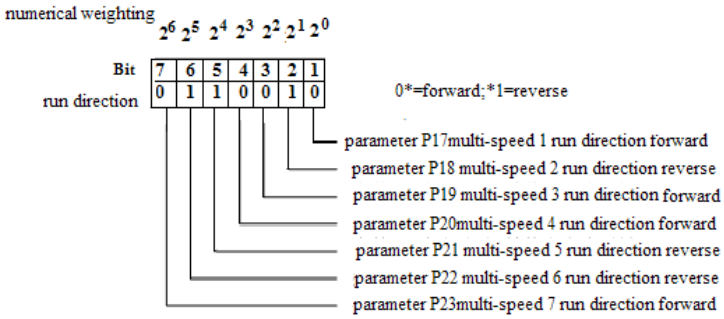
P79	Mode run direction selection	0 ~ 127	0

The set of this parameter could Decide the running direction of each stage of P17 ~ P23 during program run.

Setting method: adopt numerical weighting method to convert from 7-bit binary number to Decimal number, and then input it to other parameter. The meaning corresponding to each bit is as follows:



Setting sample: set stage speed 7 forward, stage speed 6 reverse, stage speed 5 reverse, stage speed 4 forward, stage speed 3 forward, stage speed 2 reverse, stage speed 1 forward, the meaning corresponding to each bit is as follows:



Parameter number:

$=bit7\times2^6+bit6\times2^5+bit5\times2^4+bit4\times2^3+bit3\times2^2+bit2\times2^1+bit1\times2^0$

$=0\times2^6+1\times2^5+1\times2^4+0\times2^3+0\times2^2+1\times2^1+0\times2^0$

$=0+32+16+0+0+2+0$

=50

So parameter P79=50

☞Note: Normal 2^n

2^6=64；2^5=32；2^4=16；2^3=8；2^2=4；2^1=2；2^0=1。

P80	PLC action selection	0～2	0

0：Inaction

1：Action

When the inverter running command is valid, the inverter would enter into PLC program run state.

2：Conditional action

When external PLC input terminal is valid (selected by P39～P42), the inverter would run According to target frequency set by PLC program mode. When external input terminal is invalid, the inverter would enter into lower priority level frequency setting mode automatically.

P81	1st stage run time setting	0.0～6000.0s	0.0
P82	2nd stage run time setting	0.0～6000.0s	0.0
P83	3rd stage run time setting	0.0～6000.0s	0.0
P84	4th stage run time setting	0.0～6000.0s	0.0

P85	5th stage run time setting	0.0 ~ 6000.0s	0.0
P86	6th stage run time setting	0.0 ~ 6000.0s	0.0
P87	7th stage run time setting	0.0 ~ 6000.0s	0.0

The setting time of the above 7 parameters is to coordinate the run time of each stage of PLC program automatic run.

Special version: if this parameter is set to 0s, it indicates that running of this stage is omitted and skip to next stage to execute automatically. It means that though this series inverter offer 7 stage speed program run, users could cut program run to 5 stage, 3 stage According to application needs, movement execution could achieve target as long as the stage time don't want to execute is set to 0s.

P88	RS-485 communication address	0 ~ 247	1

If the inverter is set to RS-485 serial communication control, each inverter should set the only address under this parameter.

P89	Data transmission speed	0 ~ 2	1

0：4800bps

1：9600bps

2：19200bps

This parameter is used to set data transmission rate between upper

computer and inverter.

☞Note: The baud rate set by upper computer and the inverter should be inconformity, otherwise, the communication couldn't be conducted. The bigger the baud rate, the quicker the communication speed.

P90	Transmission error handling, stop mode	0 ~ 1	0

0: continue to run

1: stop

This parameter is used to selected movement selection after communication failure. The inverter could select shield communication fault, stop or continue to run in communication abnormal situation.

P91	Communication transmission overtime detection	0.0: No transmission overtime detection0.1 ~ 120.0s	0.0

When the local machine doesn't receive correct data signal after exceeding the time interval defined by this parameter, it is judged that fault occurs to communication. Then it selects stop or continue to run According to the working mode after communication failure set by P90.

P92	Communication data form	3 ~ 5	3

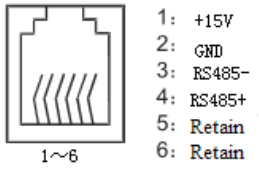
3: Modbus RTU mode，no verification <8,N,1>

4: Modbus RTU mode，even parity check<8,E,1>

5: Modbus RTU mode，odd parity check<8,O,1>

Data format set by frequency inverter should be coincident with the upper machine's data. Otherwise, communication couldn't be conducted.

MN series frequency inverter is inbuilt RS-485 serial communication interface. The upper end of communication port (J1) control panel could be connected with 6PIN telephone connector. The terminal definition is as follows:



P93	Start freq.	0.0 ~ 10.00Hz	0.00
P94	Start freq. duration time	0.0 ~ 20.0s	0.00

Setting suitable start frequency could increase torque when start. Within hold time (P94) of start frequency, output frequency of the inverter is start frequency (P93), and then run from start frequency to target frequency, if target frequency is lower than start frequency (P93), the inverter would not run, and be in stand by state. Start frequency (P93) is not subject to lower limit frequency.

P95	Automatic energy-saving operation	0 ~ 1	0

0: Invalid

1: Valid

When select automatic energy-saving run, the inverter would detect motor load status automatically, and adjust the output voltage to keep the motor working in high efficient state to achieve best energy-saving effect.

P96	Set count value	0 ~ 9999	0
P97	Appoint count value	0 ~ 9999	0

This parameter stipulates count movement of inner counter, clock terminal of the counter is selected by P42. (Only terminal S5 could be selected as clock input side).

When count value calculated from external clock by counter get value stipulated by P96, a valid signal equal to external clock period in width is outputted from corresponding multifunction output terminal.

When count value calculated from external clock by counter get value stipulated by P97, a valid signal is outputted from corresponding multifunction output terminal. Further to count till exceeding value stipulated by P96 and cause the counter reset, the output valid signal would be cancelled.

Clock period requirement of the counter is bigger than 6ms, the mini pulse width is 3ms.

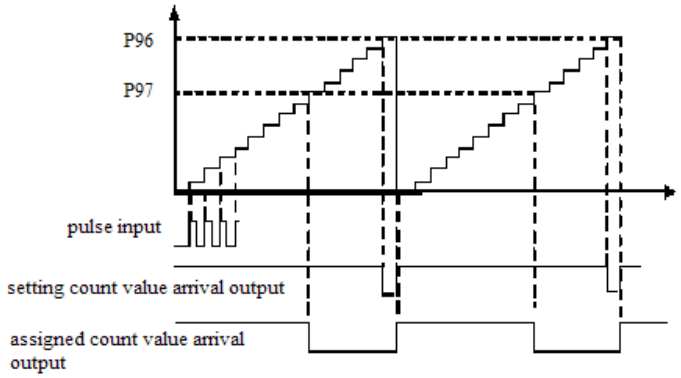


Figure 5-7 Internal counter function

P98	Cumulative boot time	Hours	

Show start up cumulative time of the inverter.

P99	Freq. lower than lower limit freq. selection	0 ~ 1	1

0: Run in zero freq.

When the given frequency is lower than lower limit frequency set by P37, it would run zero frequency. But a certain output voltage would be kept according to working condition.

1: Run in lower freq.

When the given frequency is lower than lower limit frequency set by P37, it would run in lower limit frequency.

P100	Software version	Read only	

This parameter show the software version of the inverter, it is only for read.

P101	Dead zone compensation correction	0 ~ 20	0

Low frequency torque could be improved by modifying dead zone compensation correction factor properly, it don't need to be adjusted generally.

P102	Automatic stabilivolt output adjustment AVR	0 ~ 2	0

0: Invalid

1: Dynamic valid: automatic stabilivolt function is valid in all condition.

2: Static valid: automatic stabilivolt function is valid only in constant speed run.

Automatic stabilivolt function is to guarantee that the output voltage of the inverter wouldn't vary from the input voltage. When there is big variation with power grid voltage, and the motor needs stable stator voltage and current, this function should be opened.

P103	Motor parameter measure	0 ~ 1	0

0: No measurement function

1: Measurement motor resistance value R1 at a time

When measuring resistance value at a time, motor and load don't need to come away. When conducting test, vector control mode need to be set(P105=1), and set this parameter to 1 at the same time, the keyboard display ATUN at this time, press RUN key to start motor parameter measurement, motor parameter measurement would finish after 10s, keyboard returns to normal monitoring menu. In the process of motor parameter measurement, press STOP key to stop auto-learning, other keys are invalid. Motor parameter measurement is only valid for keyboard control.

Notes: before conduct motor parameter measurement, motor related parameter need to be set:

P52: motor rated current, input refer to motor name plate.

P53: motor exciting current, input According to motor no-load current. ;

P148: motor pole

P106: motor rated slip

P104	Motor resistance R1 at a time	1 ~ 65535milliohm	Model determination

This parameter could be used to set the resistance value of motor stator, it could be input in hand, and it could be measured automatically by using P103.

P105	Control mode	0 ~ 1	0

Select control mode of the inverter.

0: V/F control

V/F control is applied in speed regulation situation that control precision requirement is not high, such as fan and pump load.

1: No PG speed vector control

No PG vector control mode refers to open loop vector control, applied in situation that speed control precision requirement is high and with lower frequency torque, a inverter could only drive a motor.

Notes: Vector control performances rely on the Accuracy of motor parameter greatly, so the following motor related parameter need to be set:

P52: motor rated current, input refer to motor name plate.

P53: motor exciting current, input According to motor no-load current.

P148: motor pole

P106: motor rated slip

P106	Motor rated slip	0.00 ~ 10.00Hz	Model determination

The formula mode is as follow:

Example:

The rated speed of 4 pole (P148=4) 3φ50Hz/220V on the motor nameplate is 1410RPM, its rated slip calculation formula is as follow:

Rated slip=50 - (1410 * P148/120) =3Hz

P106 need to be set to 3.00Hz.

P107	Start pre-excitation selection	0: Invalid 1: Valid	1
P108	Start pre-excitation time	0.10 ~ 2.00	0.30

When the motor is in stop mode before start, to get enough start torque, air-gap flux should be built in advance.

This parameter set is only valid in vector control mode. It could get the same effect with dc braking when start. But braking dc is decided by motor exciting current.

P109	Zero-speed control function	0 ~ 1	1

0: No output

1: Normal output

P110	Retain		

P111	UP/DOWN terminal freq.	0.00 ~ P03	0.00

This parameter is used to set the initial value of UP/DOWN frequency.

P112	Start mode when restart after power cut	0 ~ 1	0
P113	Normal start mode selection		

This parameter is used to select motor start mode.

0: Start from 0 Hz

1: Rotate speed track start

P114	Cooling fan start selection	0 ~ 1	0

0: Fan revolve when the drive run, fan stop when the drive stop

1: Always run

P115	PID goal source settings	0 ~ 4	0

0: Without PID function

1: Keyboard potentiometer settings

2: AVI（0 ~ 10V）settings

3: ACI（4 ~ 20mA）settings

4: PID setting address（refer to P125）

PID control is a common method of process control, which conduct ratio, integral, differential operation through dispersion of the feedback signal of the controlled variable and target signal. To consist of loop system and keep the controlled variable in target value by adjusting the output frequency of the inverter. It applies to process control situation such as flow control, pressure control and temperature control. Process PID control functional block diagram is as figure 5-8.

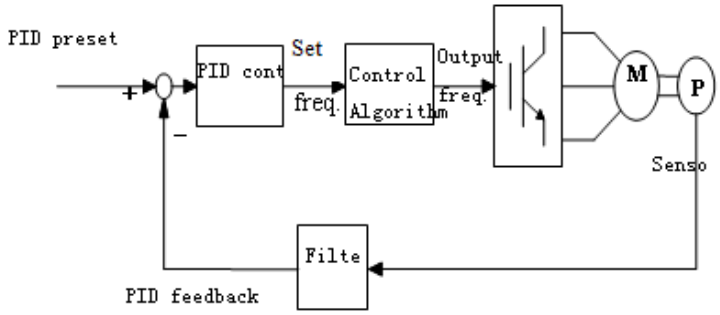


Figure 5-8 Process PID functional block diagram

P116	PID feedback source selection	0 ~ 2	0

0: Analog voltage feedback 0 ~ 10V（AVI）

1: Retain

2: Analog current feedback 4 ~ 20mA（ACI）

P117	Proportional gain（P）	0.0 ~ 50.0	10.0

P118	Integral time（I）	0.10～50.00s	1.00

Proportional gain (Kp): it Decides the adjustment intensity of the whole PID regulator, the bigger the Kp, the bigger the adjustment intensity.

Integral time (Ti): Decide the deviation of PID feedback and given to conduct integral adjustment speed.

P119	Close loop preset freq.	0.00～50.00Hz	0.00
P120	Close loop preset freq. hold time	0.0～600.0s	0.0

In some control system, in order to make the controlled object get the scheduled number quickly, the inverter set output a frequency P119 till preset time P120 forcedly According to this parameter. When the control object is near to control objective, PID controller could be input to increase response speed.

P121	Mini PID fixed variable	0.0～10.00V	0.0
P122	Max PID fixed variable	0.0～10.00V	10.00
P123	Min PID feedback variable	0.0～10.00V	0.0
P124	Max PID feedback variable	0.0～10.00V	10.00

It is used to set the corresponding relation between PID object

given signal and PID feedback signal.

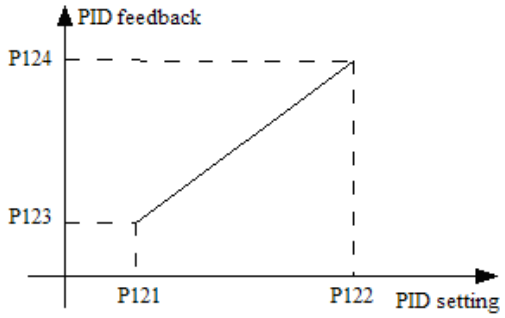


Figure 5-9 Mapping relation of PID feedback and PID setting

P125	PID digital setting	0.00 ~ 10.00V	0.00

When PID object source is set to 4(P115=4), this parameter setting act as PID object setting.

P126	Deviation allowed limit	0.0 ~ 20.0%	0.0

This parameter provides the allowed biggest deviation value relative to closed loop set value. Within deviation limit, PID regulator stops adjustment. Setting this function code reasonably could adjust the precision and stability of PID system. This function is mainly used for system that the requirement on control precision is low, and system which avoid frequent adjustment, such as constant pressure water supply system.

P127	PID freq. output upper limit	0.00 ~ P03	50.00

It is used to set upper limit frequency in PID control.

P128	Zero freq. corresponding AVI input voltage	0.0 ~ 10.0V	0.0
P129	Max freq. corresponding AVI input voltage	0.0 ~ 10.0V	10.0

It is used to set the relation between AVI input voltage scope and the corresponding setting frequency scope.

P130	Reverse AVI selection	0 ~ 1	0

0: No reverse

1: Reverse

This parameter is set by reverse parameter P128 and P129, when reverse is valid, P128 setting is corresponding to max frequency, P129 setting is corresponding to 0 frequency.

P131	Zero freq. corresponding ACI input current value	0.0 ~ 20.0mA	4.0

P132	Max freq. corresponding ACI input current value	0.0 ~ 20.0mA	20.0

It is used to set the relation between ACI input voltage scope and the corresponding setting frequency scope.

P133	Reverse ACI selection	0 ~ 1	0

0: No reverse

1: Reverse

This parameter is set by reverse parameter P131 and P132, when reverse is valid, P131 setting is corresponding to max frequency, P132 setting is corresponding to 0 frequency.

P134	Analog input filter time	0.01 ~ 1.00s	0.10

Filtering processing is conducted to frequency set by external analog input to eliminate setting wave effectively. The time constant of filter should be set properly according to the wave extent of external input signal. If the setting is too big, it would delay the response speed to setting signal.

P135	Sleep delay time	0 ~ 600s	120

When inverter PI adjustment output frequency is lower than sleep frequency (P137), and duration time exceed sleep delay time of this parameter, the inverter would stop and enter into sleep state.

P136	Awake delay time	0 ~ 600s	30

When PID feedback is lower than wake value (P138), and the duration time exceed awaken delay time of this parameter, the inverter would quit sleep state and begin to output frequency.

P137	Sleep frequency	0.00 ~ P03 0.00Hz non-dormant	0.00

When sleep frequency isn't 0, sleep function is started.

P138	Awake threshold value	0.0 ~ 10.00V	0.00

This parameter is used to set PID feedback which the inverter begins to awake and start. When PID feedback is lower than awaken threshold value of this parameter, awaking time begins.

P139	Process mode when counter arrives	0 ~ 1	0

0: Remain in operation

1: Freely stop and display external fault

This parameter is used to set the follow-up movement situation of the inverter when counter count get the set count value (P96).

P140	UP/DW terminal modification rate	0.01 ~ 100.0Hz/s	10.00

When frequency source select UP/DOWN terminal setting, this parameter set the rate of UP/DOWN increase by degrees or Decrease by degrees.

P141	Storage setting freq. selection	0 ~ 1	1

0: Don't storage freq. before power off

1: Storage freq. before power off

This parameter is only valid for digital setting frequency.

P142	2nd freq. instruction source setting	0 ~ 5	0

0:Keyboard digital setting

1: Analog signal 0 ~ 10V input（AVI）

2: Analog signal 4 ~ 20mA input（ACI）

3: Communication setting（RS-485）

4: Keyboard potentiometer setting

5: UP/DW terminal increase by degrees, Decrease by degrees setting

When multi-function set terminal function is set to 28, and close of this terminal is valid, channel output frequency is selected According to 2nd frequency source.

P143	Dynamic braking starting voltage	630 ~ 760Vdc	700
P144	Dynamic braking ratio	10 ~ 100%	50

When internal dc side voltage of the inverter is higher than dynamic braking start voltage, the inbuilt braking unit will act. If there is external braking resistor, voltage energy of the internal dc side voltage of the inverter would be released through brake resistor to make the dc voltage fall.

Adjusting dynamic braking ratio could adjust braking effect. The higher the braking ratio is, the clearer the braking will be, but the braking resistor gets heating.

P145	Waiting time if restart after power cut	0.0 ~ 20.0s	1.0s
P146	Restart after power cut setting	0 ~ 1	1

When running channel select terminal control:

0: Revolve available

If running terminal is in closed state before power on, when power on again, after P145 waiting time, the inverter would start to run whatever running state the inverter is in before the inverter power off last time.

If running terminal is in disconnected state before power on, the inverter wouldn't run automatically.

1: Revolve prohibited

If running terminal is in disconnected state before power on, if the inverter need to be started, this running terminal needs to be disconnected and then close this running terminal.

If terminal disconnect or abnormal close caused by switch bounce phenomenon due to mechanical vibration or switch part badness, the inverter is also possible to start run, so be sure careful when using this function.

When running channel select keyboard control:

0: Revolve available

If the inverter is in running state before power cut last, it would continue to run via P145 waiting time when power on again.

1: Revolve prohibited

The inverter could be started by pressing RUN after it power on again.

P147	Ace. and Dec. unit time selection	0 ~ 1	0

0: Ace./Dec. unit is 1 Decimal point (0.1s)

1: Ace./Dec. unit is 2 Decimal point (0.01s)

This parameter is used to set measurement Decimal point digit of Acc. and Dec. time unit, suitable parameter includes 1st and 2nd Acc. and Dec. and job Acc. and Dec. set.

P148	Motor pole number	2 ~ 20	4

It could be input directly According to motor nameplate or calculated According to motor rotate speed and motor rated frequency.

Motor pole P=120F/N(take round numbers), F is motor rated frequency, N is motor rated rotate speed.

P149	Triangle wave ascending & descending time	0.1 ~ 1000.0s	10.0
P150	Kick freq.	0.0 ~ 80.0%	10.0
P151	Pendulous freq. amplitude	0.0 ~ 50.0%	10.0
P152	Pendulous freq. center freq. setting	0.0 ~ P03	10.00

Parameter special for pendulous freq. run, function detail please refer to figure 5-10:

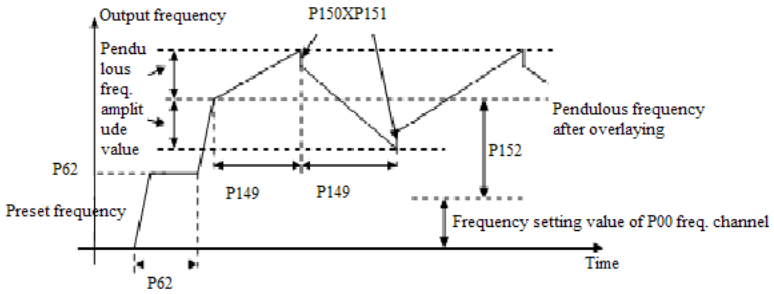


Figure 5-10 Illustration of pendulous freq. run

P153	Rotate speed estimated factor	10 ~ 500	20
P154	Rotate speed closed-loop gain	10 ~ 150	30

It is valid for vector control (P105=1), adjusting P153 , P154

could improve sensor-less vector control performance properly. It has been optimized before factory, it don't need to adjust generally.

P155	Shock compensating factor(rotate speed closed-loop integral time constant)	10～1000	200

If there is current wave phenomenon with the motor in a certain area, this situation could be improved effectively by adjusting this parameter.

P156	Communication response delay time	0～1000ms	5

Set inverter get host computer data, response the hose computer, send data delay time.

P157	Communication mode selection	0～1	1

0：Retain

1：Modbus

This parameter is used to select communication protocol format.

P158	Current sensor fault valid	0～1	1

0：Invalid

1：Valid

P159	PWM mode	0 ~ 1	0

0：PWM mode 0

The energy dissipation could be decreased if carrier frequency is self-adapted.

1：PWM mode 1

The frequency inverter heat would increase slightly if carrier frequency is fixed.

P160	Zero-frequency corresponding keyboard potentiometer voltage	0.0 ~ 10.0V	0.5
P161	Max freq. corresponding keyboard potentiometer input voltage	0.0 ~ 10.0V	9.5

It is used to set the relation between keyboard potentiometer input voltage scope and corresponding set frequency scope.

P162	Reverse keyboard potentiometer selection	0 ~ 1	0

0：No reverse

1：Reverse

This parameter is set by reverse parameter P160 and P161, when reverse is valid, P60 is set to max freq. P161 is set to 0 frequency.

Chapter 6 Communication Protocol

SVF-MN series VFD communicate with PC, PLC etc upper machines, and they need the support of J16PIN crystal plug seat. Between the upper user machine and frequency inverter communicate through the international standard ModBus communication, and the upper user machine as host machine, and the frequency inverter as slave machine. The communication content could be finished as follows: send operating command to frequency inverter, setting operating frequency, changing function code parameters, reading frequency inverter operation situation, monitoring parameters, fault information, function code etc.

6.1 Communication Allocation

Set baud rate and parity bit through P89, P92.

6.2 Protocol Form

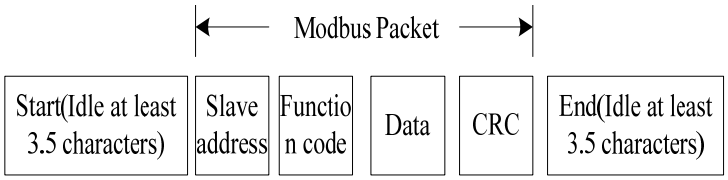


Figure 6-1 MODBUS protocol form

6.3 Protocol Form Instruction

6.3.1 Data type

All the data is expressed by 16 systems.

6.3.2 Salve machine address

The address of frequency inverter should be set through P88, 0 is broadcast address, slave address could be set to 1~247.

6.3.3 Read function code

Function code 03: present reading the variant the function code.

Realized function：reading frequency inverter operation situation, monitoring parameters, fault information, function code ,could read 6 continuous address frequency inverter parameter once time.

(1)Readable parameter address scatter：

Function	Address	Data and meaning
Operation status	2101H	BIT5: 0 Standard status, 1 fault status
		BIT11: 0 forward running stats, 1 reverse running status
		BIT12: 0 stop, 1 running
		BIT13: JOP commend
Monitoring parameters	2102H	Setting frequency 0.01HZ
	2103H	Output frequency 0.01HZ
	2104H	Output current 0.1A

	2105H	DC bus voltage 0.1V
	2106H	Output voltage 0.1V
	2107H	Multi-speed or PLC current segment
	2108H	Reserve
	2109H	Reserve
	210AH	Reserve
	210BH	Motor rotate speed RPM
	210CH	Reserve
	210DH	Temperature of the frequency inverter 0.1℃
	210EH	PID feedback value 0.01V
	210FH	PID target value 0.01V
	2110H	Reserve
	2111H	Analog quantity AVI value 0.1V
	2112H	Analog quantity ACI value 0.1V
	2113H	External terminal
Fault	2100H	0: No fault
		1: IGBT Short-circuits protection

		4: Over-current during Acceleration
		5: Over-current during Deceleration
		6: Over-current in constant speed operation
		7: Over-voltage during Acceleration
		8: Over-voltage during Deceleration
		9: Over-voltage in constant speed
		10: DC Bus under-voltage fault
		11: Motor over-load
		12: Frequency inverter over-load
		13: Reserve
		14: Reserve
		15: IPM fault
		16: IGBT module's heatsink overheat
		17: External equipment fails
		18: Reserve

		19: Current detection circuit has fault or output loss phase
		20: Auto-learning fails
		21: EEPROM operation fault
		22: Reserve
		23: Reserve
		24: Temperature sensor fault 25: Reserve
Function parameter	P00~P162(Corresponding 16 system is 00 00H~00A2H	Corresponding function code current value

☞Note: The value read from drive is Hex data, which is the integer after ignoring the Decimal point.

☞Note: The function parameter of frequency inverter divides into two part, one is high byte and low byte; the high byte presents the group serial number of function parameter; the low byte presents function parameter within the group number and need witch to 16 system.

（2）Frame in communication

The frame that upper machine send to frequency inverter：

Slave address	Function code	Parameter address high byte	Parameter address low byte	Read number high byte	Read number low byte	Parity bit high byte	Parity bit low byte

The frame that frequency inverter corresponding the upper machine:

Slave address	Function code	Read byte quantity	The first data high byte	The first data low byte	; ; ;	The n data high byte	The n data low byte	Parity bit high byte	Parity bit low byte

（3）For example

The upper machine read two data from the frequency inverter, and the two data is setting frequency and output frequency, the address is 2102H, 2103H, and the upper machine should send the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Read number high byte	Read number low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	03	21	02	00	02	6F	F7

The setting frequency of frequency inverter is 50.00Hz (corresponding 16 system data is 1388H). Bus voltage is 540v (corresponding 16 system data is 1518H).The frequency inverter feedbacks to the data to upper machine: n=2 is the number of variable quantity.

Slave address	Function code	Read number of byte (2 *n)	The first data high byte	The first data low byte	The second data high byte	The second data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	03	04	13	88	13	88	73	CB

6.3.4 Write operation function code

Function code Realized function: change the frequency inverters' control command, frequency instruct, function parameter. Just modify a single frequency inverter's parameter once time.

Function code 06：Stands for the function code of writing variable

(1)The address distribution of writing parameter

Function	Address	Data	Meaning
Communication control command	2000H	BITO~1	00B: no function
			01B: stop
			10B: start
			11B: JOG start
		BIT2~3	Reserve

Function	Address	Data	Meaning
		BIT4~5	00B: no function
			01B: Forward
			10B: Reversal
			11B: Reversal operation
		BIT6~15	Reserve
Address of communication setting frequency	2001H	Frequency commend 0.01Hz	
Reset commend	2002H	BIT0	Reserve
		BIT1	Reset
		BIT2~15	Reserve
Writing function parameter ROM	P00~P162(Corresponding 16 systems: 00 00~00 A2)	Set corresponding function code, and store in ROM, power-off protection	
Writing function parameter RAM	P00~P162(Corresponding 16 systems: 80 00H~80 A2)	Set corresponding function code, and store in RAM, without power-off protection	

☞Notice： The life of the EE PROM will be shortened if EE PROM is frequently stored. So the users should reduce the times of storing

EE PROM. And some parameter under communication mode is no need to store, and just need to change the value in RAM. When writing the RAM value of parameter, you could just change the register high address from 00H to 80H is ok. If writing the RAM of P64, the register address is 8040H (high byte address is 80H, Low byte address is 40H). But the express method of register address could not use to read the frequency inverter function parameter.

（2）Frame in communication

The frame that upper machine sends to frequency inverter:

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	Parity bit high byte	Parity bit low byte

Frequency inverter responses the frame content of upper machine: frequency inverter return the data is same with upper machine.

（3）For example

Example 1:

The Dec time of frequency inverter should change to 30.0s through upper machine, corresponding 16 system data is 012CH, and store this setting when power-off. Dec time F0.11 responds the address of 16 systems is 000BH.

And the upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	00	0B	01	2C	F8	45

And the frequency inverter feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	00	0B	01	2C	FB	45

Example2:

The Dec time of frequency inverter changes to 30.0s through upper machine, corresponding 16 system data is 012CH, and not store this setting when power-off. Dec time F0.11 responds the address of 16 systems is 800BH.

And the upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high	Parameter address low byte	Data high	Data low byt	CRC Parity bit high	CRC Parity bit high

		byte		byte	e	byte	byte
01	06	80	0B	01	2C	D1	85

And the frequency inverter feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	80	0B	01	2C	D1	85

6.3.5 Abnormal Responding Function Code

（1）Abnormal responding form

For the normal response, the frequency inverter responds the feedback data to upper machine according to the above form.

For the abnormal response, the frequency inverter return to the abnormal response form as follows;

Slave address	Function code +80H	Abnormal code	CRC Parity bit high byte	CRC Parity bit high byte

（2）The meaning of abnormal code：

Modbus abnormal code		
Code	Name	Meaning
01H	Illegal function	The received function code from PC is not allowed operation ; the slave device handles the requirement in the wrong state
02H	Illegal data address	The required address of the PC is not allowed; especially, register address and the number of bytes transmitted combination is invalid.
03H	Illegal data value	There are not allowed value in the receiving data field. ☞Note: It is never meaning that there is a value exceeded the application's expectation in the data items submitted to store.
06H	The slave device is busy	The drive is busy(E2PROM is storing)
10H	Error password	The written password from password checking address is different with the value (F9.03) set by users.
11H	Checking is wrong	When the RTC format, CRC checking bit is different with the calculated checking value, the wrong message will be send.
12H	Modified parameter is invalid	In the parameter written command, the data exceeds the parameter's range or the current state of written address can not be rewritten.
13H	System is	When the PC reads or writes, the user's

	locked	password is set, and the lock of the password doesn't be unlocked, the system will report locked

（3）For example 1: To change the frequency inverter's main frequency source to 9 through upper machine, and store that setting value after power-off.

The upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	F0	00	00	09	49	CC

But the max allowed setting value of main frequency source P00 sets 8, and when sets9 is illegal data, and the frequency inverter return to abnormal code 03. And the frequency inverter returns to the data to upper machine as follows;

Slave address	Function code +80H	Abnormal code	CRC Parity bit high byte	CRC Parity bit high byte
01	86	03	02	61

6.4 CRC parity

Based on MODBUS-RTU' 16 CRC panty, get Parity bit high byte and low byte.

The CRC verify function as follows;

```
unsignedintcrc_chk_value(unsigned char *data_value, unsigned char length)
{
    unsignedintcrc_value=0xFFFF;
    int i;
    while(length--)
    {
        crc_value^=*data_value++;
        for(i=0;i<8;i++)
        {
            if(crc_value&0x0001)
                crc_value=(crc_value>>1)^0xA001;
            else
                crc_value= crc_value>>1;
        }
    }
    return(crc_value);
}
```

Chapter 7 Troubleshooting

Table 7-1 listed the possible faults of VFD-M, and the fault code indicate range is from E001 and E004 ~ E025. Once a fault occurs, you may check it against the table and record detailed phenomena before seeking service from your supplier.

7.1 Faults and actions

Table 7-1 Faults and actions

Fault code	Fault categories	Possible reasons of fault	Actions
E001	IGBT module's shorted	Too short Acc time	Prolong the Acc time
		Inside IGBT is damaged	Seek service
		Interference causes the malfunction	Check peripheral equipment whether has strong interference
		Grounded is not good	Seeking service
E004	Over-current during Acceleration	Too short Acc time	Prolong the Acc time
		Low AC supply voltage	Check the input power supply

Fault code	Fault categories	Possible reasons of fault	Actions
		Drive power is too small	Select a high power drive
E005	Over-current during Deceleration	Too short Dec time	Prolong the Dec time
		Low AC supply voltage	Use suitable dynamic braking kit
		Drive power is too small	Select a high power drive
E006	Over-current in constant speed operation	Sudden change of load or abnormal	Check the load or reduce the Sudden change of load
		Low AC supply voltage	Check the AC input power supply
		Drive power is too small	Select a high power drive
E007	Over-voltage during Acceleration	Abnormal input voltage	Check the input power supply

Fault code	Fault categories	Possible reasons of fault	Actions
		The rotating motor re-starts after the drive stops instantly.	Avoid re-start after the drive stops instantly
E008	Over-voltage during Deceleration	Too short Dec time	Prolong the Dec time
		Too big load inertia	Use big dynamic braking kit
		Abnormal input voltage	Check the AC supply voltage
E009	Over-voltage in constant speed operation	Abnormal change of input voltage	Install input reactor
		Too big load inertia	Use suitable dynamic braking kit
E010	DC Bus under-voltage	Low AC supply voltage	Check the AC supply voltage
E011	Motor over-load	Low AC supply voltage	Check the AC supply voltage
		Improper motor's rated current	Modify motor's rated current

Fault code	Fault categories	Possible reasons of fault	Actions
		Load in creases suddenly	Check the load, adjust the value of torque boost
		The drive's and motor's powers don't match	Use suitable motor
E012	Drive over-load	Too short Acc time	Prolong the Acc time
		The rotating motor re-start	Avoid re-start after the drive stops instantly
		Low AC supply voltage	Check the AC supply voltage
		Too heavy load	Select a high power drive
E013	Reserve		
E014	Reserve		
E015	IPM fault	Too short Acc time	Prolong the Acc time
		IPM IGBT damage inside	Seek service

Fault code	Fault categories	Possible reasons of fault	Actions
E016	IGBT module's heatsink overheat	Vent is obstructed or fan does not work	Clean the vent or replace the fan
		Over-temperature	Lower the ambient temperature
		Wires or connectors of control board are loose	Check and rewiring
		Auxiliary power supply is damaged or IGBT driving voltage is too low	Seek service
		Short-circuit of IGBT bridge	Seek service
		Control board is abnormal	Seek service
E017	External equipment fails	Terminal SI used for inputting external faults acts	Check the input of the external device
E018			

Fault code	Fault categories	Possible reasons of fault	Actions
E019	Current detection circuit has fault or output loose phase	Wires or connectors of control board are loose	Check and re-wire
		Auxiliary power supply is damaged	Seek service
		Hall sensor is damaged	Seek service
		Amplifying circuit is abnormal	Seek service
E020	Auto-learning fails	Motor's and drive's capacity doesn't match each other.	Replace the drive with another model
		Improper settings of parameters on the nameplate	Set the parameters correctly According to the nameplate
		Auto-learned and standard parameters have large deviations	Let the motor no load, re-identify

Fault code	Fault categories	Possible reasons of fault	Actions
		Overtime of auto-learning	Check the motor's wiring, parameters' settings
E021	EEPROM R/W fault	R/W fault of control parameters	Press STOP/RST to reset Seek service
		EEPROM damaged	Seek service
E022	Reserve		
E023	Reserve		
E024	Temperature sensor fault	Temperature sensor off line or fault	power off, and check the frequency inverter temperature wire loosen or not, seek service
E025	Reserve		

7.2 Common fault and handling methods

During using the drive, the following faults may occur, please refer to methods in the Table 7-2 to simply analyzing the faults.

Table 7-2 Common fault and handling methods

Phenomena	Possible reasons of fault	Actions
The drive doesn't display after power-on	Drive's input supply is inconsistent with the rated voltage	Check with a multi-meter and troubleshoot the issue.
	3-phase rectifier bridge blasted	Seek service
	The drive can not charge, CHARGE is OFF.	Seek service
The MCCB trips after power-on	Between the inputs of the supply have earth or shorted.	Troubleshoot the issue
	Rectifier breakdown, power line and motor line connect wrongly	Seek service
The motor is standstill after the drive running	The 3-phase outputs among U, V, and W are unbalance.	Check if damaged or obstructed
		Set the parameters correctly According to the nameplate

	Don’t have output voltage	Seek service
The drive display is normal, after power-on, the MCCB of the power trips after operating	Between the phases of output module have shorted	Seek service
	Between the motor’s lines have shorted or grounded	Troubleshoot the issue
	The distance between the motor and drive is far, Occasionally trips	Install output reactor