VM1000 Series General Inverter

User Manual

Version Code: VM1000-E-602001031-1802

Preface

First of all, thank you for purchasing VM1000 Series general inverter!

This user manual introduces the technical specifications, installation instructions, functions and performance of VM1000 series inverter properly. Please read this user manual carefully before carrying out works such as installation, commissioning, maintenance, etc.

You are specially warned to read and understand safety precaution items of this manual before using this product, and to ensure that relevant electrical installation testers' professional qualification shall be in line with the provisions of the labor supervision department and the electrical and environmental conditions for product use shall be in conformity with relevant national standards

Make sure the wiring is correct before the product is energized; it is necessary to ensure that the motor's steering meets the requirements through debugging prior to normal operation of the product.

In the process of product installation, use and maintenance, please contact with the company's customer service center via hotline telephone in this manual service if you have anything to consult about the product function, performance,, other technical issues or safety considerations.

National unified service hotline: **400-159-0088.**

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SAFETY INSTRUCTION

Read this user manual thoroughly before installation, operation, maintenance or inspection of the variable frequency drive (INVERTER). In this manual, safety instructions are classified as "WARNING"or "CAUTION".

⚠ WARNING: Indicate a potentially dangerous situation which, if not avoided, can result in death or serious injury to personnel.

⚠ CAUTION: Indicate a potentially dangerous situation which, if not avoided, can result in minor or moderate injury and damage to equipment. It may also be used for warning against unsafe practices.

Even items described as (⚠ CAUTION) may result in a vital accident in some situations. Please follow these important notes:

■ Checking Before installation

⚠
◎Do not install or operate any INVERTER that is damaged or has missing parts. Failing to follow this rule can result in facility damage or severe injury.

■ Installation

⚠
◎When installing or handling the INVERTER, please hold the bottom of the product otherwise its case only, thus prevent its falling and being damaged. ◎Install the INVERTER on nonflammable material like metal, and keep away from flammable or explsive object, heat source, and such environment. Otherwise it may cause a fire. ◎Make sure that the mounting environment free of metal dust. Otherwise it may cause damage to the INVERTER.

◎When INVERTERs is installed inside an electrical cabinet or other kind of enclosure, please install fans or other cooling devices, and keep ventilation well enough to ensure the enclosure temperature below 40℃, or the INVERTER may be damaged due to extreme high rise of temperature.

■ Wiring

◎Ensure only qualified electrical engineering personnel for wiring work . Otherwise it can cause an electrical shock or damage to the INVERTER.
◎Make sure INVERTER is isolated from power supply by the circuit breaker. Otherwise it may cause electrical shock or a fire.
◎Make sure that the ground terminal is grounded correctly. Otherwise it may cause an electrical shock.
◎Do not touch the main circuit terminals, and keep the wiring of INVERTER main terminals from contacting to the enclosure, or it can cause electrical shock.
◎Terminals for brake resistor are (+) and PB. Do not wire to other terminals, otherwise will cause a fire.

◎Before wiring, ensure the INVERTER's rated input voltage and phases is compatible to the input power source, or it can cause a fire or personal injury.
◎Never connect the AC power supply to output terminals U, V and W. Otherwise the INVERTER will be damaged and the guarantee is voided.
◎Never carry out withstand voltage test to the INVERTER, for example by a megohm meter. Otherwise it may cause damage to the INVERTER.
◎INVERTER use damage to the t guand control circuit wiring should be separated, or run vertically from each other. Otherwise it may cause interference to the control signals.
◎Main circuit wiring cable leads should be crimped with cable lugs in insulated sleeve.
◎If the cable length between the INVERTER and the motor is greater than 50 meters, it is recommended to use an output reactor to protect the INVERTER and the motor.

■ Operating

◎It is only allowed to power on the INVERTER after the wiring is finished and its cover is reinstalled. It is strictly prohibit to remove the cover of INVERTER while power is on, otherwise it may cause electric shock.

◎Before programming a INVERTER with fault auto reset or restart option after power off, the mechanical device need to be implemented with safety measures first, otherwise it can lead to personal injury.

◎"STOP/RESET" key may become invalid as a result of some function setting. It is recommended to install an independent emergency circuit breaker for the INVERTER control system, otherwise it may result in personal injury.

◎When the power is on, the INVERTER's terminals may have electricity also even if it is in stop mode. Do not touch U, V, W terminals and motor connection terminals. Otherwise it may cause an electrical shock.

◎Do not use a magnetic contactor to control the start and stop of the INVERTER. Otherwise it may cause the INVERTER to be damaged.

◎Before starting, please make sure that the motor and mechanical device can be run with the INVERTER's accelerating time setting in their safe range. Otherwise may result in device damage.

◎Do not touch the heat sink or braking resistor. Otherwise it may cause harmful burns to the body.

◎Never modify the parameters casually in unnecessary conditions, as the INVERTER's default parameter setting has already meet the requirements of most mechanical devices. Even if some devices have special requirements, it is only needed to modify some necessary parameters. Otherwise, it may cause device damage by improper parameter modification.

■ Maintenance

◎Never touch the INVERTER the connection terminals when power is on. Otherwise it

may cause an electrical shock.

◎Only qualified electrical engineering personal can be authorized to do the jobs of maintenance, checking, or parts replacement.

◎After the power supply is OFF, make sure the charge LED is OFF , the residual voltage is not exist, or wait at least 10 minutes, before carrying out maintenance or inspection. Otherwise it may cause damage or injury.

◎PCB has CMOS integrated circuit parts, never touch with bare hand, or static electricity may cause damage to the PCB.

■ Other

◎Modification to the INVERTER without permission is strictly prohibited, otherwise can cause severe injury. Arbitrarily modification of INVERTER will result in service guarantee voided.

Symbols, Abbreviations and Trademark Statements

■ Symbols

Protected Earth: PE

Single Ground: GND

SHIELD: SHIELD

■ Abbreviations

1、In this manual, the VM1000 general inverter products are as follows: inverter, VM1000, inverter, governor, inverter product.

2、The parameters of inverter include: function parameter, function code, reference number.

3、三晶电气、Sanjing Electric、SAJ Electric are the standard abbreviation of Guangzhou Sanjing Electric Co., LTD.

4、Common technical terms and approximate or equivalent names：

Voltage frequency control mode.：VF control mode.

Sensorless vector control mode.：SVC mode

Three-phase ac induction motor: asynchronous motor, squirrel cage motor.

■ Trademark

1、Modbus® is the registered trademark of Schneider Electric company;

2、SAJ® is the registered trademark of Guangzhou sanjing electric co., LTD.

3、Other possible trademarks or product names belonging to their respective owners.

Chapter I Product Information

1.1 Product introduction

VM1000 Series general inverter purpose

It is a new generation of high-performance multi-purpose product and can be used for conventional three-phase ac induction motor speed control, with a power range of 0.75 ~ 400 kw, optional work in V/F control mode or SVC control mode.

Key design points of the product.

Design points	Descriptions
Control performance and function.	1. Parts applied in the product: high-capacity power module, high-precision detection hardware and new control platform. 2, UpgradeD functions: mainly includes torque control, S curve, frequency, vector control, V/F given separation, switch of two groups of PID parameters and input & output and auxiliary function, fault protection and user-defined protection action and 15 set of historical fault records, etc. 3. Maintain compatibility with previous products.
Input, output and communication interface.	Support 5 ways' common input, 1 high-speed pulse input, 1 high-speed pulse output (also as open collector DO output), two ways' relay output, 2 ways' analog input, 2 ways' analog output, 1 RS485 communication port.
G/P unity	3.7kW above GP unity.
Wiring installation	1. The main circuit adopts high quality terminal row (the high-power model is equipped with independent terminal), and a dual grounding terminal. 2. The control terminal is arranged vertically on the left side of the control panel, and there is a PCB screen marking.
The new keyboard	1. Using the pulse potentiometer, the standard keyboard is featured with 5 Byte digital tube display with LED indicator light; the keyboard is inserted directly into the control panel and fixed on a special bracket. 2. Standard LED keyboard, optional LCD keyboard, to realize parameter

	upload/download function.
Fault diagnosis	Fault types and countermeasures are more detailed and users can define fault protection actions by themselves.
EMC level	Standard products can meet the requirements of iec 61800-3 C3; The external filter can meet the requirements of iec 61800-3 C2.

Table 1-1 Key design points of the product

1.2 Specifications

Items		Specifications
Personalized function	Highest frequency	500Hz
	Carrier frequency	0.5kHz ～ 16kHz ; The carrier frequency can be adjusted automatically according to the load characteristics.
	Control mode	V/F ; SVC; Torque control
	Starting torque	G type machine：0.5Hz/150%（SVC)P type machine：0.5Hz/100%
	Speed range	1：100 （SVC）
	Steady speed precision	±0.5%（SVC）
	Torque control accuracy.	±5%（SVC）
	Overload capacity	G type machine: 150% rated current 60s; 180% rated current 1s. P type machine: 120% rated current 60s; 150% rated current 1s.
	Torque increase	Automatic torque improvement; Manual torque increased by 0.1% ~ 30.0%.
	V/F curve	Three ways: linear; multipoint; quadratic V/F.
	V/F Separation	Full separation, semi-separation.
	Acceleration & deceleration	Linear or s-curve acceleration & deceleration mode; Four groups of acceleration & deceleration time;

	curve	Acceleration & deceleration time range 0.0 ~ 6500.0s.
	Dc brake	Braking time: 0.0s ~ 100.0s, braking action current value: 0.0% ~ 100.0%.
	Inching control	Frequency range: 0.00Hz ~ maximum frequency; Inching acceleration & deceleration time 0.0s ~ 6500.0s.
	Simple PLC, multi-speed operation.	Achieve up to 16 periods of speed through built-in PLC or control terminal.
	Built-in PID	The closed-loop control system can be controlled conveniently.
	Automatic voltage regulation（AVR）	When the grid voltage changes, the output voltage can be maintained automatically.
	Overpressure, overcurrent & loss rate control.	Automatic limit of current voltage during operation to prevent frequent tripping for overpressure, overcurrent & loss rate control.
	Fast current limiting function.	Minimize overcurrent failure and improve system stability.
	Torque limitation and control.	The "excavator" feature is to automatically limit torque during operation to prevent frequent tripping for overcurrent.
	Safety self-check of electrical peripheral equipment.	It can realize the safety inspection of peripheral equipment such as grounding, short circuit, etc.
	MF. K key	Programmable key: command channel switch/forward/reverse run/point action function selection/menu mode switch.
	Timing control	Timing control function: set the time range 0h ~ 65535h.
Running	Run command channel	Three channels: if the operation panel is given, the control terminal is given, the serial communication port is given, switch can be achived in various ways.

	Frequency sources	There are 10 frequency sources: if the number is given, the panel pulse potentiometer is given, the analog voltage is given, the analog current is given, the pulse is given, switch can be achived in various ways.
	Auxiliary frequency sources	10 auxiliary frequency sources. The frequency can be synthesized and lightly adjusted.
	The input terminals	Six digital input terminals, one of which can be used for high speed pulse input, up to 100KHz. Compatible with active PNP or NPN input. Two analog input terminals, one of which can only be used for voltage input, and the other for voltage or current input.
	The output terminals	A high speed pulse output terminal (optional for open collector type), square wave signal output of 0kHz ~ 100kHz, can realize the output of physical quantity such as setting frequency and output frequency. Two relay output terminals. Two analog output terminals can select 0/4mA ~ 20mA or 0/2V ~ 10V respectively, and the output of physical quantity such as setting frequency and output frequency can be realized.
Display and the keyboard operation	LED display	Display parameters
	LCD display	Optional, with Chinese instructions, parameter upload/download.
	Parameters of the copy	The quick copy of parameters can be realized through LCD operation panel.
	Key lock and function selection.	The part or all of the key is locked, and the scope of the key is defined to prevent misoperation.
	Protection function	Electric motor short-circuit detection, input-output protection, over-current protection, overvoltage protection, undervoltage protection, overheat protection, overload protection, etc.
	Options	LCD operation panel, brake assembly, etc.
Application Environment	Use place	Indoor, not exposed to direct sunlight, no dust, corrosive gas, flammable gas, oil mist, water vapor, water or salt, etc.
	Elevation	Elevation below 1000m can be used according to normal load standard.

		When the elevation is above 1000m, it is required to reduce the amount of use. Each increase of 100m will require a decrease of 1%. The highest altitude is 3000m.
	Ambient Temperature	Inverter with normal rated load environment temperature allowed range: - 10 ℃ to 40 ℃. Derating use temperature range: 40 ℃ to 50 ℃. Note: 1, every 1 ℃, need derating 1%. 2. Use in cold weather. If the environment is too low, it needs to be warmed up.
	Humidity	≤95%RH,avoid condensation. Note: please install electrical heating device in the control cabinet if there is any possibility of condensation.
	Vibration	Please install in a place that is not easy to vibrate. The vibration should be no greater than 0.6g. Special attention: 1. Cannot be installed on the machine frame such as punch; 2. Cannot be used as vehicle vehicle equipment; 3. In the case of mobile parts such as cranes, it should ensure that the inverter is installed firmly with the equipment to ensure that the inverter does not have uncontrollable bumping and other abnormal conditions.
	Storage temperature	-40℃～ 70℃，Air temperature is less than 1 ℃ / min.

Table 1-2 Specifications

1.3 Brand Nameplates

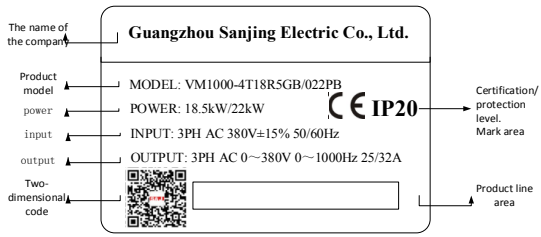


Figure 1-1 The product nameplates

1.4 Model specification

VM1000 – 4 T 18R5GB/022PB

① ② ③ ④ ⑤

Field	SN.	Identification	The specific content
Product series	①	Product series	VM1000：General vector converter series.
Voltage grade	②	Voltage grade	2：220VAC； 4：380VAC
The input power	③	Power phase identification.	S：single； T：three-phase
Rated power 1	④	G machine power range.	18R5-18.5kW，R is the decimal point G—Constant torque load B—Built-in brake unit
Rated power 2	⑤	P machine power range.	022-22kW P—Torque load B—Built-in brake unit

Table 1-3 The VM1000 model field annotation.

1.5 Complete machine structure dimension diagram.

Note: the following dimensions are based on the power of the G machine except for special notes.

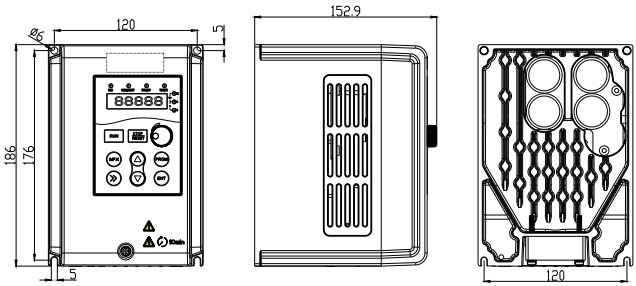


Figure 1-2 0.75kW-3.7kW installation size

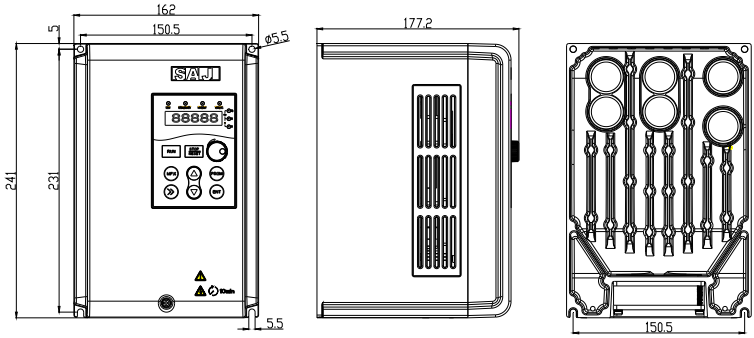


Figure 1-3 5.5kW-7.5kW installation size (including 11kW P machine)

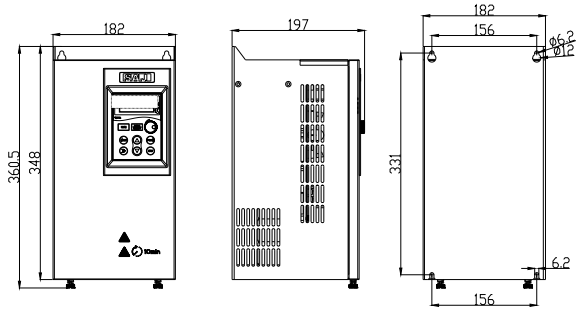
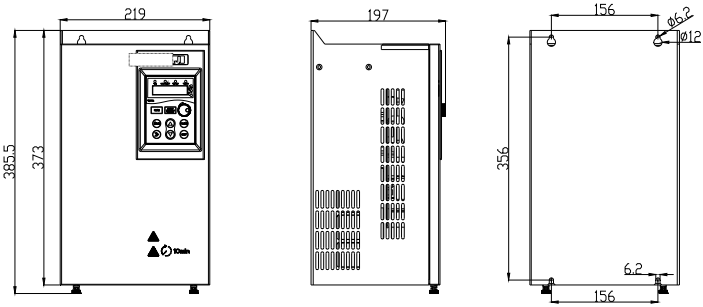


Figure 1-4 11kW-15kW installation size



size.

Figure 1-5 18.5 kW-22kW installation size.

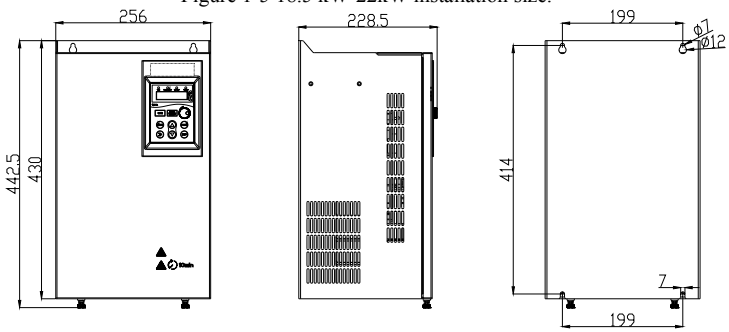


Figure 1-6 30kW-37kW installation size

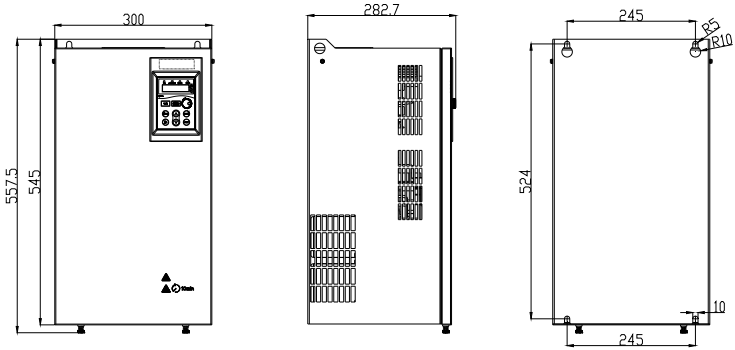


Figure 1-7 45kW-55kW installation size.

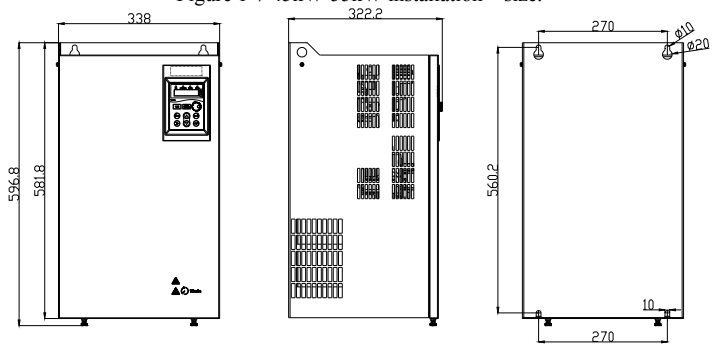


Figure 1-8 75kW-110kW installation size

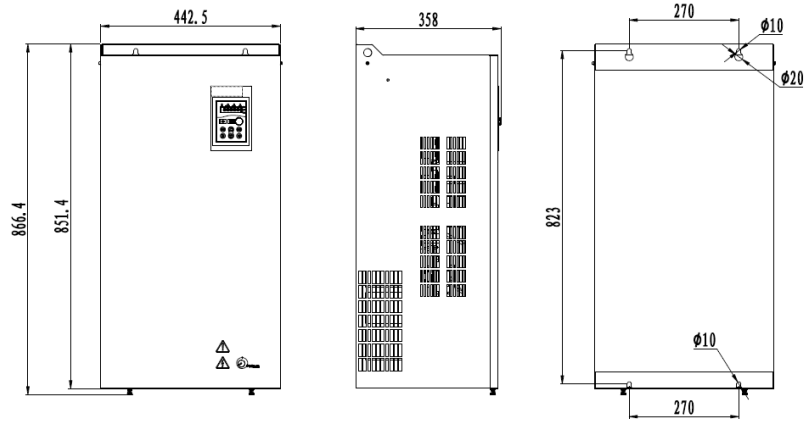


Figure 1-9 132kW-160kW installation size

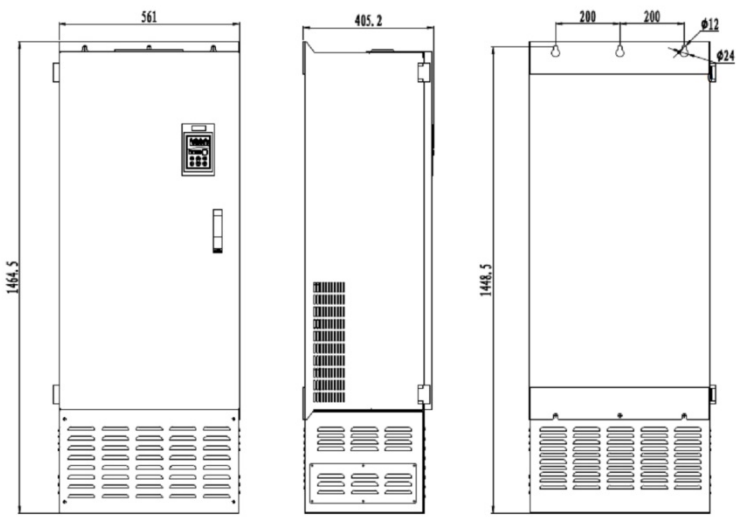


Figure 1-10 200kW-280kW installation size

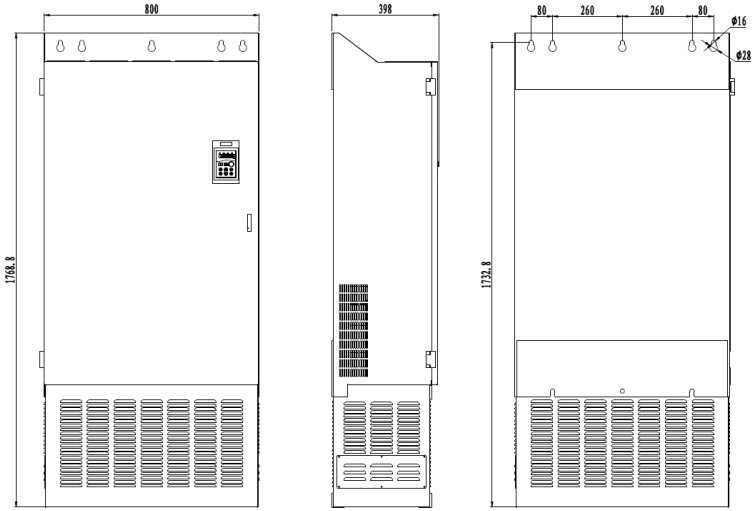


Figure 1-11 315kW-400kW installation size.

1.6 Keyboard structure size chart.

If the keyboard needs external guidance, please open the keyboard window additionally according to the figure 1-8 and figure 1-9.。

■ Size specification

(1) There are 4 keyboard clips, and the lower edge of the keyboard is 7.6mm from the surface of the keyboard, as shown in the left view of figure 1-8.

(2) When opening the keyboard window, it is suggested that the width and length of the window should be increased by 1mm respectively based on the size of the drawing. As shown in figure 1-8, the length of the right image is increased from about 101.1mm to 102mm, and the width is increased from 74mm to 75mm.

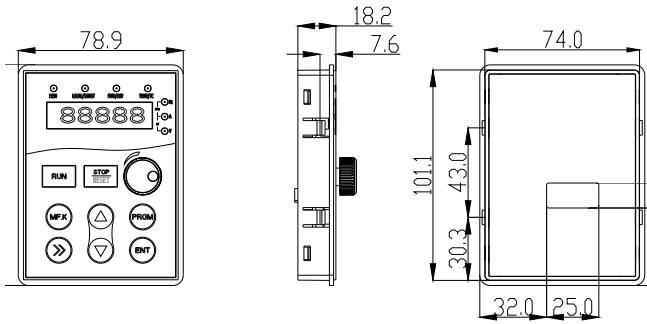


Figure 1-12 Keyboard structure size chart

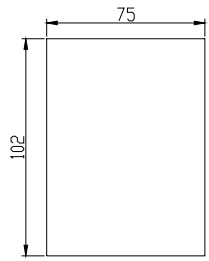


Figure1-13 Cabinet face opening size

■ **Keyboard window cover plate selection accessories**

When installing the external keyboard, a keyboard cover **plate** can be installed at the original keyboard position. The function is to fill the empty space after removing the keyboard.

It is divided into two types: 0.75-7.5kW and 11kW and above, as shown in figure 1-14 and figure 1-15.

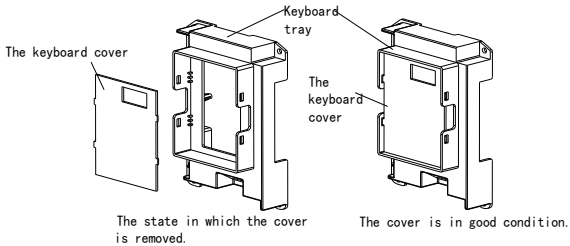


Figure 1-14 0.75-7.5kW Installation diagram of keyboard cover plate.

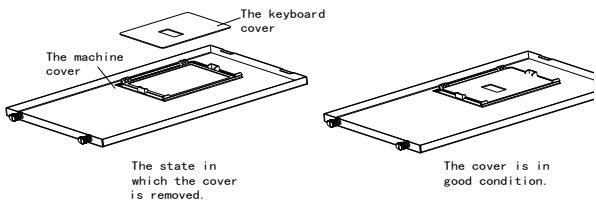


Figure 1-15 11kW and above keypad installation schematic.

1.7 Product selection specification table

Inverter G/P	Rated power (kW)	Power capacity	Input current	Output current	Adaptation motor G/P	
		kVA	A	A	kW	HP
VM1000-4T011GB/015PB	11/15	17/21	26/35	25/32	11/15	15/20
VM1000-4T015GB/18R5PB	15/18.5	21/24	35/38.5	32/37	15/18.5	20/25
VM1000-4T18R5GB/022PB	18.5/22	24/30	38.5/46	37/45	18.5/22	25/30
VM1000-4T022GB/030PB	22/30	30/40	46.5/62	45/60	22/30	30/40
VM1000-4T030G/037P	30/37	40/57	62/76	60/75	30/37	40/50
VM1000-4T037G/045P	37/45	57/69	76/92	75/91	37/45	50/60

VM1000-4T045G/055P	45/55	69/85	92/113	91/110	45/55	60/70
VM1000-4T055G/075P	55/75	85/114	113/157	112/150	55/75	70/100
VM1000-4T075G/090P	75/90	114/134	157/180	150/170	75/90	100/125
VM1000-4T090G/110P	90/110	134/160	180/214	170/210	90/110	125/150
VM1000-4T110G/132P	110/132	160/192	214/256	210/253	110/132	150/180
VM1000-4T132G/160P	132/160	192/231	256/307	253/304	132/160	180/220
VM1000-4T160G	160	231	307	304	160	220
VM1000-4T200G/220P	200/220	250/280	385/430	377/426	200/220	275/300
VM1000-4T220G/250P	220/250	280/355	430/468	426/465	220/250	300/340
VM1000-4T250G/280P	250/280	355/396	468/525	465/520	250/280	340/380
VM1000-4T280G/315P	280/315	396/445	525/590	520/585	280/315	380/430
VM1000-4T315G/355P	315/355	445/500	590/665	585/650	315/355	430/480
VM1000-4T355G/400P	355/400	500/565	665/785	650/725	355/400	480/545
VM1000-4T400G	400	565	785	725	400	545

Table 1-4 product selection specifications

1.8 Maintenance

1.8.1 Daily maintenance

Due to the influence of temperature, humidity, dust and vibration of the environment, the device aging in the converter can cause the potential failure of the inverter or reduce the service life of the converter. Therefore, it is necessary to carry out daily and regular maintenance of the inverter.

（1）Routine inspection items：

- Abnormal changes of sound in motor running.
- Is there any vibration in the motor running?
- Whether the installation environment of the inverter is changed?
- Whether the fan of the inverter is working properly?

● Whether the inverter is overheating?

（2）Daily cleaning：

● The inverter should always be kept clean.

● Effectively remove dust on the surface area of the inverter to prevent the dust from entering into the converter,especially metal dust.

● Effectively remove grease from the inverter cooling fan.

1.8.2 Regular inspection

Please check periodically for hard-to-check areas.

Periodic inspection：

● Check the air duct and clean it regularly.

● Check whether the screws are loose.

● Check whether the inverter is corroded.

● Check whether the wiring terminal has the arc marks.

1.8.3 Inverter vulnerable parts replacement.

Vulnerable parts of inverter mainly include the cooling fan and filter electrolytic capacitor, and their lifespan is closely related to the environment and maintenance condition. General lifespan is.：

Parts	Lifespan
Fan	2 ～ 3 years
Electrolytic capacitor	4 ～ 5 years

Table 1-5 Lifespan of vulnerable parts.

The user can determine the number of years to replace them according to the running time.

（1）Cooling fan

Possible damage: bearing wear and blade aging.

Judge criterion: whether there are cracks in the fan blade; whether there is abnormal vibration when the sound is turned on.

（2）Electrolytic capacitor

Possible cause of damage: poor quality of input power, high ambient temperature, frequent load jump and electrolyte aging.

Judge criterion: whether there is liquid leakage; whether the relief valve has been convex, electrostatic capacitance measurement and insulation resistance measurement.

1.8.4 The storage of the inverter.

After the user buys the inverter, the following points must be paid attention to:

The storage should be packed in the original packing box.

Long storage will result in the deterioration of electrolytic capacitors. It is necessary to ensure that the electricity will be connected to it once within one year, and the power supply time will be at least 5 hours. The input voltage must be gradually raised to the rating by the voltage regulator.

Chapter 2 Installation

2.1 Installation

Note: the following figures in this chapter are based on the power of the G machine except for the special notes.

2.1.1 Inverter composition

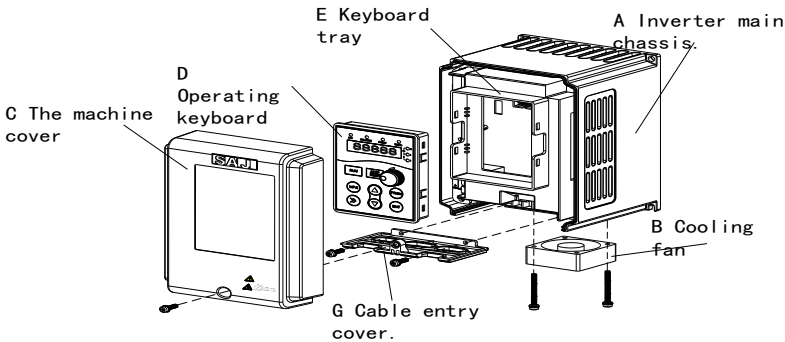


Figure 2-1 Converter composition (0.75kw-7.5 kW, including 11kW P type machine)

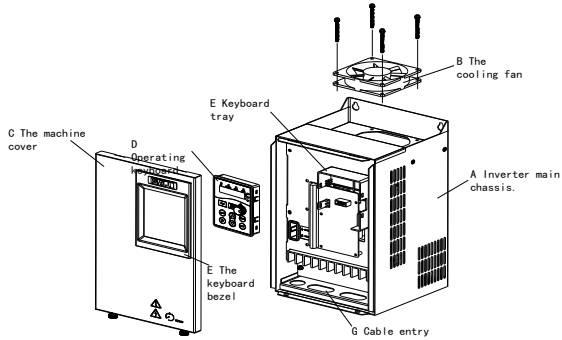


Figure 2-2 inverter composition (11kW and above)

2.1.2 The mounting steps

（1） Cover removal and installation scheme.

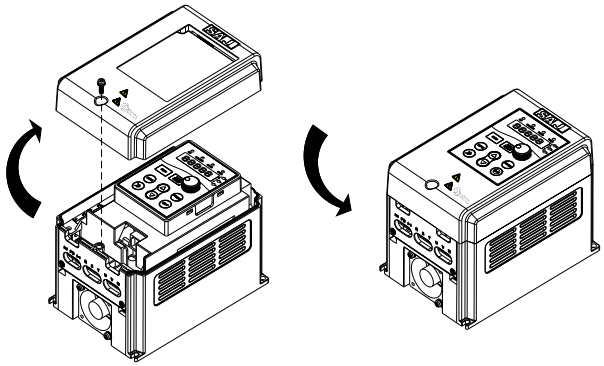


Figure. 2-3 schematic diagram of face cover (0.75kw - 7.5kw, including 11kW P)

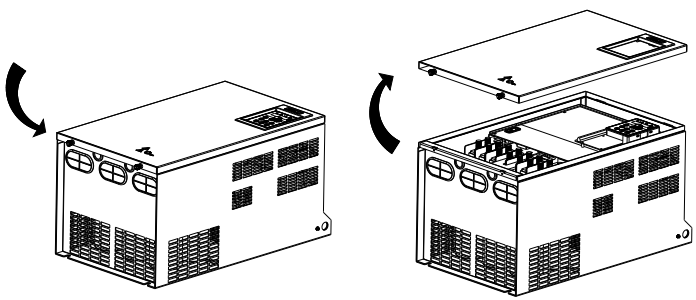


Figure 2-4 schematic diagram of face cover (11kW and above)

（2）Scheme of keyboard disassembly.

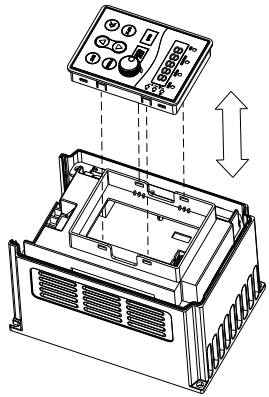


Figure 2-5 schematic diagram of keyboard disassembly (0.75kw - 7.5kw, including 11kW P machine)

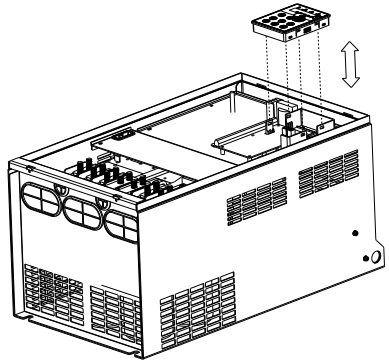


Figure 2-6 schematic diagram of keyboard disassembly (11kW and above)

（3）Scheme of fan disassembly (partial power section)

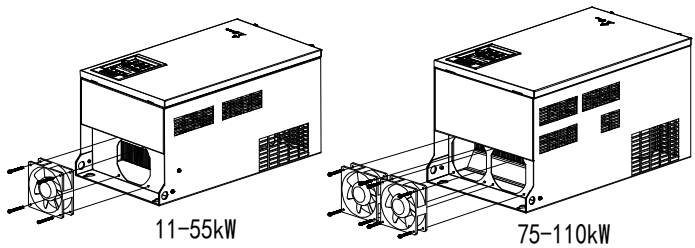


Figure 2-7 schematic diagram of fan disassembly

2.1.3 Environmental requirements

The inverter is a power electrical equipment. To ensure its normal use, it is necessary to ensure that the environment of operation and storage shall meet the requirements. The following is a list of indicators in detail. Please refer to relevant national and regional standards for other matters relating to the electrical installations and usages. 。

Items	Descriptions
Installation site and precautions.	Installation site: the inverter is of IP20 protection grade, with power supply input and high voltage output, which needs to be installed indoor or equivalent. It is recommended to be installed in a power distribution cabinet or control box with sufficient protective effect to avoid dripping water, accidental personnel touching and invasion of foreign bodies; besides,anti-pest control measures shall be guaranteed. The inverter should be installed on the surface of flame retardant objects such as bracket, board or solid building facade, and should be fastened with screws or bolts. The inverter is easy to generate a lot of heat when working, so there should be enough space for heat dissipation around, and the forced exhaust cooling device should be installed when necessary. Due to the vertical design of the converter, the inverter must be installed vertically rather than horizontally or horizontally. Avoid direct sunlight, moisture and moisture. Avoid places with corrosive, flammable or explosive gas. Avoid the place where there is oil, dust and metal dust.

Operating ambient temperature	Allowed environment temperature range for inverter with normal rated load: - 10 ℃ to 40 ℃. Temperature range derating use: 40 ℃ to 50 ℃. Note: 1, every 1 ℃, need derating 1%. 2. If the environment temperature is too low, it needs to be warmed up when the inverter is in use in cold condition.
Environmental humidity	≤95%RH，Avoid moisture condensation. Note: please install electrical heating device in the control cabinet if there is any possibility of moisture condensation.
Storage temperature	- 40 ℃ ~ 70 ℃, and the air temperature is less than 1 ℃ / min.
The altitude	In case the elevation below 1000m, it can be used according to normal load standard. When the elevation is above 1000m, it is required to reduce the amount of use. Each increase of 100m will require a decrease of 1%. The highest altitude is 3000m.
vibration	Please install the inverter in a placewhere it is not easy to vibrate. The vibration should be no greater than 0.6g. Special attention: 1. Cannot be installed on the machine frame such as punch; 2. Cannot be used as vehicle on-board equipment; 3. In the case of being used on mobile parts such as cranes, the inverter shall be ensured to be installed firmly with the equipment to make sure that the inverter does not have uncontrollable bumping and other abnormal conditions.

Table 2-1 list of environmental requirements

2.1.4 Installation instructions

（1）Single machine installation

It is necessary to keep the space distance on and above, left and right of the converter so as to ensure that the airflow around the inverter can flow fully to facilitate the heat dissipation. The recommended space distance is shown in table 2-2 below.

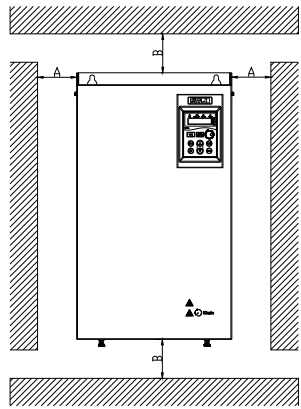


Figure 2-8 schematic diagram of installation space distance.

Power grade (power of G Type Gmachine)	Installation dimensions	
	A	B
≤7.5kW	≥ 10mm	≥ 100mm
11kW-15kW	≥ 30mm	≥ 150mm
18.5kW-37kW	≥ 50mm	≥ 200mm
45kW-400kW	≥ 50mm	≥ 300mm

Table 2-2 recommended installation space distance

（2）Vertical installation

A thermal baffle is required to separate the heat flow between two inverter, and the above recommended space distance is required. Here is an example of an thermal baffle.

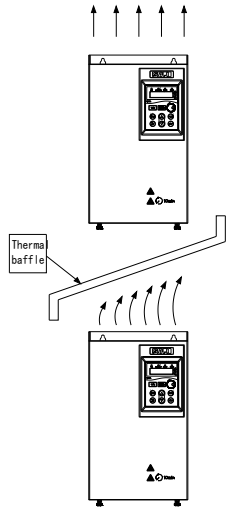


Figure 2-9 shows the schematic diagram of the thermal baffle

When two or more inverters are installed side by side, on the basis of table 2-2, the distance between each pair needs to be increased by at least 50mm, and the distance on and above, left and right of the inverter should be increased by at least 100mm.

（3）Installation

Wall-mounted type（0.75～400kW）

The base type（200～400kW）

（4）Protection requirements

① Waterproof measures shall be guaranteed.

②Prevent invasion of other objects, including precaution of pests and mice.

2.2 Wiring

2.2.1 Electrical operating conditions

The VM1000 series inverter is suitable for low voltage power electrical system.

Please confirm whether the following electrical operating conditions meet the requirements when conducting electrical wiring.

Refer to relevant national and regional standards if necessary.

Items	Descriptions
The power distribution system	Three-phase four-wire system, three-phase five-wire system.
Voltage and frequency range.	380VAC，50/60Hz
The power range	Voltage: three-phase 380VAC, fluctuation range allowed: plus or minus 15%, Frequency: 50/60hz, fluctuation range allowed: plus or minus 5%.
Grounding requirements	The PE and GND of the inverter shall be separately wired separately.
Electric leakage protection	The power distribution line with the inverter installed shall not use the circuit breaker with leakage protection any more. Any places where inverter is applied shall be guaranteed with grounding measure of the equipment to ensure safety.
Short circuit protection	The power supply side of the inverter needs to be connected with a circuit breaker or a quick fuse with short circuit protection function. Inverter output side is not recommended to use installation circuit breaker, fuse.
Start-stop control	In normal circumstances, the inverter must be controlled by its own design panel, control terminal and other means. The contactor is generally neither recommended to be used as the switching device of the power supply side of the converter, nor be used as the normal start-stop control device of the motor in the output side of the inverter. If you don't follow this and disconnect the contactor when the converter runs, you'll likely damage the

	inverter. Note: some industries and equipments (such as elevators) require the contractor to be used as a safety isolation device on the power supply side and output side of the converter, which is also in line with the above requirements.

Table 2-3 electrical operating conditions table

2.2.2 Electrical safety items

In the electrical installation, operation and maintenance of the inverter and its related equipments, it is necessary to do anti-static and anti-shock measures. Please refer to the safety safety precautions in the front part of this manual.

2.2.3 Product electrical components.

The electrical components are shown in the figure below (the 11kW model is given as an example).

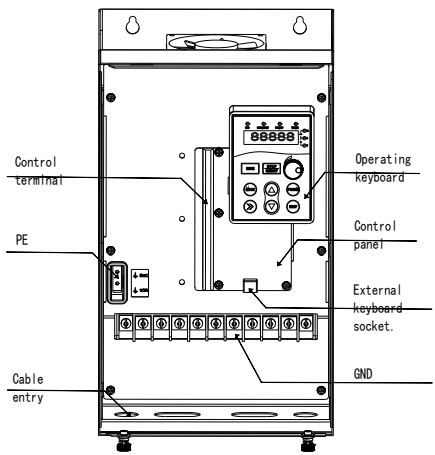


Figure 2-10 electrical component diagram.

2.2.4 Main circuit connection

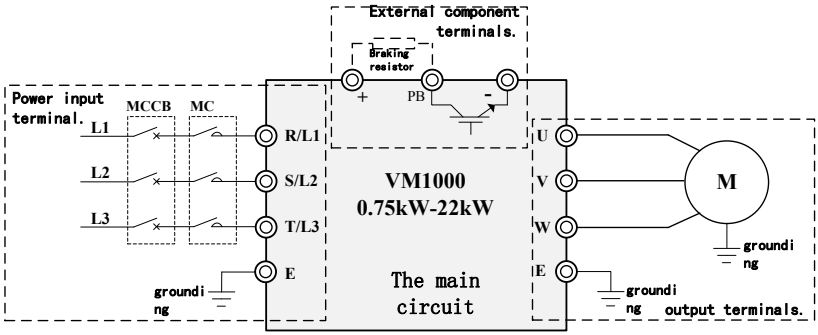


Figure 2-110.75 ~ 22kW main circuit wiring diagram.

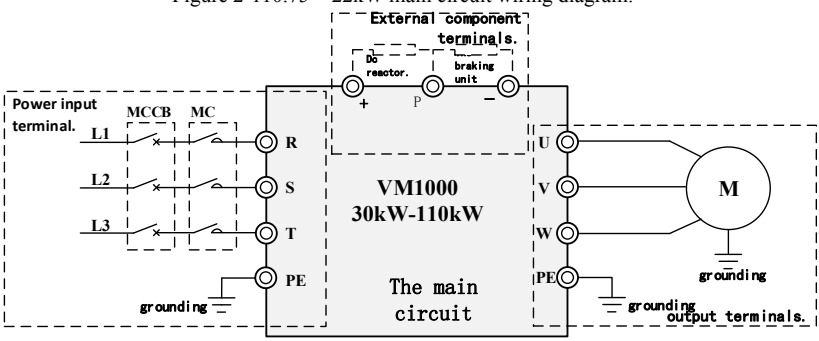


Figure 2-1230-400kw main circuit wiring diagram.

（1）0.75～7.5kW Main circuit terminal

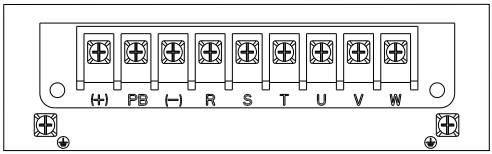


Figure 2-13 0.75～7.5kW Main circuit terminal

（2）11～22kW Main circuit terminal

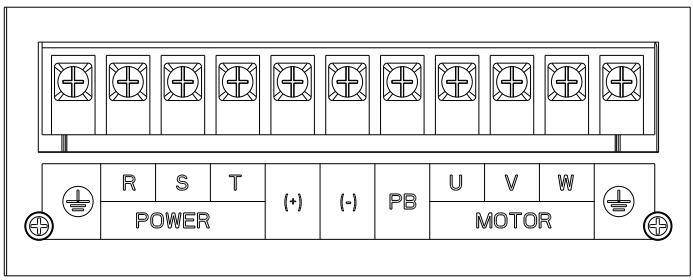


Figure 2-14 11～22kW Main circuit terminal

（3）30～37kW Main circuit terminal

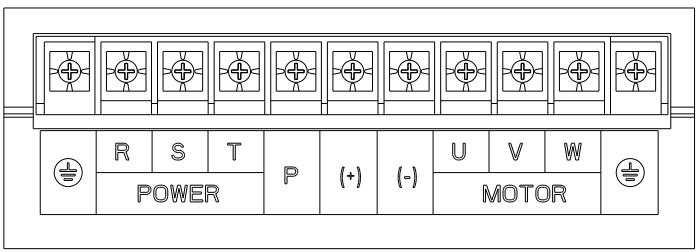


Figure2-15 30～37kW Main circuit terminal

（4）75～160kW Main circuit terminal

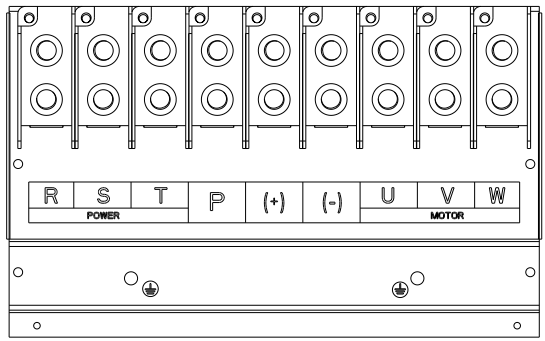
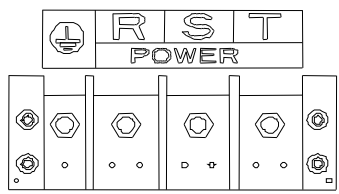


Figure 2-16 75　～160kW Main circuit terminal

（5）200～400kW Main circuit terminal



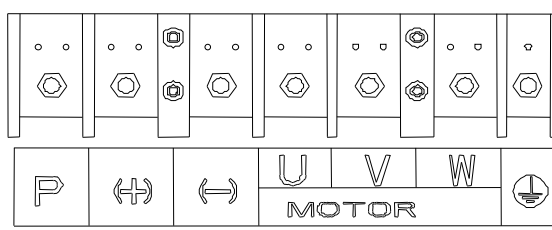


Figure2-17 200～400kW Main circuit terminal

（6）The main circuit terminals and functions are shown as below.

Terminal mark	Name	Descriptions
R、S、T	Three phase power input terminal.	Ac three phase input power connection terminal.
(+)、(-)	Dc bus positive and negative terminal.	Common dc busbar input terminal (connection terminal of 30kW and above external braking units)
(+)、PB	Brake resistance connecting terminal.	22kW and below brake resistance connection terminal.
P、(+)	External reactor terminals.	External reactor connection terminal.
U、V、W	Inverter output terminal.	Connect the three-phase motor.
⏚	Earthing terminal	Ground terminal

Table 2-4 main circuit terminals and functions.

（7）Wiring precautions.

A: Input power R, S, T:

Three-phase AC power input, no phase sequence requirements.

B: Dc bus (+), (-) terminal:

Please note that there might be residual voltage of the dc bus (+) and (-) terminals after the power failure, and wait for extinguishing of the power indicator and confirm that it is less than 36V before contact, otherwise, personnel may be injured by a risk of electric shock. Note: the power indicator light (LED) is on the power board, and the light display can be seen by opening the face cover (when there is electricity on the dc bus).

When the 30kW and above type selects external braking components, please note that the (+) and (-) polarity cannot be reversed, otherwise the inverter will be damaged or even

fire disaster may be caused.

The wiring length of the brake unit should not exceed 10m. Twisted pair cable or double close lines in parallel shall be used for wiring.

The brake resistance cannot be directly connected to the dc bus, otherwise damage to the inverter or even fire disaster may be caused.

C: Brake resistor connecting terminal (+), PB:

For the machine type rated 22kW or below and confirmed being equipped with brake unit inside, its brake resistor's connecting terminal will be effective.

Selections of the braking resistance shall refer to the recommended value and the spacing of wires equipped should be less than 5m.Otherwise, the inverter may be damaged.

D: External electric reactor terminal P, (+) :

Inverters rated 30kW and above support the external setting of dc reactor.Remove the connecting strip between P and (+) terminals when assembling, and the reactor is connected between two terminals.

E: Inverter output side U, V, W:

The output side of the inverter shall not be connected to the capacitor or surge absorber, otherwise the inverter protection will be affected and even damaged.

When the motor cable is too long, electric resonance is easy to occur due to the influence of the distributed capacitance, which can cause damage to the insulation of the motor or a large leakage current leading to overcurrent protection of the inverter. When the cable length is greater than 100m, the ac output reactor is recommended.

F: Ground terminal PE:

Terminal must be grounding reliably and grounding line resistance must be less than 0.1 Ω. Otherwise, the equipment will be abnormal or even damaged in operation.

Do not share the grounding terminal and power supply null line N terminal.

Note: selections and wiring specification of the peripheral circuit devices, including the

circuit breaker, brake resistance, brake unit, etc., shall refer to appendix A as a guide.

2.2.5 Control circuit connection

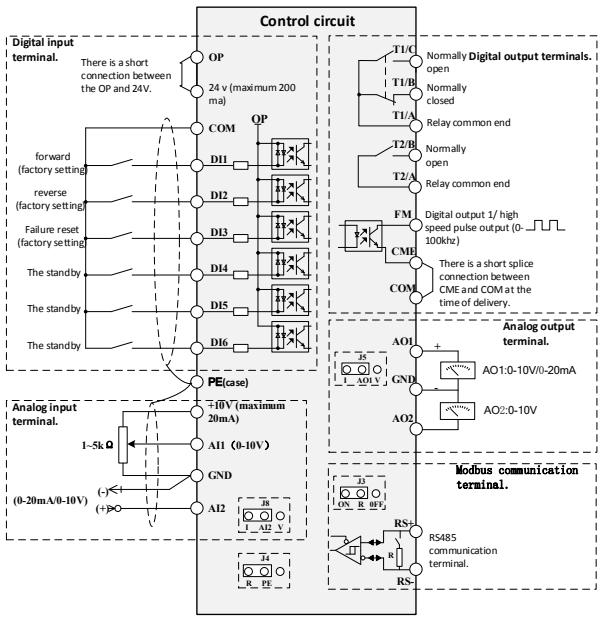


Figure 2-18 wiring diagram of control circuit (analog quantity input and output be changed to 0~20mA)

（1） Control terminal diagram

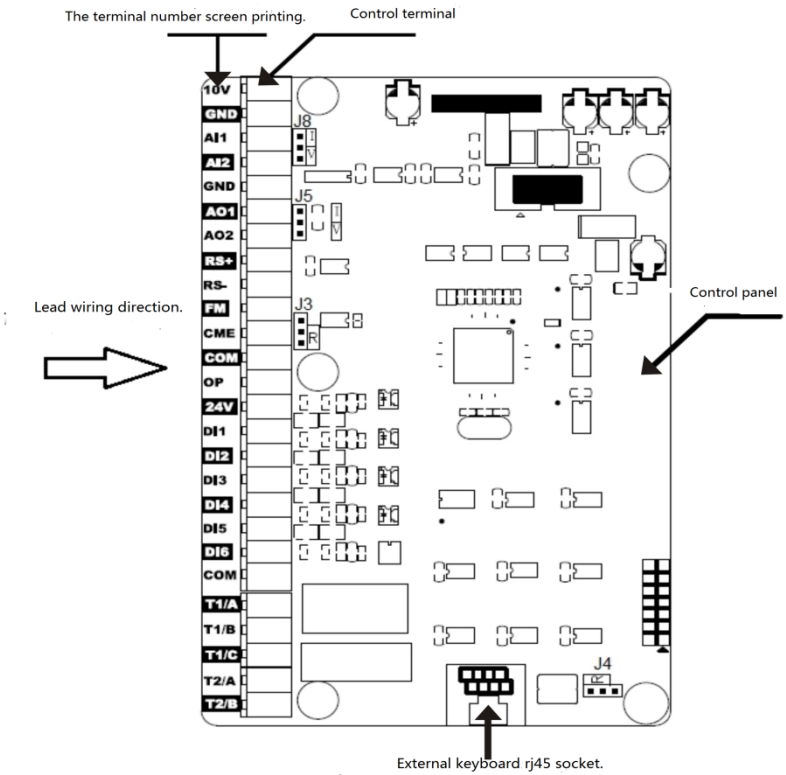


Figure 2-19 control terminal diagram.

（2）Control terminals and their function.

Category	Terminal symbols	Name of the terminals	Function description
Power	+10V-GND	＋10V power supply	To provide + 10 v power supply; the maximum output current: 10 ma, generally used as working power supply of an external potentiometer; potentiometer's resistance range: 1 kΩ~ 5 kΩ
	+24V-COM	＋24V power supply	Output current: Maxi. 200mA, usually used as power of digital input/output terminals and external sensor; Max. output current: 200mA
	OP	External power input terminal.	Connect with + 24V or COM via the connection plate on the control board. The factory defaults to + 24V connection. When the external signal is used to drive DI1 ~ DI6, the OP needs to be connected with the external power,and remove the short circuit connection blade between the OP-24V terminal (as there is in factory configuration).
Analog input	AI1-GND	Analog input terminal 1	1.Input voltage range:DC 0~10V 2.input impedance:22kΩ
	AI2-GND	Analog input terminal 2	1. Input range: DC 0V ~ 10V/0mA ~ 20mA, decided by the J8 jumper on the controlling board. 2. Input impedance, 22 k Ω if input by voltage, 500 Ω if input by current.
Digital input	DI1	Digital input 1	1. Opto couplers isolation, compatible with bipolar input. 2, input impedance: 3 k Ω 3. Voltage range in level input condition: 9V ~ 30V.
	DI2	Digital input 2	
	DI3	Digital input 3	
	DI4	Digital input 4	
	DI5	Digital input 5	

	DI6	High speed pulse input terminal.	Apart from the same function with DI1 ~ DI5, it can also be used as a high speed pulse input channel. Maximum input frequency: 100kHz. (11kW above model included)
Analog output	AO1-GND	Analog output terminal 1	For, A01, the voltage or current output shall be decided by the J5 jumper on the control board while AO2 shall only be the voltage output. Output voltage range: 0V ~ 10V. Output current range: 0mA ~ 20mA.
	AO2-GND	Analog output terminal 2	
Digital output	FM-CME	Digital output 1/ high speed pulse output.	Opto couplers isolation, bipolar open circuit collector output. Output voltage range: 0V ~ 24V. Output current range: 0mA ~ 50mA. Limited by the function code F6.00 "FM terminal output mode selection" and it is used as high speed pulse output and the highest frequency is to 100kHz; Note: the digital input field CME and the digital input field COM are internally isolated, but when they leave the factory, the CME and COM are short-connected through the wiring board on the control board. Remove the wiring piece when the external power drive is to be used.
Relay output contact	T1/A-T1/B	Normally closed terminal	Contact driving ability: AC250V，3A，COSø=0.4。 DC 30V，1A
	T1/A-T1/C	Normally open terminal	
	T2/A-T2/B	Normally open terminal	
Communication terminals and sockets.	RS+		RS485 difference signal positive terminal
	RS-		RS485 difference signal negative terminal
	RJ45 socket		Used as the external interface for LED/LCD keyboard.

Table 2-5 control terminal and function table

（3）Control terminal wiring specification.

According to the input signal type and the internal design of the terminal, there are three situations: A, B and C.

A：Analog input terminal.

Because the weak analog voltage signal is particularly vulnerable to external interference, it is generally necessary to use shielded cable, and the distribution distance shall be as short as possible, not exceeding 20m, as shown in Figure 2-19.

In the case where some analog signals are seriously disturbed, the analog signal source side needs to add a filter capacitor or ferrite core, as shown in figure 2-20.

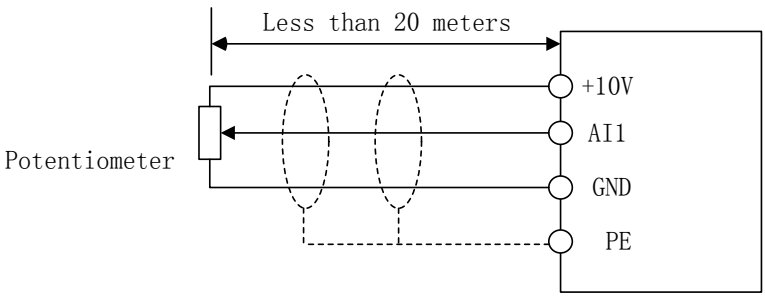


Figure 2-20 analog input terminal wiring diagram.

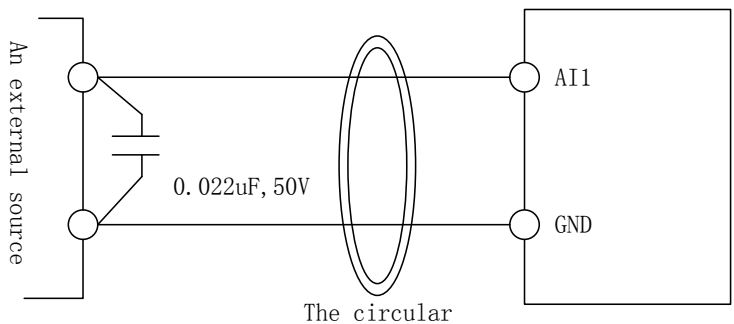


Figure 2-21 analog input terminal processing wiring diagram.

B：Digital input terminal：

It is generally necessary to use shielded cable, and the distribution distance shall be as short as possible, not more than 20m.

When the election is driven by active mode, it is necessary that the filtering measures should be taken for the crosstalk of the power supply.

Contact control mode is suggested.

- **Leakage type wiring mode.**

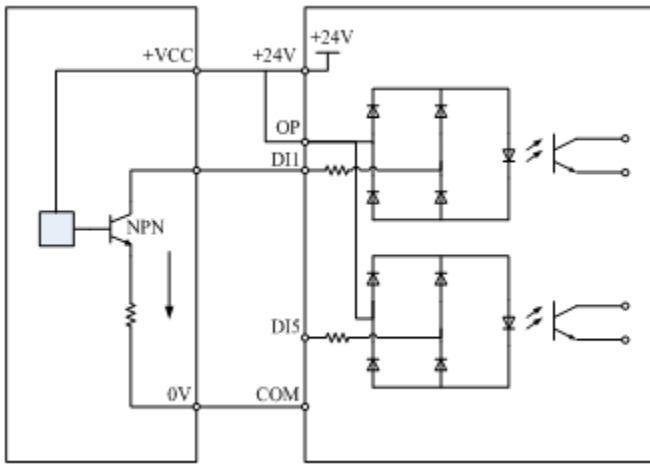


Figure 2-22 Leakage type wiring mode

Leakage type wiring is one of the most commonly used wiring methods. If external power supply is used, firstly the short circuit wiring blade between + 24 v and the OP terminal shall be removed (factory configurated), and then connect the positive pole of external power supply on the OP and the negative pole of it on the COM.

•Source type wiring mode.

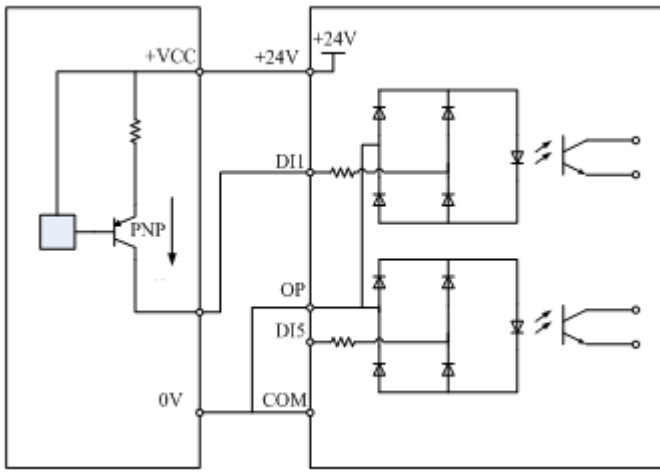


Figure 2-23 source wiring

For the source type wiring, the short circuit wiring balde must be used to connect the OP terminal to the COM terminal, and connect the 24V to the public end of the external controller. If the external power supply is used, the negative pole of the external power supply must be attached to the OP.

B：Digital output terminal.

When the digital output terminal needs to drive the relay, the absorption diode should be installed on both sides of the relay coil.

Otherwise, it will cause damage to the dc 24V power supply.

Note: the polarity of the absorption diode must be installed correctly. As shown in figure 2-23.

Otherwise, when there is output from the digital output terminal, the dc 24V power supply will be burned instantly.

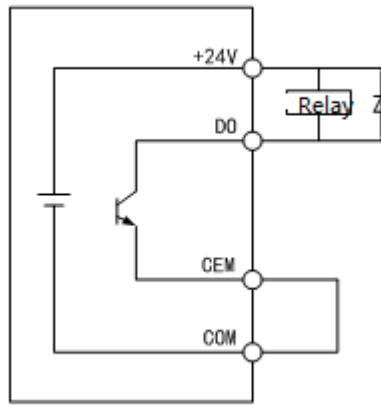


Figure 2-24 digital output terminal wiring diagram.

2.3 EMC

2.3.1 **Installation Notices for Electromagnetic Interference**

There are two kinds of electromagnetic interference: noise interference to the inverter from the environment around, and interference to the devices surrounding the inverter from the inverter itself.

Installation Notices：

1. Grounding wires of the inverter and other electric devices shall be in good GND condition.

2. Keep the lines of power input and output of inverter away from the weak electric signal lines such as the controlling lines, and do not run these two kinds of cables in parallel but in vertical as far as possible.

3. Shield cable is recommended for output power lines of the inverter, or the cable can be shielded by steel pipe, and the shields must be grounded correctly; it is recommended to use twisted shield control cable for devices being interfered, and the shields must be grounded correctly.

4. In case of application with long motor cable over 100m, an output filter or AC output reactor is needed additionally.

2.3.2 **Methods for Handling Surrounding Interference to Inverter**

Normally electromagnetic interferences to the inverter are generated from large number of devices installed nearby, including relays, contactor, or magnetic brakes. If an inverter is in malfunction by interference, the following methods are recommended as solutions:

1. Install surge arrestor to the part which generates interference.

2. Install filter to the input terminal of the inverter, as details in 2.3.5.

3. It is recommended to use shield cable for controlling and sensing signals, and cable shields must be grounded correctly.

2.3.3 **Methods for Handling Interference from the Inverter to Surrounding Devices**

The electromagnetic noises can be classified into two kinds: radiated interference from the inverter and the conduction interference from it. These two kinds of interferences can make the surrounding devices suffering from electromagnetic or electrostatic induction, then malfunction of the equipments may be caused due to interference. The following solutions are provided as per different interference situations:

1. Signals of instruments, receiver and sensors for measuring are fairly weak to be interfered easily if they are close to the inverter or in the same control cabinet. Ways as below are recommended to solve the problem: keep away from inverter as far as possible; Do not arrange signal cables running close and parallel to power cables, especially never bundle them together in parallel; shield cables are suggested to be used as signal and power lines and they must be grounded correctly;, add ferrite beads (blanketing frequency scope among 30~1000MHz are suggested) to the output of inverter and round them with 2~3 coils each; install an EMC output filter additionally under some worse conditions.

2. If the device which is interfered shares the same power source with inverter and results in conducting interference, and the methods above cannot eliminate the interference, an EMC filter should be installed between the the power source and the inverter (refer to 2.3.5 for more details).

3. When GND of the peripheral devices is in separate state, the interference caused by current leakage from grounding lines of the inverter in a condition of grounding together will be avoided.

2.3.4 **Current Leakage Handling**

There are two types of current leakage in inverter application: ground current leakage and current leakage between lines.

1. Factors of ground current leakage and solutions:

There is distributed capacitance between lines and earth ground. The larger the distributed capacitance, the larger ground current leakage is. To reduce the distributed capacitance, the distance from inverter to motor shall be effectively shortened. The higher the carrier frequency is, the larger the ground current leakage is. It is effective to reduce ground current leakage by lowering the carrier frequency, but this will result in increasing of the motor noise. Note: Installing an electric reactor is also an effective method for lowering ground current leakage.

Ground current leakage will increase with the increasing of the main circuit current, which means the larger power the motor, the larger ground current leakage is.

2. Factors of current leakage between lines

There is distributed capacitance among output wiring lines of the inverter. If the current through the output lines contains upper harmonics, syntony and current leakage may be caused. In this situation, if a thermal relay is employed, malfunction might be caused.

To prevent malfunction, lower the carrier frequency or install an output reactor. When an inverter has been used, it is recommended to use thermal relay but the electric overcurrent protection of inverter shall be used instead.

2.3.5 **Notice for Installation of EMC at the Power Input Terminal**

1. Note: usage of an EMC filter must be in strict accordance with its rated specifications. As a filter belongs to Category I apparatus, its metal ground enclosure must be contacted to the ground bus of control cabinet as well as possible in surface, and the continuity of ground

conductor must be in good condition, otherwise it will lead to the risk of electric shock and badly affectting the effect of EMC.

2. Through test on EMC, the ground enclosure of EMC filter must be connected to the same common ground bus of the PE terminal of the inverter, or it will badly affect the effect of EMC.

3. The filter must be installed as close as possible to the power input terminals of the inverter.。

Chapter 3 Panel Display & Operation

3.1 Introduction on Panel Display & Operation

The operation panel can be used to conduct operation of the converter, including change the function parameters, working condition monitoring and operation control (such as start, stop) of the inverter. Its appearance and function are as shown in the figure below:

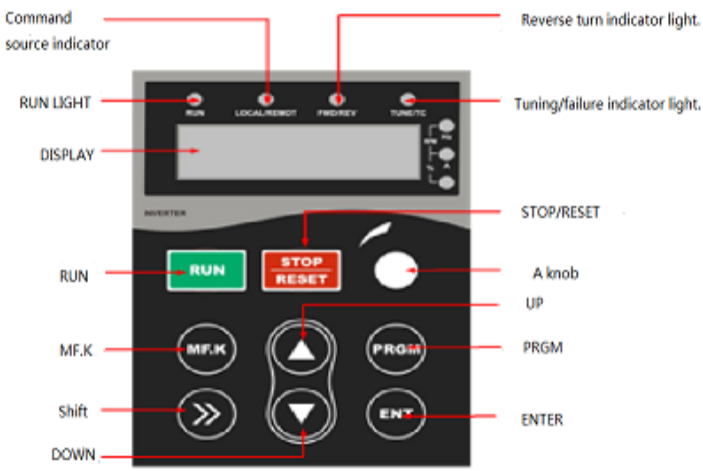


Figure 3-1 schematic diagram of operation panel.

（1）Description on function light indicators

RUN：When the lamp is out, it means that the inverter is in a state of shutdown. When the light is on, it indicates that the inverter is in operation.

LOCAL/REMOTE：Keyboard operation, operation and remote terminal operations (communication control) lights, lights off means the keyboard operation controlling state and lights on means the terminal operation control state, while the lights flash means in the remote control operation state.

FWD/REV：Positive and negative turn indicator light, the light indicates that it is in a positive state.

TUNE/TC：The tuning indicator light indicates that the light is in the state of tuning and the flashing light indicates that it is in a state of failure.

（2）Unit light

Hz: frequency unit; A: current unit; V: voltage unit;
RMP (Hz+A) : RPM unit; % (A+V) : percentage.

（3）Digital display area

5 Byte LED display, display the setting frequency, output frequency, various monitoring data and alarm code, etc.

（4）Pulse potentiometer (also as electronic knob).

The inverter panel has a pulse electronic knob that can be used as a given source of frequency.

When the frequency source is set by the inverter, rotate clockwise to increase the given and counterclockwise to reduce the given.

The icon on the panel indicates the direction of operation.

Note: the role of the pulse electronic knob, clockwise to increase the given is equivalent to increasing key on the keyboard, counterclockwise to reduce given equals to the decreasing key on the keyboard; the adjustment object is F0.08 keyboard for a given frequency values;

In frequency source with A + B (B) A switch Settings, the F0.08 keyboard given frequency value set by A knob, increasing and decreasing button shall not be used, because once after switch, knob Settings will return to zero value.

（5）Keyboard buttons and functions.

Key Symbol	Key Name	Function Description
PRGM	Program/ Exit key	First-level menu entry or exit.
ENT	Data enter key	Step by step, enter the menu screen and confirm the parameters.
△	UP increase key	Progressively increase data or function codes

▽	DOWN decrease key	Progressively decrease data or function codes.
>>	Shift key	Under the stop display interface and the running display interface, the display parameters can be selected. When modifying parameters, you can select the modification bit of the parameter.
RUN	Run key	Start to run the inverter in keypad control mode.
STOP/ RESET	STOP/ RESET	When running, press this button to stop the operation; When a fault alarm state is used, it can be used for reset operation, which is restricted by the function code F7.02.
MF.K	Multi-function key	Select the function switch according to F7.01.

Table 3-1 keyboard button instructions.

3.2 Function code viewing & modification method description.

The operation panel of the VM1000 series inverter adopts the three-level menu structure for parameter setting and so on.

Three levels of menu are as follow: Function code group (first-class)→Function code (second-class)→Setting parameter of function code (third-class). The operation flow is shown in figure 3.2.

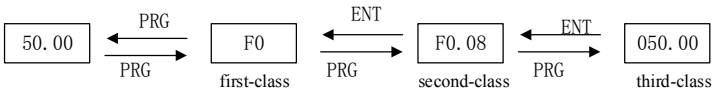


Figure 3-2 three-level menu operation flow chart.

Remarks:

Pressing PRGM or ENT can return to the second-class menu from the third-class menu. The difference is: Pressing ENT will return to the second-class menu by saving the setting parameters into control board, and meanwhile shift to the next function code automatically.

While pressing PRGM will directly return to the second-class menu without saving the parameters, and keep staying at the current function code.

For example:

Change the parameter 10.0Hz of function code F4.02 into 50.0Hz as the following flow chart shows:

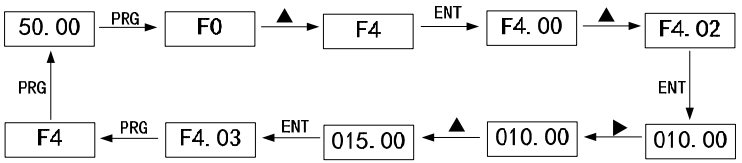


Figure 3-3 Flow Chart of Parameter Setting

Under the third-class menu, if the parameter has no flickering bit, it means that the function code cannot be modified. The possible reasons include:

a. The parameter of this function code can't be modified, such as actually detected parameter, operation records and so on.

b. This function code can't be modified during running state but can be modified during stop state.

3.3 View method of state parameters.

A variety of state parameters can be displayed by means of the shift key ">>" in an outage or running state.

The function code F7.03(LED operation display parameter 1), F7.04(LED running display parameter 2), F7.05(LED stop display parameter) in binary digit are referred to decide whether this parameter shall be displayed.

In stop state, with a total of 12 outage state parameters can be selected to be displayed or not, including: the set frequency, busbar voltage, DI input state, the DO output state, voltage analog input AI1, AI2 analog input voltage, the actual numerical value, the actual length, PLC phase steps (running steps), load speed display, PID setting, PULSE input frequency. The shift key ">>" shall be used to switch the selected parameters to be displayed as per the key pressing sequences.

In the running state, 29 parameters can be selected for viewing.

Among them, operating frequency and output current are as factory defaulted while other parameters which can be displayed include: the set frequency, busbar voltage, output voltage, output power, output torque, DI input state, the DO output state, voltage analog input AI1, AI2 analog input voltage, the analog input voltage AI3, actual count value, the actual length value, linear velocity, PID setting, PID feedback and so on.

Whether each parameter is displayed shall be selected as per the function code F7.03 and F7.04 (which shall be converted to binary unit), and then the selected parameters can be switched by clicking the ">>" button order.

After the converter is cut off and repower it again immediately, the parameters will be defaulted as the previous parameters set before powering off.

3.4 **Password Setting**

The inverter provides the user with the password protection function. When FE.00 is set to be non-zero, it is the password of the user, and the password protection of the exit function code is entered into effect. Once again, press the PRGM key, which will show "_____", and the user password must be entered correctly to enter the normal menu, otherwise it cannot enter.

To disable password protection only through the password and set FE.00 to 0.

Chapter 4 Quick commissioning instruction

4.1 Preparation and inspection before commissioning

The inverter is an electrical equipment used for motor drive and speed regulation. Therefore, it is necessary to prepare the electrical and mechanical conditions before running and performing the test run.

The following table 4-1 is items related to commissioning.

Items	Instructions
Inverter fixing or installation	1. The inverter needs to be firmly installed to prevent the connection loose or the equipment falling and damage due to movement. Please confirm the installation is correct according to 2.1.3 and 2.1.4. 2. For the temporary power operation, such as product inspection and testing, the converter must be placed on a stable platform, and it cannot run for too long.
Main circuit input wiring.	1. Ensure that the input voltage and capacity can meet the rating requirements of the inverter. Please refer to the 1.3 for the nameplate part and data in 1.6. 2. Make sure that the cable connection is correct, and the cable specification should conform to the reference data of the cable type in appendix a. 3.。
Main circuit output wiring.	1. Ensure that the rated voltage of the motor is consistent with the output rating of the inverter; Ensure the wiring is stable and reliable. 2. Make sure the cable is connected correctly, and the cable specification should conform to the reference data of the type of cable in appendix a. 3.

Motor installation.	1. Ensure that the motor is installed firmly and reliably, meeting the corresponding mechanical design requirements. An unsecured motor will cause an accident. 2. For an idle motor or an electric motor with load, it is necessary to ensure that it does not pose a danger to any personnel and equipment after starting, even in commissioning process. For devices that are forbidden to be reversed, the motor and mechanical coupling must be removed first, and the mechanical connection can be restored only after confirming that it has turned correctly through commissioning. 3.In the torque control mode of the inverter, ensure that the motor and the equipment will not suffer from the risk of flying,. Meanwhile, set and check the torque control positive & negative direction maximum frequency (F3.12 and F3.13). Note: flying means a state out of control for sudden fast speed or acceleration for lack of load. 4. Make sure the insulation of the motor is normal. Take off the output wiring line of the inverter before testing the insulation of the motor. Please refer to the safety precautions in this manual.
Mechanical safety inspection	1. Ensure that the motor and machinery driven by the converter have adequate safety protection measures. 2. It is recommended to carry out no-load test during the first run.
Control loop connection	1. Adopt the cable selection in accordance with section a.3. 2. Please refer to section 2.2.5 for design and inspection of control circuit wiring.
Inverter parameters.	Please check that the parameter setting of the inverter is in line with the control method required for mechanical design or product testing. Failure to properly set up will result in an accident after startup. For the inverter applied to vector control mode, the motor parameters shall be automatically tuned, please refer to section 4.5.

Table 4-1 test run checklist.

After completing the above commissioning inspection, test procedures such as generating and other follow-up testing procedures can be made according to the standard electrical safety operation standard.

4.2 Panel operation

（1）Applicable occasions

In the case of a single machine operation, for an inverter without the need of external operation or control device, as well as the conventional product test, panel operation test can meet the requirements.

At the same time, the frequency can be given by a knob or a number.

（2）Typical connection

After wiring the main circuit, the operation of the panel can be operated, including starting and stopping.

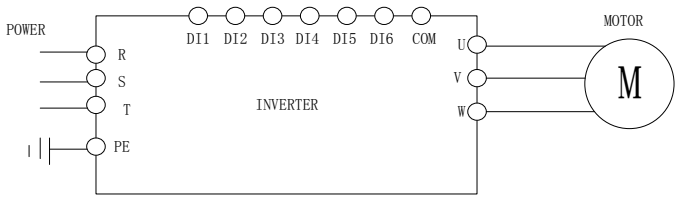


Figure 4-1 main circuit wiring of inverter.

（3）Inverter parameters setting.

Function Code	Name	Setting	Instructions	Note
F0.00	Motor control mode	1: V/F control	1. The factory value is set to 1, which is controlled by V/F. In addition to the motor nameplate rating vale, the other motor parameters need not be adjusted in testing process. 2. If you want to change to 0, in vector control mode, please refer to section 4.5 to adjust the motor parameters	In simple application, keep the factory default value unchanged.

			automatically.	
F0.01	Command source selection	0: operation panel command channel (LED out)	The factory default value is 0 means to start and stop control through the operation panel.	Keep unchanged.
F0.03	Choice of main frequency source X.	0: electronic potentiometer (no memory, as the frequency source switch will be reset) 1. Digital setting (memory loss)	1. The factory default value is set to 0, i.e. through the operation panel. The electronic potentiometer is given in frequency. 2. It can be changed to 1, which is modified through the operation panel. Frequency given value of F0.08.	When using electronic potentiometer, keep the factory default value unchanged.
F0.08	Keyboard setting frequency	0.00Hz ~ maximum frequency F0.10.	When F0.03 is changed to 1, this parameter needs to be set to run the given frequency.	
F0.09	Running direction selection	0: same direction 1: opposite direction	When the running direction of the motor is found to be inconsistent with the use requirement, direction can be changed by modifying this parameter..	Modifying this parameter is equivalent to changing the phase of wiring of the motor.
F0.10	Maximum output frequency	320.00Hz	This parameter is generally set according to the motor's nameplate, to ensure that output of the inverter does not exceed the motor rating. Note: it can be adjusted as per the frequency range of the motor allowed.	The factorydefault value: 50.00Hz.

Table 4-2 panel operation commonly used parameter setting.

Other parameters that may need to be adjusted include: F0.18 acceleration time 1, F0.19 deceleration time 1, etc.

（4）Panel operation steps

Steps	Operation	LED Display	Indicator light	Note
Start	Press "RUN" button	Run time 5 Byte LED display from flicker to non-flicker.	The RUN light turns on.	Refer to section 3.1
Check the running state	Press ">>" button to rotate the display state.	The default display include 4 items: running frequency, setting frequency, bus voltage and output current.	Hz, A and V are lighted respectively or lighted in group.	Refer to section 3.1
Stop	Press the "STOP/RESET" button"	After the shutdown, the 5 Byte LED display change from flicker to non-flicker.	RUN light is off.	Refer to section 3.1

Table 4-3 Panel operation steps

4.3 The terminal forward/start/stop control.

（1）Applicable occasions

It is the control mode commonly used for inverter. General ordinary conveyor, fan, water pump can adopt this control mode.

（2）Typical wiring

The control loop can be made of 2 wire system or 3 wire system.

The following is the 2 wire system control wiring.

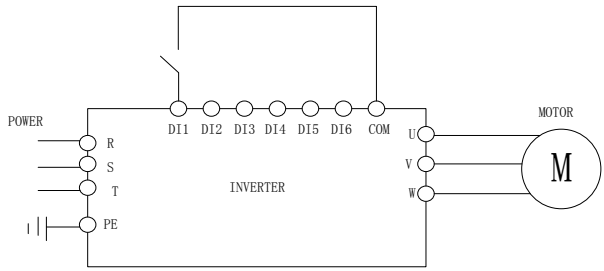


Figure 4-2 forward and stopping control of the inverter.

（3）Inverter parameter setting.

For F0 group parameters except F0.01, other common parameter Settings can be found in the panel operation in table 4-2 above.

Function Code	Name	Setting	Descriptions	Note
F0.01	Command source selection	0: operation panel command channel (LED out) 1: terminal command channel (LED light) 2: serial port communication command channel (LED flashing)	1. Modify the setting to 1, namely, the start-stop control is carried out through the terminal input signal. 2. In terminal control state, LOCAL/REMOTE light is on.	
F5.00	DI1 terminal function selection.	Adjustable range: 0 ~ 50. Of this range, 1 means that it is running (FWD).	The factory default value has been set to 1, which means the forward control is carried out through DI1.	Keep the factory value unchanged.
F5.16	Terminal command mode.	Adjustable range: 0 ~ 3. Where 0 represents: 2 wire system control mode 1.	The factory default value has been set to 0, that is, by using the two-wire system control mode 1.	Keep the factory default value unchanged.

Table 4-4 terminals forward/start/stop control common parameter settings

（5）Control operation steps

Steps	Operation	LED Display	Indicator light	Note
Start	Connect DI1 and COM. A manual toggle switch or a PLC output point is often used.	Run time 5 byte LED display from flicker to non-flicker.	The RUN light turns on.	Refer to section 3.1
Check the running state	Press ">>" button to rotately switch the display state.	The default display includes 4 items: running frequency, setting frequency, bus voltage and output current.	Hz, A and V are lighted respectively or lighted in group..	Refer to section 3.1
Stop	Disconnect DI1 from COM.	After the shutdown, five LED displays never flicker to flicker.	RUN light is off.	Refer to section 3.1

Table 4-5 terminals foreford/start/stop operation steps

4.4 Common control application guidance

4.4.1 Multiple speed control

（1）Multistage speed

It refers to select the preset output frequency of the inverter through combination of DI input terminals,16 preset values are available to be selected.

This method is generally used for sequential switching of multiple running speeds.

Common applications include escalators, conveyor belts, large laundry equipment, etc.

（2）Typical wiring

The following is the wiring diagram selected by the multistage speed indicators, using DI2 and DI3 terminals.

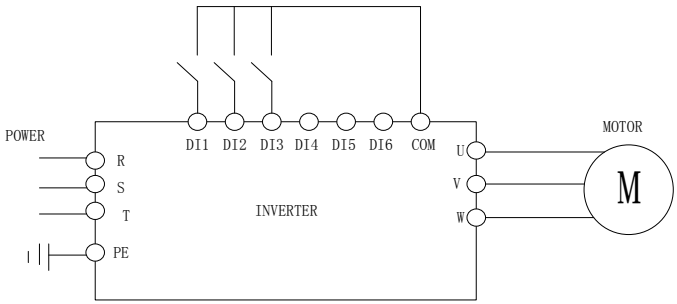


Figure 4-3 forward multistage control of inverter.

（3）Parameter Settings

This control application is also a terminal control. The start/stop control can be achieved by 2 wire or 3 wire system. The control parameters can be referred to table 4-4 as above.

The following table 4-6 is an example of the 4-segment speed correlation parameters shown in figure 4-3 using two DI terminals.

Function Code	Name	Setting	Descriptions	Note
F5.01	DI2 terminal function selection.	Adjustable range: 0 ~ 50. Among them, 12 ~ 15 represents multiple instructions 1 ~ 4.	Change the setting to 12, which means that DI2 is multi-segment instruction 1.	
F5.02	DI3 terminal function selection.	Adjustable range: 0 ~ 50. Among them, 12 ~ 15 represents multiple instructions 1 ~ 4.	Change the setting to 13, which means that DI3 is multi-segment instruction 2.	
FD.00	Multistage speed instruction 0	-100.0% ～ 100.0% (The maximum frequency of 100.0% is F0.10.)	Set according to application requirements.	
FD.01	Multistage speed instruction 1	-100.0% ～ 100.0%	Set according to application requirements.	

FD.02	Multistage speed instruction 2	-100.0% ～ 100.0%	Set according to application requirements.	
FD.03	Multistage speed instruction 3	-100.0% ～ 100.0%	Set according to application requirements.	

Table 4-6 multistage speed forward control parameters.

4.4.2 PID control

（1）PID control

It is a control mode that adopts PID algorithm to control the process of controlled objects.

In this mode, the output of the inverter is used to adjust certain physical quantities, such as speed, temperature, pressure, flow, etc., and the corresponding target setting value can be achilved through digital setting, or analogue given or communication given, etc.

It is commonly used in frequency conversion air compressor, drawing machine, constant pressure water supply, hvac and so on.

（2）Typical wiring

The following is a constant pressure water supply system wiring diagram with a digit given and analog feedback.

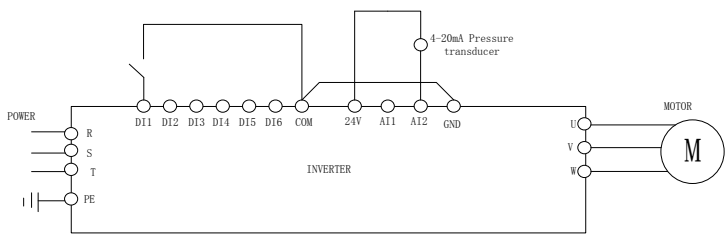


Figure 4-4 inverter number given PID control.

（3）Parameter Settings

This control application is also a terminal control, starting/stopping can be achieved through 2 wire or 3 wire system, and the main frequency source should be modified to PID.

Some control parameters are available in table 4-4 above.

The following table 4-7 is an example of PID correlation parameter with AI2 analog feedback.

Function Code	Name	Setting	Descriptions	Note
F0.03	Selection of main frequency source X.	0: electronic potentiometer (no memory, as the frequency source switch will be reset) ..... 8: PID 9: communication given	Change the setting to 8, and the output result of PID operation is the main frequency source.	
F5.23	AI2 minimum input	0.00V ～ F5.25	Set according to application requirements.	Calibration of analog signal.
F5.24	AI2 minimum input corresponding setting.	-100.0% ～ +100.0%	Set according to application requirements.	Calibration of analog signal.
F5.25	AI2 maximum input	F5.23 ～ +10.00V	Set according to application requirements.	Calibration of analog signal.
F5.26	AI2 maximum input corresponding setting.	-100.0% ～ +100.0%	Set according to application requirements.	Calibration of analog signal.

F9.00	PID given source	Adjustable range: 0 ~ 6. 0 represents the function code F9.01 given.	The factory default value has been set to 0, which means to set F9.01 as the number given.	Keep the factory default value unchanged.
F9.01 ～ F9.32	The remaining parameters of the PID parameter group.	-100.0% ～ 100.0%	Set up and debug according to application requirements.	Some parameters need to be repeatedly debugged to get the appropriate value.

Table 4-7 PID control parameters of the inverter

4.5 Motor parameters automatica tuning

Select vector control operation mode. Before the inverter runs, the nameplate parameter of the motor must be accurately entered, and the nameplate parameter of VM1000 inverter will match the standard motor parameters.

The vector control method depends much on the motor parameters. To obtain good control performance, accurate parameters of the controlled motor must be obtained.

The automatic tuning steps of motor parameters are as follows:

First, select the command source (F0.02) as the operation panel command channel.

Then, please input the following parameters according to the actual motor parameters (according to the current motor selection):

F2.00: motor type display select F2.01: motor rated power.

F2.02: motor rated voltage F2.03: motor rated current.

F2.04: motor rated frequency F2.05: motor rated speed.

If the motor can be completely disconnected from the load, then please select 2 for F2.11 (the asynchronous machine is fully tuned), and then press the RUN button on the keyboard panel, and the inverter will automatically calculate the following parameters of the motor:

F2.06: asynchronous machine stator resistance F2.07: asynchronous machine rotor resistance.

F2.08: asynchronous machine leakage resistance F2.09: asynchronous machine interaction resistance.

F2.10: asynchronous machine no-load current.

The above is to complete automatical tuning of the motor parameters.

If the motor cannot be completely unloaded with the load, then please select 1 for F2.11 (the asynchronous machine is still tuned) and then press the RUN button on the keyboard panel.

Inverter will measure the stator resistance, rotor resistance and leakage inductance parameter in turn, but will not measure the mutual inductance and no-load current of the motor; the user can calculate these two parameters according to the motor nameplate; the motor nameplate parameters which can be calculated include: rated voltage (U), rated current (I), rated frequency and power factor (η) :

The calculation method of the no-load current of the motor and of the mutual inductance of the motor are described in the following formula, where Lδ is the motor leakage reactance。

$$Lm = \frac{U}{2\sqrt{3}\pi f \cdot I_0} - L\delta$$

IO:motor no-load current

Lm: motor mutual inductance

Lδ: motor leakage inductance

U: motor rated voltage

I: motor rated current

f: motor rated frequency

η: motor power factor

4.6 Fault searching and reset

（1）Failure state and reset.

Start, stop and operation of the inverter is limited by various external and internal abnormalities internal factors which may lead to malfunctions. In a state of failure, if the equipment and security conditions permit, labor workers are needed to reset the inverter before it can be put into a normal standby state.

The automatic reset function can also be set for the inverter.。

（2）Fault query and resetting steps

Steps	Operation	LED Display	Indicator light	Note
Check the state of failure	View fault code	The panel displays the fault code at the beginning of E and serves as a flashing reminder.。	TUNE/TC flashing	Indicator light refers to section 3.1. The failure code refers to section 8.1.
Check the failure record.	1. View the E0 group parameters for the latest failure information. 2. Check E1~E4 for historical fault information.	In the case of failure, in addition to the fault information, various parameters are available and can be modified.	——	
Reset	1. Deal with the impact of failure, confirm the cause of failure and eliminate it. 2. Press "STOP/RESET" button to RESET.	In the case of a qualified condition, the fault code is no longer displayed, reset it to the standby operation state.	TUNE/TC Lights are off.	Indicator light refers to section 3.1.

Table 4-8 fault query and resetting steps

4.7 Parameters restore factory default value

Before the parameters are restored to the factory default value, please confirm that there will be no safety risks to the device (such as control failure) upon restoring, and some parameters already confirmed after debugging will not be lost.

Record if necessary.

Note: the parameters can be copied by LCD keyboard.

Operation steps:

(1) open F0 group parameters and enter F0.20 (parameter initialization).

(2) select 1 to restore factory default parameters (excluding motor parameters and record values)

(3) select 2 to clear record values, including various accumulated data such as running time, etc.

Chapter 5 Function Parameter Table

（1）Parameter table password protection.

Fe.00 is set to the non-zero value, that is, the parameter protection password is already set. The parameter menu can only be entered after entering the correct password. To cancel the password, FE. 00 must be set to 0.

The parameters in the shortcut menu are not password protected.

（2）Graphic symbols:

In the function table, change mode of the parameters are marked with graphic symbols, which are explained as follows.

○——The parameters can be modified both at stop and running status.

●——The parameters cannot be modified at running status.

◎——The parameters are actual-detecting record value cannot be modified.

□——The parameter is "manufacturer's parameter", which is limited to manufacturer's setting and user operation is forbidden.

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F0 Group: Basic Parameters					
F0.00	Control mode selection	0: speed-sensorless vector control (SVC) 1:V/F control	1	1	●
F0.01	Command source selection	0: operation panel command channel (LED out) 1: terminal command channel (LED	1	0	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		light) 2: serial port communication command channel (LED flashing)			
F0.02	Runtime UP/DOWN benchmark.	0: operation frequency 1: setting frequency	1	1	●
F0.03	Settings of master frequency source X	0: the number is set as F0.08 (pulse knob and UP/DOWN can be adjusted, the power is not in memory, and it will be cleared upon switch as the frequency source) 1. The number is set as F0.08 (pulse knob and UP/DOWN can be adjusted, power memory lost) 2: AI1 3: AI2 4: reserved 5: PULSE setting (DI6) 6: multistage speed instructions. 7: simple PLC 8: PID 9: communication given	1	1	●
F0.04	Settings of auxiliary frequency source Y	Same as F0.03(selection of main frequency source X)	1	0	●
F0.05	Selection of auxiliary frequency source Y when it is superposed	0 : Relative to the maximum frequency. 1: Relative to frequency source X	1	0	○
F0.06	Selection of auxiliary frequency source Y	0% ～ 150%	1%	100%	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
	when it is superposed				
F0.07	Frequency reference selection	Single-digit: Selection of frequency source selection. 0: main frequency source X 1. main & auxiliary operation results. 2: switch of main frequency source X and auxiliary frequency source Y switch. 3. Switching between main frequency source X and main & auxiliary operation. 4: Switching between auxiliary frequency source Y and main & auxiliary operation result switch. Two-digit: frequency source main & auxiliary operation relation. 0: main + auxiliary 1: main - auxiliary 2: maximum value of both 3: minimum of both.	11	0	○
F0.08	Keypad setting frequency	0.00Hz~ F0.10	0.01Hz	50.00Hz	○
F0.09	Running direction selection	0: in the same direction 1: opposite direction	1	0	○
F0.10	Max. output frequency	50.00Hz ～ 320.00Hz	0.01Hz	50.00Hz	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F0.11	Upper limit frequency source selection	0: F0.12 setting. 1: AI1 2: AI2 3: Reserved 4: PULSE setting (DI6) 5: Communication given	1	0	●
F0.12	Upper limit frequency	F0.14~ F0.10	0.01Hz	50.00Hz	○
F0.13	Upper limit frequency offset.	0.00Hz ～F0.10	0.01Hz	0.00Hz	○
F0.14	Lower limit frequency	0.00Hz~ F0.12	0.01Hz	0.00Hz	○
F0.15	The function of lower limit frequency	When the setting frequency is lower than the lower frequency: 0 : Running at lower limit frequency 1: Stop frequency point 2: Sleep frequency point	1	0	○
F0.16	Carrier frequency setting	0.5kHz ～ 16.0kHz	0.1kHz	Defined by inverter model	○
F0.17	Reserved				
F0.18	Acceleration time 1	0.0s ～ 6500.0s	0.1s	Defined by inverter model	○
F0.19	Deceleration time 1	0.0s ～ 6500.0s	0.1s	Defined by inverter	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
				model	
F0.20	Default setting restoring	0:No operation 1: Restore to factory default setting (not including parameters of the motor) 2: clear fault record	1	0	●
F0.21	function code modification attribute	0: modifiable 1: non-modifiable	1	0	○
F0.22	Digital setting frequency stop memory selection.	0: no memory 1: memory	1	1	●
F0.23	Acceleration & Deceleration time unit	0：1 s 1：0.1 s 2：0.01 s	1	1	●
F0.24	Acceleration & Deceleration time reference frequency.	0: maximum frequency (F0.10) 1: setting frequency 2：100Hz	1	0	●
F0.25	Cooling fan running method	0: Automatic running 1: Keep running when power on	1	0	○
F0.26	Frequency instruction decimal point.	1:1 decimal point 2:2 decimal point	1	2	●
F1 Group: Start/Stop Parameters					
F1.00	Start mode	0:Start directly 1: Speed tracing and start 2: Pre-excitation by asynchronous motor and then start	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F1.01	Speed tracking mode	0: start with the frequency of power failure. 1: start at zero speed. 2: start at the maximum frequency.	1	0	●
F1.02	Speed tracking is fast.	1 ～ 100	1	20	○
F1.03	Start frequency	0.00Hz ～ 10.00Hz	0.01Hz	0.00Hz	○
F1.04	Hold time of start frequency	0.0s ～ 100.0s	0.1s	0.0s	●
F1.05	DC braking current before start/ Pre-excitation current	0% ～ 100%	1%	0%	●
F1.06	DC braking time before start/ Pre-excitation current	0.0s ～ 100.0s	0.1s	0.0s	●
F1.07	Acceleration & deceleration method	0: Linear method 1: S curve method A 2: S curve method B	1	0	●
F1.08	S Curve Starting Stage Ratio	0.0% ～ 70.0%	0.10%	30.00%	●
F1.09	S Curve Finishing Stage Ratio	0.0% ～ 70.0%	0.10%	30.00%	●
F1.10	Stop mode	0: Deceleration to stop 1: free stopping	1	0	○
F1.11	Trigging frequency of DC braking at stop	0.00~ F0.10	0.01Hz	0.00Hz	○
F1.12	Waiting time before DC	0.0s ～ 100.0s	0.1s	0.0s	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
	braking at stop				
F1.13	DC braking current at stop	0% ～ 100%	1%	0%	○
F1.14	DC braking time at stop	0.0s ～ 100.0s	0.1s	0.0s	○
F1.15	Brake use rate	0% ～ 100%	1%	100%	○
F2 Group: Motor Parameters					
F2.00	Motor type selection	0: ordinary asynchronous motor. 1: variable frequency asynchronous motor.	1	0	●
F2.01	Motor rated power	0.1kW ～ 400.0kW	0.1kW	Set according to inverter model	●
F2.02	Motor rated voltage	1V ～ 440V	1V	Set according to inverter model	●
F2.03	Motor rated current	0.01A ～ 655.35A（<=55kW） 0.1A ～ 6553.5A（>55kW）	0.01A/ 0.1A	Set according to inverter model	●
F2.04	Motor rated frequency	0.01Hz ～F0.10	0.01Hz	Set according to inverter model	●
F2.05	Motor rated rotation speed	1rpm ～ 36000rpm	1rpm	Set according	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
				to inverter model	
F2.06	Asynchronous motor stator resistance	0.001Ω ～ 65.535Ω （<=55kW） 0.0001Ω ～ 6.5535Ω（>55kW）	0.001Ω/ 0.0001Ω	Set according to inverter model	●
F2.07	Asynchronous motor rotator resistance	0.001Ω ～ 65.535Ω （<=55kW） 0.0001Ω ～ 6.5535Ω（>55kW）	0.001Ω/ 0.0001Ω	Set according to inverter model	●
F2.08	Asynchronous motor leakage inductance	0.01mH ～ 655.35mH （<=55kW） 0.001mH ～ 65.535mH （>55kW）	0.01mH/ 0.001mH	Set according to inverter model	●
F2.09	Asynchronous motor mutual inductance	0.1mH ～ 6553.5mH （<=55kW） 0.01mH ～ 655.35mH （>55kW）	0.1mH/ 0.01mH	Set according to inverter model	●
F2.10	Asynchronous motor no-load current	0.01A ～ F2.03 （<=55kW） 0.1A ～ F2.03 （>55kW）	0.01A/ 0.1A	Set according to inverter model	●
F2.11	Tuning selection	0: no operation 1: asynchronous machine static tuning. 2: the asynchronous machine is fully tuned.	1	0	●
F2.12	Drive model	0:General model (G) (constant torque load model) 1:Pump model (P) (draught fan, water pump type load model)	1	Set according to inverter model	◎

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F3 Group: Vector Control Parameters					
F3.00	Speed loop proportional gain 1	1 ～ 100	1	30	○
F3.01	Speed loop integral time 1	0.01s ～ 10.00s	0.01s	0.50s	○
F3.02	Switch frequency 1	0.00 ～ F3.05	0.01Hz	5.00Hz	○
F3.03	Speed loop proportional gain 2	1 ～ 100	1	20	○
F3.04	Speed loop integral time 2	0.01s ～ 10.00s	0.01s	1.00s	○
F3.05	Switch frequency point	F3.02 ～F0.10	0.01Hz	10.00Hz	○
F3.06	VC control mode rotation difference coefficient	50% ～ 200%	1%	100%	○
F3.07	Speed loop filter time constant.	0.000s ～ 0.100s	0.001s	0.000s	○
F3.08	Speed control torque upper limit	0.0% ～ 200.0%	0.10%	150.00%	○
F3.09	Speed/torque control.	0: speed control 1. Torque control	1	0	●
F3.10	Torque control torque limit source.	0: digital setting 1: AI1 2: AI2 3: Reserved 4: PULSE setting. 5: communication given	1	0	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		6: MIN (AI1, AI2) 7: MAX (AI1, AI2)			
F3.11	Torque control torque limit setting.	-200.0% ～ 200.0%	0.10%	150.00%	○
F3.12	Torque control forward maximum frequency.	0.00Hz ～maximum frequency	0.01Hz	50.00Hz	○
F3.13	Torque control inverse maximum frequency.	0.00Hz ～maximum frequency	0.01Hz	50.00Hz	○
F3.14	Torque control acceleration time.	0.00s ～ 650.00s	0.01s	0.00s	○
F3.15	Torque control deceleration time.	0.00s ～ 650.00s	0.01s	0.00s	○
F3.16	Torque stiffness coefficient.	10.0%~120.0%	0.10%	100.00%	●
F3.17	M axis current loop proportional gain.	0 ～ 60000	1	2000	○
F3.18	M axis current loop integral gain.	0 ～ 60000	1	1300	○
F3.19	Taxis current proportional gain.	0 ～ 60000	1	2000	○
F3.20	Taxis current integral gain.	0 ～ 60000	1	1300	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F3.21	The speed loop integral separation.	0: invalid 1: effective	1	0	○
F4 Group: V/F Control Parameters					
F4.00	V/F curve & mode selection	0：Linear V/F curve 1：Multipoint V/F curve 2：Square V/F curve 3~9：Reserved 10: VF complete separation mode. 11: VF semi-detached mode.	1	0	●
F4.01	Torque boost	0.0%：（auto） 0.1% ～ 30.0%（not valid when V/F is separated.）	0.10%	Set according to inverter model	○
F4.02	Torque lift cutoff frequency.	0.00Hz ～maximum frequency	0.01Hz	50.00Hz	●
F4.03	Multipoint V/F frequency 1	0.00Hz ～ F4.05	0.01Hz	0.00Hz	●
F4.04	Multipoint V/F voltage 1	0.0% ～ 100.0%	0.10%	0.00%	●
F4.05	Multipoint V/F frequency 2	F4.03 ～ F4.07	0.01Hz	0.00Hz	●
F4.06	Multipoint V/F voltage 2	0.0% ～ 100.0%	0.10%	0.00%	●
F4.07	Multipoint V/F frequency 3	F4.05 ～motor rated frequency (F2.04)	0.01Hz	0.00Hz	●
F4.08	Multipoint V/F voltage 3	0.0% ～ 100.0%	0.10%	0.00%	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F4.09	V/F torque difference compensation coefficient	0.0% ～ 200.0%	0.10%	0.00%	○
F4.10	V/F Overexcitation gain	0 ～ 200	1	64	○
F4.11	Oscillation suppression gain	0 ～ 100	1	Set according to inverter model	○
F4.12	V/FSeparated voltage source.	0: digital setting (F4.13) 1: AI1 2: AI2 3: Reserved 4: PULSE setting (DI6) 5: multiple speed instructions. 6: simple PLC 7: PID 8: communication given 100.0% is corresponding to the motor rated voltage	1	0	○
F4.13	V/F separation voltage source digital setting.	0V ～Motor rated voltage	1V	0V	○
F4.14	V/F separation voltage rise time.	0.0s ～ 1000.0s （Represents the time of the change of 0V to the rated voltage of the motor.）	0.1s	0.0s	○
F5 Group: Input Terminals Parameters					

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F5.00	DI1 terminal function selection	0: no function 1: forward running (FWD) 2: reverse running (REV) 3: three-wire operation control. 4: forward point movement (FJOG) 5: reverse point movement (RJOG) 6: terminal UP 7: terminal DOWN 8: free parking 9: RESET 10: operation suspension 11: external faults often open input. 12: multi-speed instruction terminal 1. 13: multi-speed instruction terminal 2. 14: multi-speed instruction terminal 3. 15: multi-speed instruction terminal 4. 16: acceleration & deceleration time to select terminal 1. 17: acceleration & deceleration time to select terminal 2. 18: frequency source switching (terminal, keyboard)	1	1	●
F5.01	DI2 terminal function selection		1	4	●
F5.02	DI3 terminal function selection		1	9	●
F5.03	DI4 terminal function selection		1	12	●
F5.04	DI5 terminal function selection		1	13	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F5.05	DI6 terminal function selection	19: clear the UP/DOWN setting. 20: run command switch terminal. 21: acceleration & deceleration is prohibited. 22: PID suspension 23: PLC state reset. 24: swing stop 25: counter input. 26: counter reset. 27: length count input. 28: length reset. 29: torque control is prohibited. 30: PULSE input (only valid for DI6) 31: Reserved 32: immediate dc braking. 33: input external failure in frequent closed state. 34: frequency setting effect terminal (this terminal function is not set, the default is valid) 35: the PID action direction goes as the reverse terminal. 36: external stopping terminal 1. 37: control command switching terminal. 38: PID integral stop terminal. 39: frequency source X and preset frequency switching terminals. 40: frequency source Y and preset	1	0	●
F5.06 –F5.09	Reserved				
F5.10	VDI terminal function		1	0	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		frequency switching terminals. 41 ~ 42: Reserved 43: PID parameter switching terminal. 44: user-defined fault 1. 45: user-defined fault 2. 46: speed control/torque control switching. 47: emergency stop 48: external stopping terminal 2. 49: deceleration dc braking. 50: this running time is returned to zero. 51 ~ 59: Reserved			
F5.11~ F5.14	Reserved				
F5.15	DI Filtering time	0.000s ～ 1.000s	0.001s	0.010s	○
F5.16	Terminal control mode	0:2-wire control mode 2 2:3-wire control mode 1 3:3-wire control mode 2 4:3-wire control mode 2	1	0	●
F5.17	UP/ DOWN change rate range	0.01Hz ～ 6553.5Hz	0.01Hz	0.50Hz	○
F5.18	AI1 lower limit	0.00V ～ F5.20	0.01V	0.00V	○
F5.19	Setting value corresponding to AI1 lower limit	-100.0% ～ +100.0%	0.10%	0.00%	○
F5.20	AI1 upper limit	F5.18～ +10.00V	0.01V	10.00V	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F5.21	Setting value corresponding to AI1 upper limit	-100.0% ～ +100.0%	0.10%	100.00%	○
F5.22	AI1 input filter time	0.00s ～ 10.00s	0.01s	0.10s	○
F5.23	AI2 lower limit	0.00V ～ F5.25	0.01V	0.00V	○
F5.24	Setting value corresponding to AI2lower limit	-100.0% ～ +100.0%	0.10%	0.00%	○
F5.25	AI2pper limit	F5.23 ～ +10.00V	0.01V	10.00V	○
F5.26	Setting value corresponding to AI2 upper limit	-100.0% ～ +100.0%	0.10%	100.00%	○
F5.27	AI2 input filter time	0.00s ～ 10.00s	0.01s	0.10s	○
F5.28	PULSE lower limit	0.00kHz ～ F5.30	0.01kHz	0.00kHz	○
F5.29	Setting value corresponding to PULSE lower limit	-100.0% ～ 100.0%	0.10%	0.00%	○
F5.30	PULSE upper limit	F5.28 ～ 100.00kHz	0.01kHz	50.00kHz	○
F5.31	Setting value corresponding to PULSE upper limit	-100.0% ～ 100.0%	0.10%	100.00%	○
F5.32	PULSE input filter time	0.00s ～ 10.00s	0.01s	0.10s	○
F5.33	DI1 On delay time	0.0s ～ 3600.0s	0.1s	0.0s	○
F5.34	DI2 On delay time	0.0s ～ 3600.0s	0.1s	0.0s	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F5.35	DI1 Off delay time	0.0s ～ 3600.0s	0.1s	0.0s	○
F5.36	DI2 Off delay time	0.0s ～ 3600.0s	0.1s	0.0s	○
F5.37	The DI input terminal is valid for setting 1.	0: high level 1: low level Bits: DI1 Ten: DI2 One hundred: DI3 One thousand: DI4 Ten thousand: DI5	11111	0	●
F5.38	The DI input terminal is valid for setting 2	0: high level 1: low level Single-digit: DI6 Ten-digit: Reserved Hundred-digit: Reserved Thousand-dight: Reserved Ten Thousand-digit: Reserved	11111	0	●
F6 Group: Output Terminals Parameters					
F6.00	FM output selection	0: pulse output (FMP) 1: open collector output (FMR)	1	0	○
F6.01	FMR output selection	0: no output 1: inverter operation. 2: fault output (downtime) 3: FDT1 output is detected at the	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F6.02	Relay 1 output selection.	frequency level. 4: frequency arrival 5: zero speed operation (no output during shutdown) 6: motor overload warning alarm. 7: inverter overload alarm. 8: set the count value arrive. 9: specify the count value to arrive. 10: length arrive 11: the PLC cycle is completed. 12: cumulative running time to arrive. 13: frequency is in limit. 14: torque is in limit. 15: run ready. 16: AI1 > AI2 17: upper limit frequency arrive. 18: lower limit frequency arrive (operation related) 19: undervoltage state output. 20: communication setting 21: positioning completed (reserved) 22: positioning approach (reserved) 23: operation at zero speed 2 (also output when stop) 24: cumulative time of on power arrive. 25: detection of FDT2 output at frequency level. 26: frequency arrival 1 output.	1	2	○
F6.03	Relay 2 output selection.		1	1	○
F6.04 ~F6.05	Reserved				
F6.06	VDO output selection		1	0	●
F6.07~ F6.10	Reserved				

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		27: frequency arrival 2 output. 28: the current arrival 1 output. 29: the current arrival 2 output. 30: regularly arrival output. 31: AI1 input exceeds the upper limit. 32: load in drop 33: running direction 34: zero current detection. 35: module temperature arrive. 36: software overcurrent output. 37: lower limit frequency arrive (non-operational) 38: fault output (continue operation) 39: Reserved 40: this running time arrive. 41: user-defined output 1. 42: user-defined output 2.			
F6.11	FMP output selection	0: operation frequency 1: setting frequency 2: output current 3: output torque 4: output power 5: output voltage 6: PULSE input (100.% corresponding to 100.0kHz) 7: AI1 8: AI2 9: Reserved	1	0	○
F6.12	AO1 output selection		1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F6.13	AO2 output selection	10: length 11. Count value 12: communication setting 13: motor speed 14: output current (0-1000a, corresponding to 0-10v) 15: output voltage (0-1000v, corresponding 0-10v) 16: Reserved	1	1	○
F6.14	FMP output maximum frequency.	0.01kHz ～ 100.00kHz	0.01kHz	50.00kHz	○
F6.15	AO1 zero offset coefficient.	-100.0% ～ 100.0%	0.10%	0.00%	○
F6.16	AO1 gain	-10.00 ～ 10.00	0.01	1	○
F6.17	AO2 zero offset coefficient.	-100.0% ～ 100.0%	0.10%	0.00%	○
F6.18	AO2 gain	-10.00 ～ 10.00	0.01	1	○
F6.19	FMR connectting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.20	Relay 1 connectting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.21	Relay 2 connectting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.22	VDO connectting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.23	FMR disconnecting delay	0.0s ～ 3600.0s	0.1s	0.0s	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
	time.				
F6.24	Relay 1 disconnecting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.25	Relay 2 disconnecting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.26	VDO disconnecting delay time.	0.0s ～ 3600.0s	0.1s	0.0s	○
F6.27	Output terminal valid state selection.	0: positive logic 1: anti-logic Single-digit: FDOR Ten-digit: RELAY1 Hundred-digit: RELAY2 Thousand-digit: Reserved Ten thousand-digit: Reserved	11111	0	○
F6.28	User defined output variability selection (EX)1	0:Running frequency 1:Setting frequency 2:DC bus voltage 3:Output current 4:Output voltage 5: output power 6: output torque 7 ~ 8: reserved 9: AI1 input quantity. 10: AI2 input quantity. 11: Reserved 12: count value 13: meter value	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F6.29	User defined comparison method 1	Single-digit: comparison test method 0: Equal (EX==X1) 1: Equal or greater than 2: Equal or less than 3: Interval comparison (X1≤EX≤X2) 4:Units digit test (EX&X1=X2) Ten-digit : output method 0: False value output 1: Real value output	11	0	○
F6.30	User defined output dead zone 1	0 ～ 65535	1	0	○
F6.31	User-defined 1 output comparison value 1.	0 ～ 65535	1	0	○
F6.32	User-defined 1 output comparison value 2.	0 ～ 65535	1	0	○
F6.33	User defined output variability selection (EX)2	0:Running frequency 1:Setting frequency 2:DC bus voltage 3:Output current 4:Output voltage 5: output power 6: output torque 7 ~ 8: reserved 9: AI1 input quantity. 10: AI2 input quantity. 11: Reserved 12: count value 13: meter value	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F6.34	Comparison method of user defined output 2	Single-digit: comparison test method 0: Equal (EX==X1) 1: Equal or greater than 2: Equal or less than 3: Interval comparison (X1≤EX≤X2) 4:Units digit test (EX&X1=X2) Ten-digit : output method 0: False value output 1: Real value output	11	0	○
F6.35	User defined output dead zone 2	0 ～ 65535	1	0	○
F6.36	User-defined 2 output comparison value 1.	0 ～ 65535	1	0	○
F6.37	User-defined 2 output comparison value 2	0 ～ 65535	1	0	○
F7 Group: Display Interface Parameters					
F7.00	LCD keyboard parameter copy.	0: no operation 1: the native function parameters are uploaded to the LCD keyboard. 2: LCD keyboard function parameters are downloaded to the machine.	1	0	○
F7.01	MF.K key function selection.	0: MF.K invalid 1: switch between operation panel command channel and remote command channel (remote command channel includes communication and terminal control) 2: switch between forward & reverse.	1	0	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		3: forward movement 4: reverse movement 5: menu mode switch.			
F7.02	STOP/RESET key stop function	0：Only valid under control of keypad 1：Valid under all control mode	1	1	○
F7.03	LED operation display parameter 1.	0000 ~ FFFF Bit00: operation frequency (Hz) Bit01: setting frequency (Hz) Bit02: bus voltage (V) Bit03: output voltage (V) Bit04: output current (A) Bit05: output power (kW) Bit06: output torque (%) Bit07: DI input state. Bit08: DO output state. Bit09: AI1 voltage (V) Bit10: AI2 voltage (V) Bit11: Reserved Bit12: count value Bit13: length value Bit14: load speed display. Bit15: PID setting	1111	17	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F7.04	LED operation display parameter 2.	0000 ~ FFFF Bit00: PID feedback. Bit01: PLC stage. Bit02: feedback speed, unit 0.1Hz. Bit03: Reserved Bit04: remaining running time. Bit05: AI1 pre-correction voltage. Bit06: AI2 pre-correction voltage. Bit07: Reserved Bit08: linear speed. Bit09: current on power time. Bit10: current run time. Bit11: Reserved Bit12: communication set value. Bit13: Reserved Bit14: main frequency X display. Bit15: auxiliary frequency Y display.	1111	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F7.05	LED stop display parameters.	0000 ~ FFFF Bit00: setting frequency (Hz) Bit01: bus voltage (V) Bit02: DI input state. Bit03: DO output status. Bit04: AI1 voltage (V) Bit05: AI2 voltage (V) Bit06: Reserved Bit07: count value Bit08: length value Bit09: PLC stage Bit10: load speed display. Bit11: PID setting Bit12: PULSE input frequency, unit 0.01kHz. Bit13: PID feedback value.	1111	33	○
F7.06	Load speed display coefficient.	0.0001 ～ 6.5000	0.0001	0.3	○
F7.07	Inverter module radiator temperature	0℃～ 100℃	1℃	.	◎
F7.08	rectifier bridge radiator temperature	0℃～ 100℃	1℃	.	◎
F7.09	Accumulative running time	0h ～ 65535h	1h	.	◎
F7.10	Product No.	-		.	◎
F7.11	Inverter software version	-		.	◎

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F7.12	The load speed shows the decimal number.	0:0 decimal place. 1:1 decimal place 2: 2 decimal place 3: 3 decimal place	1	0	○
F7.13	Accumulative power-on time	0h ～ 65535h	1h	.	◎
F7.14	Accumulative power consumption	0 W*h～ 65535 W*h	1 W*h	.	◎
F8 Group: Auxiliary Function Parameters					
F8.00	inching running frequency	0.00Hz ～F0.10	0.01Hz	2.00Hz	○
F8.01	inching acceleration time	0.0s ～ 6500.0s	0.1s	20.0s	○
F8.02	inching deceleration time	0.0s ～ 6500.0s	0.1s	20.0s	○
F8.03	Acceleration time 2	0.0s ～ 6500.0s	0.1s	Set by inverter model	○
F8.04	Deceleration time 2	0.0s ～ 6500.0s	0.1s		○
F8.05	Acceleration time 3	0.0s ～ 6500.0s	0.1s		○
F8.06	Deceleration time 3	0.0s ～ 6500.0s	0.1s		○
F8.07	Acceleration time 4	0.0s ～ 6500.0s	0.1s		○
F8.08	Deceleration time 4	0.0s ～ 6500.0s	0.1s		○
F8.09	Hopping frequency 1	0.00Hz ～F0.10	0.01Hz	0.00Hz	○
F8.10	Hopping frequency 2	0.00Hz ～F0.10	0.01Hz	0.00Hz	○
F8.11	Hopping frequency	0.00Hz ～F0.10	0.01Hz	0.01Hz	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
	range				
F8.12	forward-reverse run till dead time.	0.0s ～ 3000.0s	0.1s	0.0s	○
F8.13	Reversion control	0: allow reversion 1: no reversion	1	0	○
F8.14	The carrier frequency is adjusted with temperature.	0：no 1：yes	1	1	○
F8.15	Droop control	0.00Hz ～ 10.00Hz	0.01Hz	0.00Hz	○
F8.16	Set accumulated power-on arrive time	0h ～ 65000h	1h	0h	○
F8.17	Set accumulated running arrive time	0h ～ 65000h	1h	0h	○
F8.18	Start protection selection	0: no protection 1: protect	1	0	○
F8.19	Frequency detection value(FDT1)	0.00Hz ～F0.10	0.01Hz	50.00Hz	○
F8.20	Frequency detection lagged value (FDT1)	0.0% ～ 100.0%（FDT1 electrical value）	0.10%	5.00%	○
F8.21	Detecting range of frequency arrival	0.0% ～ 100.0%（Maxi. Frequency）	0.10%	0.00%	○
F8.22	Whether the hopping frequency is effective during acceleration & deceleration.	0: invalid 1: effective	1	0	○
F8.23	Accumulated running time arrive action	0:Keep running 1:fault warning	1	0	●

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
	selection				
F8.24	Accumulated power-on time arrive action selection	0:Keep running 1: fault warning	1	0	●
F8.25	Acceleration time 1/2 switching frequency point.	0.00Hz ～Maxi. Frequency	0.01Hz	0.00Hz	○
F8.26	Deceleration time 1/2 switch frequency point.	0.00Hz ～Maxi. Frequency	0.01Hz	0.00Hz	○
F8.27	Terminal inching prioritized.	0: invalid 1: effective	1	1	○
F8.28	Frequency detection lagged value(FDT2)	0.00Hz ～F0.10	0.01Hz	50.00Hz	○
F8.29	Arbitrary arrival frequency detection value	0.0% ～ 100.0% （FDT2 electrical level）	0.10%	5.00%	○
F8.30	Any arrival frequency detection value 1	0.00Hz ～Maxi. Frequency	0.01Hz	50.00Hz	○
F8.31	Any arrival frequency detection range 1	0.0% ～ 100.0%（Maxi. Frequency）	0.10%	0.00%	○
F8.32	Any arrival frequency detection value 2	0.00Hz ～Maxi. Frequency	0.01Hz	50.00Hz	○
F8.33	Any arrival frequency detection range 2	0.0% ～ 100.0%（Maxi. Frequency）	0.10%	0.00%	○
F8.34	Zero current detection delay level.	0.0% ～ 300.0% The motor rated current is 100.0%, which is not output when the machine is down.	0.10%	5.00%	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F8.35	Zero current detection delay time.	0.01s ～ 600.00s	0.01s	0.10s	○
F8.36	Software overcurrent point	0.0%（Don't test） 0.1% ～ 300.0%（Motor rated current）	0.10%	200.00%	○
F8.37	Software overcurrent detection delay time.	0.00s ～ 600.00s	0.01s	0.00s	○
F8.38	Any arrival current 1.	0.0% ～ 300.0%(Motor rated current	0.10%	100.00%	○
F8.39	Any arrival current 1 width.	0.0% ～ 300.0%(Motor rated current)	0.10%	0.00%	○
F8.40	Any arrival current current 2	0.0% ～ 300.0%(Motor rated current)	0.10%	100.00%	○
F8.41	Any arrival current 2 width.	0.0% ～ 300.0%(Motor rated current)	0.10%	0.00%	○
F8.42	Timing function selections	0: invalid 1: effective	1	0	●
F8.43	Timing running time selection.	0: F8.44 setting. 1: AI1 2: AI2 3: Reserved	1	0	●
F8.44	Timing running time	0.0Min ～ 6500.0Min	0.1Min	0.0Min	●
F8.45	AI1 input voltage protection value lower limit.	0.00V ～ F8.46	0.01V	3.10V	○
F8.46	AI1 input voltage protection value upper limit.	F8.45 ～ 10.00V	0.01V	6.80V	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F8.47	Module temperature arrival	0℃～ 100℃	1℃	75℃	○
F8.48	Fast current limiting enabled.	0: not-enabled. 1: enabled.	1	1	○
F9/FE Group PID Control Parameters					
F9.00	PID setting source	0: function code F9.01 setting. 1: AI1 2: AI2 3: Reserved 4: PULSE setting (DI6) 5: communication given 6: multiple speed instructions given.	1	0	○
F9.01	PID preset value	0.0% ～ 100.0%	0.10%	50.0%	○
F9.02	PID feedback source selection	0: AI1 1: AI2 2: Reserved 3: AI1, AI2 4: PULSE setting (DI6) 5: communication setting 6: AI1+AI2. 7: MAX (| AI1 | ,| AI2 |) 8: MIN (| AI1 | ,| AI2 |)	1	0	○
F9.03	PID controlling characteristic	0: Positive 1: Negative	1	0	○
F9.04	PID setting feedback range.	0 ～ 65535	1	1000	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F9.05	Proportional gain P1	0.0 ～ 100.0	0.1	20	○
F9.06	Integral time I1	0.00s ～ 10.00s	0.01s	2.00s	○
F9.07	Differential time D1	0.000s ～ 10.000s	0.001s	0.000s	○
F9.08	PID reverse cut-off frequency.	0.00 ～Maxi. Frequency	0.01Hz	0.00Hz	○
F9.09	PID deviation limit	0.0% ～ 100.0%	0.10%	0.0%	○
F9.10	PID differential limit range	0.00% ～ 100.00%	0.01%	0.10%	○
F9.11	PID setting change time.	0.00 ～ 650.00s	0.01s	0.00s	○
F9.12	PID feedback filtering time.	0.00 ～ 60.00s	0.01s	0.00s	○
F9.13	PID output filtering time.	0.00 ～ 60.00s	0.01s	0.00s	○
F9.14	Proportional gain P2	0.0 ～ 100.0	0.1	20	○
F9.15	Integral time I2	0.00s ～ 10.00s	0.01s	2.00s	○
F9.16	Differential time D2	0.000s ～ 10.000s	0.001s	0.000s	○
F9.17	PID parameter switching condition.	0: no switching 1: DI terminal 2: automatic switching based on deviation.	1	0	○
F9.18	PID parameter switching deviation 1.	0.0% ～ F9.19	0.10%	20.0%	○
F9.19	PID parameter switching deviation 2	F9.18 ～ 100.0%	0.10%	80.0%	○

Function Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modification Type
F9.20	PID initial value	0.0% ～ 100.0%	0.10%	0.0%	○
F9.21	PID initial value remaining time	0.00 ～ 650.00s	0.01s	0.00s	○
F9.22	Two output deviation forward maximum.	0.00% ～ 100.00%	0.01%	1.00%	○
F9.23	Two output deviation reverse maximum.	0.00% ～ 100.00%	0.01%	1.00%	○
F9.24	PID integral property	Single-digit: Integration separation 0: Disabled 1: Enabled Ten-digit: Output to limit value and whether to stop the integral 0: Continue the integral 1: Stop the integral	11	0	○
F9.25	PID feedback loss detection value.	0.0%：do not judge the feedback loss. 0.1% ～ 100.0%	0.10%	0.0%	○
F9.26	PID Feedback loss detection time.	0.0s ～ 20.0s	0.1s	0.0s	○
F9.27	PID calculation in stop state	0: Stop calculation in stop state 1: Continue calculation in stop state	1	0	○
F9.28	PID function selection	0: normal PID 1: sleep PID	1	0	○
F9.29	PID sleep threshold	0.0% ～ 100.0%	0.10%	60.0%	○
F9.30	PID sleep delay	0.0 ～ 3600.0s	0.1s	3.0s	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
F9.31	PID wake-up threshold	0.0% ～ 100.0%	0.10%	20.0%	○
F9.32	PID wake-up time delay	0.0 ～ 3600.0s	0.1s	3.0s	○
FA Group: Malfunction & Protection Parameters					
FA.00	Motor overload protection selection	0: Disabled 1: Enabled	1	1	○
FA.01	Motor overload protection gain.	0.20 ～ 10.00	0.01	1	○
FA.02	Motor overload early warning coefficient.	50% ～ 100%	1%	80%	○
FA.03	Over-voltage stalling gain.	0 ～ 100	1	0	○
FA.04	Over-voltage stalling protection point	120% ～ 150%	1%	130%	○
FA.05	Over-current stalling gain.	0 ～ 100	1	20	○
FA.06	Over- current stalling protection point	100% ～ 200%	1%	150%	○
FA.07	Grounding short circuit protection in on-power state.	0: invalid 1: effective	1	1	○
FA.08	Fault auto-reset times	0 ～ 5	1	0	○
FA.09	Fault DO action selection during automatic reset.	0: no action 1:Action	1	0	○
FA.10	Fault auto-reset interval	0.1s ～ 100.0s	0.1s	1.0s	○
FA.11	Input Phase-lack protection	0:Disabled 1:Enabled	1	1	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FA.12	Output phase-lack protection	0: Disabled 1:Enabled	1	1	○
FA.13	Fault protection action option 1.	0: free machine stopping 1: stop the machine by the stop mode. 2: keep running Single-digit: motor overload (Err11) Ten-digit: input missing phase (Err12) Hundred-digit: output gap (Err13) Thousand-digit: external fault (Err15) Ten thousand-digit: communication exception (Err16)	11111	0	○
FA.14	Reserved				
FA.15	Fault protection action option 3	0: free machine stopping 1: stop the machine by the stop mode. 2: keep running Single-digit: user-defined fault 1(Err27) Ten-digit: user-defined fault 2(Err28) Hundred-digit: retention Thousand-digit: drop (Err30) Ten thousand-digit: PID feedback loss at run time (Err31)	11111	0	○
FA.16	Reserved				
FA.17	Reserved				
FA.18	Undervoltage setting	60.0% ～ 140.0%	0.10%	100.00%	○
FA.19	Overvoltage setting	200.0V ～ 810.0V	0.1V	810.0V	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FA.20	Continue to run frequency selection during failure.	0: run with the current run frequency. 1: run with the set frequency. 2: run with the upper limit frequency. 3: run with lower limit frequency. 4: run with standby frequency when abnormal.	1	0	○
FA.21	Abnormal standby frequency setting.	0.0% ～ 100.0%(Current target frequency)	0.10%	100.00%	○
FA.22	Instant stop action selection.	0: invalid 1: slow down 2: deceleration stop	1	0	○
FA.23	Pause action to suspend judgment voltage.	80.0% ～ 100.0%	0.10%	90.00%	○
FA.24	The instantaneous stop voltage rise again judging time.	0.00s ～ 100.00s	0.01s	0.50s	○
FA.25	The instantaneous stop motion judging voltage.	60.0% ～ 100.0%(Standard bus voltage.)	0.10%	80.00%	○
FA.26	Drop protection options.	0: Disabled 1:Enabled	1	0	○
FA.27	Drop detection level.	0.0 ～ 100.0%	0.10%	10.00%	○
FA.28	Drop detection time.	0.0 ～ 60.0s	0.1s	1.0s	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FA.29	The decimal point of the frequency in failure state.	1:1 decimal point 2:2 decimal point Single-digit: the third fault frequency decimal point. Ten-digit: the second failure frequency of the decimal point. Hundred-digit: the first frequency of failure.	1	222	○
FB Group: Swing Frequency, Fixed Length & Counting Meter Parameters					
FB.00	Frequency setting mode.	0: relative to the center frequency. 1: relative to the maximum frequency.	1	0	○
FB.01	Swing frequency range	0.0% ～ 100.0%	0.10%	0.00%	○
FB.02	Skip frequency range	0.0% ～ 50.0%	0.10%	0.00%	○
FB.03	The swing frequency cycle	0.1s ～ 3000.0s	0.1s	10.0s	○
FB.04	The triangular wave rising time of swing frequency.	0.1% ～ 100.0%	0.10%	50.00%	○
FB.05	Length setting	0m ～ 65535m	1m	1000m	○
FB.06	The actual length	0m ～ 65535m	1m	0m	○
FB.07	Pulse number per meter, unit: 0.1.	0.1 ～ 6553.5	0.1	100	○
FB.08	Counter value setting	1 ～ 65535	1	1000	○
FB.09	Designated counter value	1 ～ 65535	1	1000	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FC Group: RS485 Communication Parameters					
FC.00	Local address	1 ～ 247，0 refers to the broadcast address	1	1	○
FC.01	Baud rate selection	0：300 bps 1：600 bps 2：1200 bps 3：2400 bps 4：4800 bps 5：9600 bps 6：19200 bps 7：38400 bps 8：57600 bps 9：115200 bps	1	5	○
FC.02	Communication data format	0 :(8.N.2) 8 bits, no check, 2 stop bits. 1 :(8.E.1) 8 bits, even check, 1 stop bit. 2 :(8.O.1) 8 bits, odd check, 1 stop bit. 3 :(8.N.1) 8 bits, no check, 1 stop bit.	1	3	○
FC.03	Communication response delay time	0ms ～ 20ms	1ms	2	○
FC.04	Communication timeout fault setting	0.0（invalid），0.1s~60.0s	0.1s	0	○
FC.05	Communication reads current resolution.	0：0.01A 1：0.1A	1	0	○
FD Group:Multistage Speed and Simple PLC Parameters					
FD.00	Multistage speed 0	-100.0% ～ 100.0% (F0.10)	0.10%	0.00%	○
FD.01	Multistage speed 1	-100.0% ～ 100.0%	0.10%	0.00%	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FD.02	Multistage speed 2	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.03	Multistage speed 3	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.04	Multistage speed 4	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.05	Multistage speed 5	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.06	Multistage speed 6	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.07	Multistage speed 7	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.08	Multistage speed 8	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.09	Multistage speed 9	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.10	Multistage speed 10	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.11	Multistage speed 11	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.12	Multistage speed 12	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.13	Multistage speed 13	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.14	Multistage speed 14	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.15	Multistage speed 15	-100.0% ～ 100.0%	0.10%	0.00%	○
FD.16	Simple PLC operation method	0:Stop after operation once time 1:Keep the final value after operation once time 2:Operation in cycles	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FD.17	Memory option of simple PLC when power-off	Single-digit: 0: no memory in power failue 1: memory in power failue Ten-digit： 0: no memory in stop state 1: memory in stop state	11	0	○
FD.18	0 stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.19	PLC 0 stage deceleration time selection.	0 ～ 3	1	0	○
FD.20	1st stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.21	PLC 1st stage deceleration time selection.	0 ～ 3	1	0	○
FD.22	2nd stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.23	PLC 2nd stage deceleration time selection.	0 ～ 3	1	0	○
FD.24	3rd stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.25	PLC 3rd stage deceleration time selection.	0 ～ 3	1	0	○
FD.26	4th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.27	PLC 4th stage deceleration time selection.	0 ～ 3	1	0	○
FD.28	5th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.29	PLC 5th stage deceleration time selection.	0 ～ 3	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FD.30	6th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.31	PLC 6th stage deceleration time selection.	0 ～ 3	1	0	○
FD.32	7th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.33	PLC 7th stage deceleration time selection.	0 ～ 3	1	0	○
FD.34	8th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.35	PLC 8th stage deceleration time selection.	0 ～ 3	1	0	○
FD.36	9th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.37	PLC 9th stage deceleration time selection.	0 ～ 3	1	0	○
FD.38	10th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.39	PLC 10th stage deceleration time selection.	0 ～ 3	1	0	○
FD.40	11th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.41	PLC 11th stage deceleration time selection.	0 ～ 3	1	0	○
FD.42	12th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.43	PLC 12th stage deceleration time selection.	0 ～ 3	1	0	○

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FD.44	13th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.45	PLC 13th stage deceleration time selection.	0 ～ 3	1	0	○
FD.46	14th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.47	PLC 14th stage deceleration time selection.	0 ～ 3	1	0	○
FD.48	15th stage running time	0.0s(h) ～ 6553.5s(h)	0.1s(h)	0.0s(h)	○
FD.49	PLC 15th stage deceleration time selection.	0 ～ 3	1	0	○
FD.50	PLC operation time unit	0：s（second） 1：h（hour） 2：min（minute）	1	0	○
FD.51	Multiple speed instruction 0 setting	0: function code FD.00 setting. 1: AI1 2: AI2 3: Reserved 4: PULSE 5: PID 6: preset frequency (F0.08) setting, UP/DOWN can be modified.	1	0	○
FE Group: Function code management.					

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
FE.00	The user password	0 ～ 65535	1	0	○
FE.01	Record number of failures.	0 ～ 15	1	5	○
FF Group: Reserved Factory Parameters□					
E0 Group: the latest Failure Record.					
E0.00	the latest fault type	0: no fault 1: Reserved 2: accelerating over current (Err02) 3: deceleration over current (Err03) 4: constant speed over current (Err04) 5: accelerated overvoltage (Err05) 6: deceleration overvoltage (Err06)	—	—	◎
		7: constant speed overvoltage (Err07) 8: buffer resistance overload failure (Err08) 9: underpressure failure (Err09) 10: inverter overload (Err10) 11: motor overload (Err11) 12: inpuy missing phase (Err12) 13: output missing phase (Err13) 14: module overheating (Err14) 15: external fault (Err15) 16: communication abnormal (Err16) 17: Reserved 18: current detection fault (Err18) 19: motor tuning failure (Err19)			

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
		21: parameter read and write abnormally (Err21) 22: on-power EEPROM check fault (Err22) 23: motor to earth short circuit fault (Err23) 24: reserved (Err24) 25: reserved (Err25) 26: running time arrival (Err26) 27: user-defined fault 1(Err27) 28: user-defined fault 2(Err28) 29: on-power arrival time (Err29) 30: load drop (Err30) 31: PID feedback loss in running time (Err31) 40: fast current limit timeout fault (Err40) 41: Reserved			
E0.01	Frequency by the latest failure.	—	—	—	◎
E0.02	Current i by the latest failure.	—	—	—	◎
E0.03	Bus voltage by the latest failure.	—	—	—	◎
E0.04	Input terminal state by the latest failure.	—	—	—	◎
E0.05	Output terminal state by the latest failure.	—	—	—	◎

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
E0.06	The inverter state by the latest failure.	—	—	—	◎
E0.07	Time of latest failure (timing from this on-power time)	—	—	—	◎
E0.08	Time of the latest failure (timing from the running beginning)	—	—	—	◎
E0.09	Reserved	—	—	—	◎
E0.10	Reserved	—	—	—	◎
E1 ~ EE Group's: the First 14 fault records.					
D0 Group: Monitoring					
D0.00	Operating frequency (Hz)		0.01Hz	—	◎
D0.01	Set frequency (Hz)	—	0.01Hz	—	◎
D0.02	Bus voltage (V)	—	0.1V	—	◎
D0.03	The output voltage (V)	—	1V	—	◎
D0.04	The output current (A)	—	0.01A	—	◎
D0.05	The output power (kW)	—	0.1kW	—	◎
D0.06	The output torque (%)	—	0.1%	—	◎
D0.07	DI input state	—	1	—	◎
D0.08	DO output status	—	1	—	◎
D0.09	AI1 voltage (V)	—	0.01V	—	◎

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
D0.10	AI2 voltage (V)	—	0.01V	—	◎
D0.11	Reserved	—	—	—	◎
D0.12	Count value	—	1	—	◎
D0.13	Length value	—	1	—	◎
D0.14	Load speed display	—	1	—	◎
D0.15	PID setting	—	1	—	◎
D0.16	PIDfeedback	—	1	—	◎
D0.17	PLC stage	—	1	—	◎
D0.18	PULSE input PULSE frequency. (0.01kHz)	—	0.01kHz	—	◎
D0.19	Feedback speed (unit: 0.1Hz)	—	0.1Hz	—	◎
D0.20	Remaining running time	—	0.1Min	—	◎
D0.21	AI1 pre-correction voltage.	—	0.001V	—	◎
D0.22	AI2 pre-correction voltage.	—	0.001V	—	◎
D0.23	Reserved	—	—	—	◎
D0.24	Linear velocity	—	1m/Min	—	◎
D0.25	Current on-power time.	—	1Min	—	◎
D0.26	Current running time	—	0.1Min	—	◎

Funct-ion Code	Function	Setting range & Descriptions	Minimum Unit	Factory default value	Modi fica-tion Type
D0.27	Reserved	—	—	—	◎
D0.28	Communication set value.	—	0.01%	—	◎
D0.29	Reserved			—	◎
D0.30	Main frequency X display	—	0.01Hz	—	◎
D0.31	Auxiliary frequency Y display	—	0.01Hz	—	◎
D0.32	Look at any memory address values.	—	1	—	◎
D0.33	Reserved			—	◎
D0.34	Reserved	—		—	◎
D0.35	The target torque (%)	—	0.1%	—	◎
D0.36	Reserved			—	◎
D0.37	Reserved	—	—	—	◎
D0.38	Reserved			—	◎
D0.39	VF separation target voltage.	—	1V	—	◎
D0.40	VF separation output voltage.	—	1V	—	◎
D0.41	The DI input state is visually displayed.	DI1--DI20		—	◎
D0.42	The DO output state is visually displayed.	DO1--DO20		—	◎

Chapter 6 Function Parameter in Detail

6.1 F0 Group: Basic Function

F0.00	Control Mode Selection		Factory Default Setting	0
	Setting Options	0	Sensorless vector control(SVC)	
		1	V/F control	

0: Sensorless vector control.

This mode refers to open loop vector control. It is suitable to high performance general applications of INVERTER without PG encoder feedback, such as machine tool, centrifugal machines, wire drawing bench, injection molding machine, etc. In this mode, one INVERTER can drive only one electric motor once.

1: V/F control

V/F control is suitable to applications which do not require high accuracy of loading, such as fans and pumps etc. In those applications, an INVERTER can drive multiple motors simultaneously.

Note: When choosing vector control mode, it is necessary to perform motor parameter auto-tuning first. Only getting accurate motor parameters before driving a motor can achieve the advantage of vector control mode. And more optimized performance will be achieved by adjusting parameters of the speed regulator(in F3 group).

F0.01	Command source selection		Factory Default Setting	0
	Setting	0	Operation panel command channel.	

	Options	1	Terminal command channel.
		2	Serial port communication command channel.

Select the channel of the inverter control command.

Inverter control commands include: start, stop, forward, reverse, inching, etc.

0: operation panel command channel (" LOCAL/REMOT "lamp out);

RUN command control on the RUN, STOP/RESET button on the operation panel.

1: terminal command channel (" LOCAL/REMOT ");

Run command control by multi-function input terminal FWD, REV, FJOG, RJOG, etc.

2: serial port communication command channel (" LOCAL/REMOT "flashing)

The upper computer gives the command control by means of communication.。

F0.02	Runtime UP/DOWN benchmark.		Factory Default Setting	0
	Setting Options	0	Running frequency	
		1	Set frequency	

This function is only valid for the frequency source number setting, and it is used to determine the frequency of the UP/DOWN to increase or decrease based on the current running frequency or the current target frequency.

F0.03	Settings of master frequency source X		Factory Default Setting	1
	Setting Options	0	The number set F0.08 (pulse knob and UP/DOWN can be adjusted,with memory in power lost state.)	
		1	The number set F0.08 (pulse knob and UP/DOWN can be adjusted, no memory in power lost state.)	
		2	AI1	
		3	AI2	
		4	Reserved	
		5	PULSE setting (DI6)	

		6	Multistage speed
		7	PLC
		8	PID
		9	Communications setting

Select the input channel of the main given frequency of the inverter .

There are 10 main given frequency channels:

0: number setting F0.08 (pulse knob and UP/DOWN can be adjusted, no memory in power lost state, as the frequency source switch will be reset)

The initial value is 0, which can increase or decrease the frequency through the pulse knob, and can also change the frequency value of the inverter by using the keyboard's "UP" or "UP" button (or the multi-function input terminal's UP and DOWN).

When the inverter is switched off, the set frequency value is reset to 0.

This parameter should not be used as the object of the frequency source switch because it will be reset to 0 upon switching as the frequency source.

1. The number setting F0.08 (pulse knob and UP/DOWN can be adjusted, with memory in power lost state)

The initial value is the "number setting preset frequency" of F0.08.

The frequency value of the inverter can be changed by means of the pulse knob, the keyboard's "UP" or "DOWN" button.

No memory means that the setting frequency of the inverter will be the one before being powered off when it is re-energized.(note that this shall be in line with F0.23).

2: AI1 3: AI2.

This means that the frequency is determined by the analog input terminal.

Standard unit provides two analog input terminals (AI1, AI2), of which AI1 belongs to a voltage type input from 0 v to 10 v voltage while AI2 can be voltage input in the range 0 v ~ 10 v, or the 4 ~ 20 ma current input, depending on the J8 jumper on the control panel.

5. PULSE given (DI6)

The frequency is given by the terminal pulse.

Pulse given signal specification: voltage range of 9V ~ 30V, frequency range 0kHz ~ 100kHz.

Description: pulse given can only be input from multi-function input terminal DI6.

6. Multiple speed

Select multi-stage running mode.

F5 group"input terminal" and FD group "multi-speed and PLC" parameters need to be set to determine the corresponding relationship between a given signal and a given frequency.

7. Simple PLC

Select simple PLC mode.

When the frequency source is simple PLC, the FD group "multi-speed and PLC" parameters need to be set to determine the given frequency.

8, the PID

Select the process PID control.

By then, you need to set the F9 group "PID function".

The running frequency of the inverter is value of the frequency after action of the PID.

Among them, the PID given source, the given quantitative and feedback source, etc., refer to the "PID function" of F9 group.

9. Communication given setting

The main frequency source is given by the upper computer by means of communication.

F0.04	Settings of auxiliary frequency source Y		Factory Default Setting: 0
	Setting Options	0	The number set F0.08 (pulse knob and UP/DOWN can be adjusted, the power is not memory.)
		1	The number set F0.08 (pulse knob and UP/DOWN can be adjusted to drop the memory.)
		2	AI1
		3	AI2
		4	Reserved
		5	PULSE setting (DI6)
		6	Multistage speed

		7	PLC
		8	PID
		9	Communication given setting

The auxiliary frequency source is the same as the main frequency source X when it is acted as an independent frequency given channel (that is, the frequency source chooses X to Y switching).

When the auxiliary frequency source is used for superposition given (that is, the frequency source chooses X+Y, X to X+Y, or Y to X+Y switch), there are some special features:

1, when the auxiliary frequency source is digital given or pulse potentiometer given, preset frequency (F0.08) doesn't work, adaptation can be achieved based on the main given frequency by the ▲/ ▼keys (or multi-function input terminal of the UP and DOWN) on the keyboard.

2. When the auxiliary frequency source is given by the analog input (AI1, AI2) or pulse input given, the input set is 100% corresponding to the auxiliary frequency range (see F0.05 and F0.06).

If you need to adjust up and down on the basis of the given frequency, set the corresponding setting range of the analog input to n%～+n%.

3. The frequency source is pulse input given, which is similar to the analog quantity.

Note: the auxiliary frequency source Y selection cannot be the same as setting value of the main frequency source X, that is, the main & auxiliary frequency source cannot use the same frequency given channel.。

F0.05	Setting relative value of auxiliary frequency source Y when it is superposed		Factory Default Setting	0
	Setting Options	0	Relative to the max. frequency	
		1	Relative to the main frequency source X	
F0.06	Setting range of auxiliary frequency source Y when it is superposed		Factory Default Setting	0

	Setting Options	0%～150%

When the frequency source is selected as superposed frequency source (set F0.07 as 1, 3 or 4), it is used to determine the adjustable range of the auxiliary frequency source. F0.05 can determine the corresponding object of this range; if the corresponding object is the maximum frequency(F0.10), the range of the auxiliary frequency source will be fixed; if the corresponding object is the main frequency source X,its range will change along with the change of main frequency source X.。

F0.07	Frequency source superposed selection.	Factory Default Setting	0
	Setting Options	the unit	Frequency source selection
		0	Master frequency source X
		1	Main & auxiliary operation results (the operation relationship is determined by the ten-digit)
		2	Switch between main frequency source X and auxiliary frequency source Y.
		3	Switch between main frequency source X and main & auxiliary operation results
		4	Switch between auxiliary frequency source Y and main & auxiliary operation results
		Ten-digit	Frequency source main and auxiliary operation relationship.
		0	X+ Y
		1	X- Y
		2	MAX(X， Y)
		3	MIN(X， Y)

Select the frequency given channel through this parameter.

The frequency is given by the combination of the main frequency source X and the auxiliary frequency source Y.

Single-digit: frequency source selection:

0: main frequency source X

The main frequency X is the target frequency.

1. Main and auxiliary operation results.

The main and auxiliary operation results are the target frequency (the main & auxiliary operation relationship is shown in instructions on the ten-digit).

2: Switch between main frequency source X and auxiliary frequency source Y.

When multi-function input terminal 18: frequency source switch is invalid, the main frequency X shall be the target frequency.

When multi-function input terminal 18: frequency source switching is valid, auxiliary frequency Y shall be the target frequency.

3. Switch between main frequency source X and main & auxiliary operation results.

When multi-function input terminal 18: frequency source switch is invalid, the main frequency X shall be the target frequency.

When multi-function input terminal 18: frequency source switch is valid, the main & and auxiliary operation results shall be the target frequency.

4: Switch between auxiliary frequency source Y and main & auxiliary operation results.

When multi-function input terminal 18: frequency source switch is invalid, auxiliary frequency Y shall be the target frequency.

When multi-function input terminal 18: frequency source switching is valid, the main & auxiliary operation results shall be the target frequency.

Ten-digit: frequency source main & auxiliary operation relationship:

0: main frequency source X+ auxiliary frequency source Y.

Sum of the main frequency X and the auxiliary frequency shall be the target frequency, to achieve frequency superposition given function.

1. Main frequency source X- auxiliary frequency source Y.

The result of the main frequency X minus the auxiliary frequency Y shall be the target frequency.

2: MAX (main frequency source X, auxiliary frequency source Y)

The maximum one of the absolute values of the main frequency X and the auxiliary frequency Y shall be considered as the target frequency.

3: MIN(main frequency source X, auxiliary frequency source Y)

The minimum one of the absolute values of the main frequency X and the auxiliary frequency Y shall be considered as the target frequency.

F0.08	The preset frequency	Factory Default Setting	50.00Hz
	Setting Options	0.00Hz～ F0.10 (the setting value is valid when the main or auxiliary frequency source is digital setting)	

When the frequency source chooses "digital setting" or "terminal UP/DOWN", the function code value is the initial value for the frequency digit of the inverter.

F0.09	Running direction selection	Factory Default Setting	0
	Setting Options	0	In the same direction
		1	In the opposite direction

Steering direction of the motor can be changed by changing the function code under the condition of without changing any other parameters; its effect is equivalent to adjust any two lines to achieve switching of the rotation direction of the motor (U, V, W).

Tip: after the parameter is initialized, the motor will return to its original state.

It is strictly forbidden to change the steering of the motor when the system is debugged.

F0.10	Max. output frequency	Factory Default Setting	50.00 Hz
	Setting Options	50.00Hz～500.00Hz	

F0.11	Upper limit frequency source selection		Factory Default Setting	0
	Options	0	F0.12setting	
		1	AI1	
		2	AI2	
		3	Reserved	
		4	PULSE setting (DI6)	
		5	Communication setting	

Define the source of the upper limit frequency.

The upper limit frequency can be derived from the number setting (F0.12) or from the analog input channel.

When the upper limit frequency is set by the analog input, 100% of the analog input corresponds to F0.12.

For example, in torque control, speed control is invalid.

In order to avoid the occurrence of "flying cars" in the material breakage, the upper limit frequency can be set by the analog quantity. When the inverter runs to the upper limit frequency value, the torque control is invalid, and the inverter continues to operate at the upper limit frequency.。

F0.12	Upper limit frequency	Factory Default Setting	50.00Hz
	Setting Options	F0.14～ F0.10	
F0.13	Upper limit frequency offset.	Factory Default Setting	0.00Hz
	Setting Options	0.00Hz～F0.10	

When the upper limit frequency is analog quanitty given, this parameter shall be the offset of the upper limit frequency calculation; the upper limit frequency offset shall be added on the anolog upper limit frequency setting value to be the final upper limit frequency setting value..

F0.14	Lower limit frequency	Factory Default Setting	0.00Hz
	Setting Options	0.00Hz～ Upper limit frequency F0.12	

When the INVERTER starts running, it will starts from the start frequency. In the running process, if the given frequency is lower than the lower limit frequency, the INVERTER will run at the lower limit frequency, stop or run at zero speed, and the running mode at this situation can be set by F0.15.

F0.15	The function of lower limit frequency		Factory Default Setting: 0
	Setting Options	0	Running at lower limit frequency
		1	Stop
		2	Run at zero speed

Select the running state when the setting frequency is lower than the lower limit frequency. In order to avoid the long term low speed operation of the electric motor, this functional parameter can be used to stop the inverter.

F0.16	Carrier frequency setting	Factory Default Setting	Related to the inverter model
	Setting Options	0.5kHz～16.0kHz	

This function can adjust the carrier frequency of the inverter. By adjusting carrier frequency, the motor noises can be reduced, the resonance point of mechanical system can be avoided and the earthing current leakage from different wires and interference from the inverter can be reduced.

When the carrier frequency is low, high order harmonic of the input current will be added, the motor loss added and motor temperature will also add.

When carrier frequency is set higher, the motor loss will drop and the temperature rise of motor will decrease; but the damage of inverter will rise, the temperature rise of the inverter will increase and so will the interference from the inverter.

Following is Influences to the corresponding performances while adjusting the carrier frequency:

Carrier frequency	Low → High
Motor noises	Loud → Low
Output current waveform	Bad → Good
Temperature rise of motor	High → Low
Temperature rise of inverter	Low → High
Leakage current	Small → Large
Exterior radiation interference	Small → Large

F0.18	Acceleration time 1	Factory Default Setting	According to the model
	Setting range	0.0s～6500.0s	
F0.19	Deceleration time 1	Factory Default Setting	According to the model
	Setting range	0.0s～6500.0s	

Acceleration time 1 means the needed time T1 that the inverter accelerate from 0Hz to the Max. output frequency(F0.10) (confirmed by F0.24), see t1 in figure 6.1.

Deceleration time 1 means the needed time T2 that the inverter decelerate from the Max. output frequency(F0.10)to 0Hz(confirmed by F0.24), see t2 in figure 6.1 .

See the diagram below:

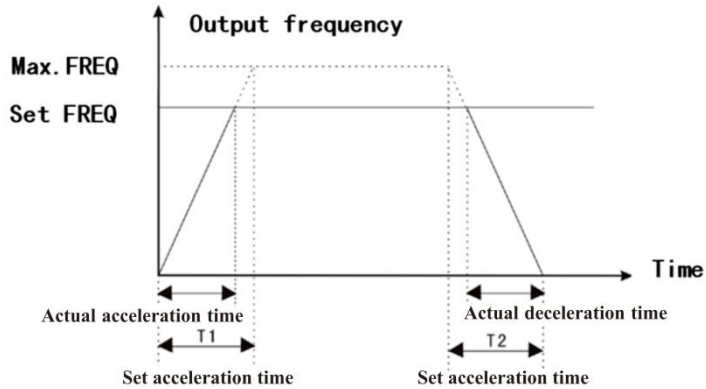


Figure 6-1 Sketch Map of Acceleration and Deceleration Time

Note: The difference between the actual acceleration/deceleration time and the set acceleration/ deceleration time.

Totally 4 groups of acceleration & deceleration time are optional.

Group 1:F0.18, F0.19;

Group 2:F8.03, F8.04

Group 3:F8.05, F8.06

Group 4 F8.07, F8.08.

The acceleration and deceleration time can be selected through the multi-function digital input terminals (F5.00～F5.05).

F0.20	Default Initializing		Factory Default Setting	0
	Setting Options	0	No operation	
		1	Restore to factory default setting	
		2	Fault record clearing	

After the parameter is changed to 1 or 2, all parameters are initialized, and then the parameter is automatically reset to zero.

1. Restore factory default setting value, excluding motor parameters.

Motor parameters, recording information is not restored.

2: Clear the record information.

The failure record of the inverter clearing, the cumulative running time (F7.09), the cumulative power time (F7.13) and the cumulative power consumption (F7.14).

F0.21	Function code modification attribute		Factory Default Setting	0
	Setting Options	0	Modifiable	
		1	Unmodifiable	

Modifying attribute of control function code,when it is locked this parameter can be prevented to be mistakenly modified.

0: all function codes can be modified.

1. Except F0.21 function code, the remaining parameters can only be viewed and cannot be modified.

F0.22	Digital setting frequency stop memory selection.		Factory Default Setting	1
	Setting Options	0	Without memory	
		1	With memory	

This function is only effective when the frequency source is in digital setting.

0: without memory, when the inverter is stopped, the digital setting frequency value is restored to F0.08 set value.

1: with memory, when the inverter is stopped, the digital setting frequency is reserved for the setting frequency of the last stop state.

F0.23	Acceleration & deceleration time unit.		Factory Default Setting	1
	Setting Options	0	1s	
		1	0.1s	
		2	0.01s	

This function is used to determine all acceleration & deceleration time units.

Note that when this parameter is modified, the actual acceleration & deceleration time will change accordingly (decimal point position will change, the actual display digits won't change.) so all acceleration & deceleration settings shall be adapted according to the circumstance.

Pay attention to the following function code：F0.18，F0.19，F8.01，F8.02，F8.03，F8.04，F8.05，F8.06，F8.07，F8.08。

F0.24	Acceleration & deceleration time reference frequency.		Factory Default Setting	0
	Setting Options	0	F0.10	
		1	Setting frequency	
		2	100Hz	

Define the frequency range corresponding to acceleration & deceleration time.

See fig.6.1 acceleration & deceleration time schematic diagram.

F0.25	Cooling fan control		Factory Default Setting	0
	Setting Options	0	Automatic running	
		1	Keep running when power on	

This function is used to set the operation mode of the cooling fan.

This setting can be adjusted according to the operating conditions to achieve a balance between maximizing heat dissipation and extending fan life.

0：Automatic running. When the motor runs, the fan runs; when the motor stops running, the fan stops running after 30 seconds. When the inverter module temperature exceeds 50 degrees, the fan also starts to run.

1：Keep running when power on. When the inverter is powered on, the cooling fan keeps running.

6.2 F1 GroupStart/Stop Parameters

F1.00	Start mode		Factory Default Setting	0
	Setting Options	0	Direct starting (when dc braking time is not 0, dc braking first, then restart)	
		1	Rotating speed tracking and then restart.	
		2	Asynchronous machine pre-excitation start (when pre-excitation time is not 0, pre-excitation first, then restart)	

0: direct start

If F1.06 starts dc braking/preexcitation time and the setting is 0, it starts at startup frequency.

When the setting is not 0, conduct dc braking first and then restart, which can be applied to solve the problem of reversal when starting under the small inertia load condition.

1: Rotating speed tracking and then restart.

The inverter first detects the motor's rotating direction and rotating speed, then starts according to the real time speed, applying to restarting of the instantaneous power failure of the large inertia load or to smooth restarting of equipments in rotation.

Set accurate F2 group motor parameters to obtain better performance in rotating speed tracking.

2: asynchronous machine pre-excitation start.

Preexcitation current, time and dc braking current, time sharing function code.

If F1.06 starts dc braking/preexcitation time, set it to 0, start at startup frequency.

When the setting is not 0, the pre-excitation restarting way shall be conducted to improve the dynamic response speed.

F1.01	Rotating speed tracking mode		Factory Default Setting	0
	Setting Options	0	Start with the frequency in power failure.	
		1	Start at zero speed.	
		2	Start at the maximum frequency.	

Provide 3 rotating speed tracking methods:

0: tracking down from the frequency in power failure,and this way is often used.

1: tracking up from 0 frequency, and use it to restart when the power failure time is longer.

2: tracking down from the maximum frequency, generally used for power generation loading condition.

F1.02	Rotating speed tracking speed fast & slow selection	Factory Default Setting	20
	Setting Options	1～100	

When the rotating speed tracking restarting mode is chosen, set the rotating speed tracking speed. The larger the parameter is set, the faster the tracking speed. But too faster tracking speed may cause the tracking to be unreliable.。

F1.03	Start frequency	Factory Default Setting	0.00Hz
	Setting Options	0.00Hz～10.00Hz	
F1.04	Start frequency retention time.	Factory Default Setting	0.0s
	Setting Options	0.0s～100.0s	

To ensure the torque at startup, set the appropriate startup frequency.

In addition, a magnetic flux is established for the waiting motor to start up, so that the starting frequency can be accelerated after retention a certain period of time.

The starting frequency value F1.03 is not restricted by the lower limit frequency.

The frequency given value (frequency source) is less than the starting frequency, and the inverter cannot be started and is in standby mode.

When switching between positive and negative, the starting frequency retention time is not effective.

The retention time is not included in the acceleration time, but is included in the running time of the simple PLC.

F1.05	Start dc brake/preexcitation current.	Factory Default Setting	0%
	Setting range	0%～100%	
F1.06	Start dc braking/preexcitation time.	Factory Default Setting	0.0s
	Setting range	0.0s～100.0s	

Starting dc braking is generally used to start after the motor has stopped completely.

The preexcitation is generally used to set up the motor to start the magnetic field before starting and improve the response speed.

If the starting mode is to start directly, the inverter starts by starting the dc braking with the set starting dc braking current, and then starts running after the set start dc braking time.

If the dc braking time is set to 0, it will be started without dc braking.

The larger the dc brake current, the greater the braking force.

If the starting mode is asynchronous machine pre-excitation starting, a magnetic field is preset as per the set starting pre-excitation current shall be established to start the inverter and then the inverter will begin to run upon the set pre-excitation starting time.

If the pre-excitation time is set to 0, the inverter will start instantly without going through pre-excitation.

Starting dc braking/preexcitation current is relative to the percentage of the rated current of the inverter.

F1.07	Acceleration & deceleration mode		Factory Default Setting	0
	Setting Options	0	Linear acceleration & deceleration	
		1	S curve acceleration & deceleration A.	
		2	S curve acceleration & deceleration B	

Select the mode of frequency variation of inverter in the process of starting and stopping.

0: linear acceleration & deceleration.

The output frequency increases or decreases linearly.

The acceleration & deceleration time is changed according to the set acceleration & deceleration time.

The VM1000 series inverter provides four kinds of acceleration and deceleration time.

You can select the acceleration & deceleration time through the multi-function digital input terminal (F5.00 ~ F5.05).

1: S curve acceleration & deceleration A.

The output frequency is increasing or decreasing according to the S curve.

The S curve is generally used in places where the process of starting and stopping is relatively gentle, such as elevators and conveyor belts.

Function code F1.08 and F1.09 respectively define the time scale of initial segment and ending segment of acceleration & deceleration A of the S curve.

2: S curve acceleration & deceleration B.

In this acceleration & deceleration curve, the motor rated frequency f_b is always the inflection point of the S curve.

See figure 6-3.

It is generally used in high - speed areas with rated frequencies above.

When the setting frequency is above the rated frequency, the acceleration & deceleration time is:

$$t = (\frac{4}{9} \times (\frac{f}{f_b})^2 + \frac{5}{9}) \times T$$

Where, f is the setting frequency;

f_b is the rated frequency of the motor;

T is the time speed up from 0 frequency and rated frequency f_b.

F1.08	The initial segment of the S curve.	Factory Default Setting	30.0%
	Setting range	0.0%～70.0%	
F1.09	The end segment of the S curve.	Factory Default Setting	30.0%
	Setting range	0.0%～70.0%	

Function codes F1.08 and F1.09 respectively define the time scale of initial segment and ending segment of acceleration & deceleration A of the S curve, and the two meet the condition: F1.08 + F1.09 is less than 100.0%.

In figure 6.2, t1 is the parameter defined by parameter F1.08, and the slope of the output frequency changes gradually during this period.

T2 is the time defined for parameter F1.09, and the slope of the output frequency changes gradually to 0 during this time period.

In the time between t1 and t2, the slope of the output frequency change is fixed.

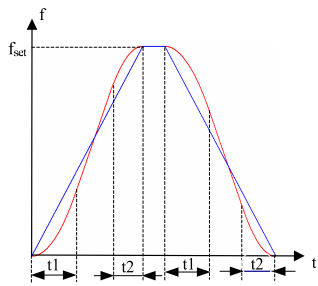


Figure 6-2 S curve acceleration & deceleration A diagram.

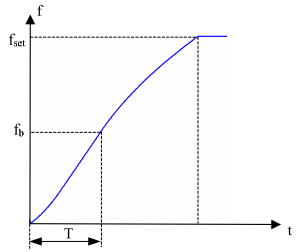


Figure 6-3 S curve acceleration & deceleration B diagram.

F1.10	Stop mode	Factory default setting	0
	Setting Options	0	Deceleration to stop
		1	Free stop

0: Deceleration to stop

After the stop command takes effect, the inverter will reduce output frequency in accordance with deceleration mode and the defined acceleration and deceleration time, and the inverter will stop if the frequency reduced to 0.

1: Free stop

After the stop command takes effect, the inverter immediately ceases to output. The inverter stop freely according to mechanical inertia.

F1.11	Start frequency at DC braking stop state	Factory default setting	0.00Hz
	Setting range	0.00Hz～F0.10	
F1.12	Waiting time before DC braking at stop	Factory default setting	0.0s
	Setting range	0.0s～36.0s	
F1.13	DC braking current at stop	Factory default setting	0%
	Setting range	0%～100%	

F1.14	DC braking time at stop	Factory default setting	0.0s
	Setting range	0.0s～36.0s	

Start frequency at DC braking stop state: a deceleration stop process, when the output frequency is less than this frequency, then the dc braking process begins.

Waiting time before DC braking at stop, when the frequency of the output in the process of downtime is reduced to F1.11 downtime dc brake start frequency, the inverter will stop output, and start timing; after F1.12 set the delay time, then restart dc braking to prevent overcurrent failure in DC braking caused by high speed.

DC braking current at stop: refers to the amount of dc braking added.

The higher the value, the stronger the dc braking effect.

DC braking time at stop: the amount of time added to the dc brake.

When this value is 0, it means that there is no dc braking process, and the inverter will stop as per the set decelerating stop process.

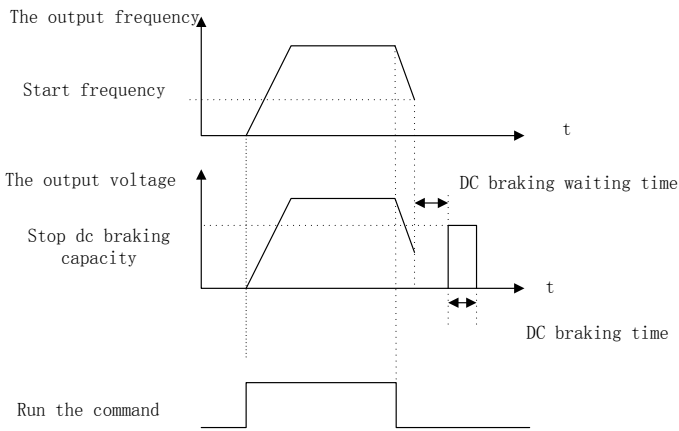


Figure 6-4 stop dc braking diagram

F1.15	Brake rate	Factory default setting	100%
	Setting range	0%～100%	

It is effective for inverter with built-in brake unit. The braking effect of energy consumption braking function can be adjusted.

6.3 F2 Group: Motor Parameters

F2.00	Motor type selection		Factory default setting	0
	Setting Options	0	Ordinary asynchronous machine	
		1	Variable frequency asynchronous motor.	

F2.01	Motor rated power	Factory default setting	Defined by inverter model
	Setting Range	0.1kW～400.0kW	
F2.02	Motor rated voltage	Factory default setting	Defined by inverter model
	Setting Range	0V～440V	
F2.03	Motor rated current	Factory default setting	Defined by inverter model
	Setting Range	0.01A～655.35A(Inverter power <=55kW) 0.1A～6553.5A(Inverter power >55kW)	
F2.04	Motor rated frequency	Factory default setting	Defined by inverter model
	Setting Range	0.00Hz～F0.10	
F2.05	Motor rated rotation speed	Factory default setting	Defined by inverter model
	Setting Range	0rpm～36000rpm	

Attention
Please set the parameters according to the nameplate of the electric motor. To make sure the superior control performance of vector control, please set accurate parameters; accurate parameter identification comes from the right settings of rated parameters of the electric motor. In order to ensure the control performance, please configure the electric motor according to the standards of electric motor adaption of the inverter. If the gap between motor power and the standard adaptation motor is too large, the control performance of the inverter will decline sharply.

F2.06	Asynchronous motor stator resistance	Factory default setting	Defined by inverter model
	Setting Range	0.001Ω～65.535Ω(Inverter power <=55kW) 0.0001Ω～6.5535Ω(Inverter power >55kW)	
F2.07	Asynchronous motor rotator resistance	Factory default setting	Defined by inverter model
	Setting Range	0.001Ω～65.535Ω(Inverter power <=55kW) 0.0001Ω～6.5535Ω(Inverter power >55kW)	
F2.08	Asynchronous motor leakage inductance	Factory default setting	Defined by inverter model
	Setting Options	0.01mH～655.35mH(Inverter power <=55kW) 0.001mH～65.535mH(Inverter power >55kW)	
F2.09	Asynchronous motor mutual inductance	Factory default setting	Defined by inverter model
	Setting Range	0.1mH～6553.5mH(Inverter power <=55kW) 0.01mH～655.35mH(Inverter power >55kW)	
F2.10	Motor no-load current	Factory default setting	Defined by inverter model
	Setting Range	0.01A～F2.03(Inverter power <=55kW) 0.1A～F2.03(Inverter power >55kW)	

After automatic tuning of electric motor finishes normally, the setting values of F2.06～F2.10 will update automatically.

Upon each modifiying of the rated power of F2.01, the inverter will restore the standard default parameters of F2.06～F2.10.(Quadrupole Y series asynchronous motor)

If the spot situation do not allow tuning for electric motor, it is possible to refer to the known parameters of the electric motors of same type and input the parameters manually.

F2.11	Tuning selection		Factory default setting	0
	Setting Options	0	No operation	
		1	Asynchronous motor static tuning	
		2	Asynchronous motor complete tuning	

Tip: Before tuning, make sure that the motor type and rater parameter of the electric motor (F2.01～F2.05) is set correctly.

0: No operation, that is, tuning is prohibited.

1: Asynchronous motor static tuning is suitable for the occasions that the electric motor is not easy to break away from load and is not able to conduct rotary tuning.

Action specification: set this function code as 2 and confirm this by pressing the button RUN, the inverter will begin to conduct static tuning.

2: Asynchronous motor complete tuning

To ensure the dynamic control performance of the inverter, please select rotary tuning and in rotary tuning the motor shall be off from the load, at this time, the electric motor must be in the status of no load.

After selecting rotary tuning, the VFD will conduct static tuning(with load) first, after completion, the electric motor will accelerate to the speed of 80% of the rated frequency according to the acceleration time set in F0.18 and hold it for some time. Then the motor will decelerate to zero-speed as per the deceleration time set in F0.19, and then the rotary tuning ends.

Action specification: set this function code as 1 and confirm this by pressing the button RUN, the inverter will begin to conduct rotary tuning.

Tuning operation specification:

Set F2.11 as 1 or 2 and press ENT, now “TURN” is displayed and flashes, then press the button RUN to conduct parameter tuning, now the “RUN”stops flashing. Tuning finished, the stop state will be displayed. In the process of tuning, press “STOP/RESET” to stop tuning. After the completion of tuning, the value of F2.11 will restore to 0 automatically.

Note: tuning can only be effective in keyboard control mode, and the factory default value is recommended for acceleration & deceleration time.

F2.12	Machine model		Factory default setting	Defined by inverter model
	Setting Options	0	General model (G)	
		1	Pump model (P)	

This parameter can only be used by the user to view the factory default model and cannot be changed.

1: applicable to constant torque load with specified rated parameters.

2. applicable to variable torque load (fan, water pump load) with specified rated parameters

6.4 F3 Group: Vector Control Parameters

F3 group function codes are valid only in vector control mode, i.e., F0.00 = 0, which is invalid when F0.00 = 1.

F3.00	speed loop proportional gain 1	Factory default setting	30
	Setting Options	1～100	

F3.01	speed loop integral time 1	Factory default setting	0.50s
	Setting Options	0.01s～10.00s	
F3.02	Switching frequency 1	Factory default setting	5.00Hz
	Setting Options	0.00～F3.05	
F3.03	speed loop proportional gain 2	Factory default setting	15
	Setting Options	0～100	
F3.04	speed loop integral time 2	Factory default setting	1.00s
	Setting Options	0.01s～10.00s	
F3.05	Switching frequency 2	Factory default setting	10.00Hz
	Setting Options	F3.02～F0.10	

F3.00 and F3.01 are the PI adjustment parameters when the running frequency is less than the switching frequency 1 (F3.02).

F3.03 and F4.04 are the PI adjustment parameters of the frequency band between the running frequency and switching frequency 2 when the former is more than the latter.

The PI parameter of the frequency band between switching frequency 1 and switching frequency 2 is a linear switch between two groups of PI parameters, as shown in the figure below:

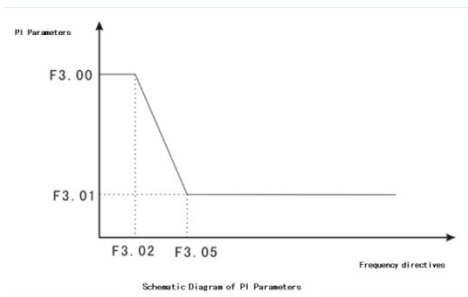


Figure 6-5 PI parameter schematic diagram.

By adjusting the proportion coefficient and integral time of speed regulator, the dynamic response performance of the speed vector control can be adjusted. Increasing proportional gain and reducing integral time can both speed up the dynamic response of speed loop. The conditions of too large proportional or too short integral time will cause system oscillation.

Recommended adjustment method: If the factory parameters cannot meet the requirements, make light adjustment on the basis of factory parameters: firstly increase the proportional gain and ensure that the system will not oscillate, and then reduce integral time so that the system owns fast response and small overshoot.

Note: Inappropriate setting of PI parameters will lead to large speed overshoot, even causing over-voltage fault when overshoot falls back.

F3.06	VC control mode rated slip compensation coefficient	Factory default setting	100%
	Setting range	50%～200%	

In the speed sensorless vector control mode, this parameter is used to adjust the steady-speed accuracy of the motor. When the motor is at too low speed in overload, the parameter shall be increased be reduced vice versa.

F3.07	Speed loop filter time constant.	Factory default setting	0.000s
	Setting range	0.000s～0.100s	

In the vector control mode, the output of the speed loop regulator is the torque current instruction, which is used to filter the torque instruction.

This parameter is generally not adjusted, and the filtering time can be relatively increased when the velocity fluctuation is large.

If the motor is oscillating, the parameter should be reduced appropriately.

when the speed loop filter time constant is small, and the output torque of the inverter may vary greatly, but the response is fast.

F3.08	Speed control torque upper limit setting	Factory default setting	150.0%
	Setting range	0.0%～200.0%	

Under the speed control mode, the maximum output torque of the inverter is controlled by F3.08.

F3.09	Speed/torque control mode		Factory default setting	0
	Setting Options	0	Speed control	
		1	Torque control	

Select the control mode of inverter for speed control or torque control. This function code needs to combine the terminal function 29: torque control prohibited, 46: speed control/torque control & switch can be judged jointly.

When torque control prohibited is not effective, the inverter is in speed control mode.

When the torque control prohibited is not valid, if the speed control/torque control switching is invalid, use F3.09 to determine the control mode. If the speed control/torque control switching is effective, then take the reversed value of F3.09.

When the torque control is controlled, the running frequency of the inverter is given by F3.12 and F3.13, and the acceleration & deceleration time is given by F3.14 and F3.15.

F3.10	Drive torque upper limit source.	Factory default setting	0
	Setting Options	0	Digital setting（F3.11）
		1	AI1
		2	AI2
		3	Reserved
		4	PULSE setting
		5	Communication setting
		6	MIN(AI1,AI2)
		7	MAX(AI1,AI2)
		The full range of options 1 ~ 7 corresponds to F3.11.	

F3.11	Torque upper limit digital setting.	Factory default setting	150.0%
	Setting Options	-200.0%～200.0%	

F3.10 is used to set the torque upper limit in the torque control mode; when sett it as per the anolog quantity, the analog quantity input setting 100% shall be in line with F3.11 and the set 100% inverter shall be matched with the rated torque of the motor.

F3.12	Torque control forward maximum frequency.	Factory default setting	50.00Hz
	Setting range	0.00Hz～F0.10	
F3.13	Torque control inverse maximum frequency.	Factory default setting	50.00Hz
	Setting range	0.00Hz～F0.10	

The maximum operating frequency of the inverter under the torque control mode is set.。

F3.14	Torque control acceleration time.	Factory default setting	0.00s
	Setting range	0.00s～65000s	
F3.15	Torque control deceleration time.	Factory default setting	0.00s
	Setting range	0.00s～65000s	

The frequency and deceleration time of the converter are set in the torque control mode.

F3.16	Torque stiffness coefficient.	Factory default setting	100.00%
	Setting range	10.0%~120.0%	

In torque control mode, when the set torque is relatively small, this coefficient can be properly reduced to gain a stable control effect; on the other hand, this coefficient can be properly increased to achieve a stable control effect.

F3.17	M axis current loop proportional gain.	Factory default setting	2000
	Setting range	0～60000	
F3.18	M axis current loop integral gain.	Factory default setting	1300

	Setting range	0～60000	
F3.19	T-axis current ratio gain.	Factory default setting	2000
	Setting range	0～60000	
F3.20	T-axis current integral gain.	Factory default setting	1300
	Setting range	0～60000	

The current loop control parameters in the MT coordinate system and the synchronous machine dq coordinate system are automatically identified after the complete parameter identification, and no modification is required.

The bandwidth of the current loop directly determines the response speed of the electromagnetic torque. If the regulation parameter is conducted too strongly, the current loop will be out of tune, leading to the whole control loop oscillation.

When the current oscillation and torque fluctuation are too large, this group of parameter can be adjusted manually to improve the effect.

F3.21	Speed loop integral property.		Factory default setting	0
	Setting range	0	Disable	
		1	Enable	

6.5 F4 Group: V/F Control Parameters

This group of function codes are only effective for V/F control (F0.00=1), but are invalid for vector control.

V/F control is suitable for the application of general loading conditions such as fan, water pump, etc., or a inverter with multiple motors, or the application condition when inverter power is lower than that of the motor power for a grade or higher than the that of the latter for two grades.

F4.00	V/F curve & mode setting		Factory default setting	0
	Setting Options	0	Line V/F curve	
		1	Multipoint V/F curve	
		2	Square V/F curve	
		3~9	Reserved	
		10	VF complete separation mode.	
		11	VF semi-detached mode.	

Fan pump type load can choose the square V/F control.

Normal VF control mode.

0: line V/F curve.

Suitable for ordinary constant torque load.

1: multi-point V/F curve.

It is suitable for special loads such as dehydrator and centrifuge.

2: square V/F curve.

Suitable for centrifugal load such as fan and pump.

VF separation control mode.

10: VF complete separation mode.

The output voltage is set separately according to the setting of F4.13(VF separation voltage source).

11: VF semi-detached mode.

In this case, V is proportional to F, and the voltage source is only used to adjust the slope of V/F. At this time, the relationship between V and F is related to the rated voltage and rated frequency of the motor set in F2 group.

If the voltage source input is X (X is 0~100% value), then: V/F=2 * X * (motor rated voltage)/(motor rated frequency)

F4.01	Torque increase	Factory default setting	Defined by inverter model
	Setting range	0.0%～30%	
F4.02	Torque lift cutoff frequency.	Factory default setting	50.00Hz
	Setting range	0.00Hz～F0.10	

In order to make up for the feature of low-frequency torque of V/F control, do a lift compensation for the output voltage of the inverter when it is in low frequency.

If the settings for torque boost are too high, the electric motor will become too hot and the inverter will be in over-current. Generally, when setting the torque boost, do not exceed 8.0%.

Adjust this parameter effectively can avoid over-current when start up. As for large load, it is recommended to increase this parameter, and reduce this when the load is light.

When torque is increased to 0.0, the inverter will be in the status of automatic torque boost\

Torque boost and torque cutoff frequency: under this frequency, the torque of torque boost is effective, but if exceed this set frequency, the torque boost will be invalid. See figure 6.6 for details.

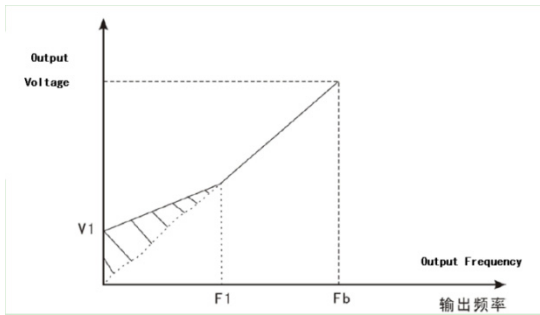


Figure 6-6. Manual torque improvement diagram

F4.03	V/F frequency point F1	Factory default setting	0.00Hz
	Setting range	0.00Hz～F4.05	

F4.04	V/F voltage point V1	Factory default setting	0.0%
	Setting range	0.0%～100.0%	
F4.05	V/F frequency point F2	Factory default setting	0.00Hz
	Setting range	F4.03～F4.07	
F4.06	V/F voltage point V2	Factory default setting	0.0%
	Setting range	0.0%～100.0%	
F4.07	V/F frequency point F3	Factory default setting	0.00Hz
	Setting Options	F4.05～F2.04	
F4.08	V/F voltage point V3	Factory default setting	0.0%
	Setting Options	0.0%～100.0%	

F4.03 ~ F4.08 six parameters define multiple V/F curves.

The set value of the V/F curve is usually set according to the load characteristics of the motor.

Note: V1 < V2 < V3, F1 < F2 < F3.

High voltage setting in low frequency may cause the motor to overheat or even burn down, and the inverter may lose speed or go through current protection.

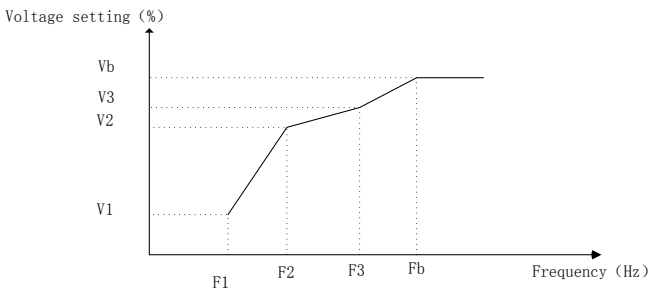


Figure 6-7 V/F curve setting diagram

F4.09	V/F Rated slip compensation coefficient	Factory default setting	0.0%
	Setting Options	0%～200.0%	

This is effective for V/F control. Setting this parameter can make up the speed deviation because of load in V/F control, and make sure that the speed of electric motor can remain stable when the load changes.Generally the rated slip of the motor with rated load condition is set as 100%, this means if the electric motor is in rated load, the compensated speed deviation will be the rated slip of the electric motor. Refer to the following principles to adjust the rated slip coefficient: when the load is the rated load, and set the rated slip coefficient as 100%, the rotational speed of the electric motor driven by the inverter will basically be close to the given speed.

F4.10	VF overexcitation gain.	Factory default setting	64
	Setting range	0～200	

The function of the VF overexcitation gain function is to suppress the increase of bus voltage during the deceleration of the converter, so as to avoid overvoltage failure of the busbar voltage over the overvoltage protection limit.

The higher the excitation gain, the stronger the inhibitory effect.

Setup instructions are as follows:

1. When the normal inertia is very small, the excitation gain is set to be 0 and the excitation gain should be appropriately raised in conditions with big inertia.

2. In case of braking resistance, please set the excitation gain to 0.

F4.11	Oscillation suppression gain	Factory default setting	Defined by inverter model
	Setting range	0～100	

Please select this gain to 0 when the motor is not oscillating.

Only when the obvious oscillation of the motor is unable to run properly, the gain will be increased, and the greater the gain, the more obvious the suppression of oscillation.

When using the suppression oscillating function, it is required that the motor rated current and no-load current parameters are not deviated much from the actual value.

The selection method of this gain is to minimize this gain as much as possible under the condition of minimizing the effect of VF operation, to avoid too much influence on VF running.

F4.12	VF separated voltage source.		Factory default setting	0
	Setting Options	0	Digital setting (F4.14)	
		1	AI1	
		2	AI2	
		3	Reserved	
		4	PULSE settingDI6)	
		5	Multiple speed instruction	
		6	Simple PLC	
		7	PID	
		8	Communication setting	
		100.0% corresponding motor rated voltage F2.02.		

Define the voltage source for VF separation.

The output voltage can come from the number setting (F4.13), or from analog input channels, multi-speed instructions, PLC, PID, or communication.

When the output voltage is set with a non-digital setting, the input set is 100% corresponding to the rated voltage of the motor, and the absolute value of the input setting is used as the effective set value.

0: digital setting (F4.13);

The voltage is set directly through F4.13.

1: AI1 2: AI2 voltage is determined by the analog input terminal. AI input 0 ~ 100% corresponds to output voltage 0V ~ motor rated voltage.

4. PULSE setting (DI6)

The voltage is given by the terminal pulse, and F5.28 ~ F5.31 is required to determine the corresponding relation between the given signal and the given voltage (100% of the motor rated voltage).

Pulse given signal specification: voltage range of 9V ~ 30V, frequency range 0kHz ~ 100kHz.

Note: the pulse can only be input from the high speed pulse input terminal DI6.

5. Multi-speed

When the voltage source is multi-speed, the F4 group "input terminal" and FC group "multi-speed and PLC" parameters need to be set to determine the corresponding relationship between the given signal and the given voltage (100% corresponding to the motor rated voltage).

6. Simple PLC

When the voltage source is simple PLC, it is necessary to set the FC group "multi-speed and PLC" parameters to determine the given output voltage (100% corresponding to the motor rated voltage).

7, the PID

The output voltage is generated according to the PID closed-loop.

See the FA group PID profile for details.

8. Communication setting

The voltage is given by the upper computer by means of communication (100% corresponding to motor rated voltage)

F4.13	VF separation voltage source digital setting.	Factory default setting	0V
	Setting Options	0V～Motor rated voltage	

When the voltage source is a digital setting, the value is directly used as the output voltage target value.

F4.14	VF separaed voltage rise time.	Factory default setting	0.0s
	Setting Options	0.0s～1000.0s	

VF separated voltage rise time refers to the time required for the output voltage to change from 0V to the rated voltage of the motor.

As shown in figure 6-8：

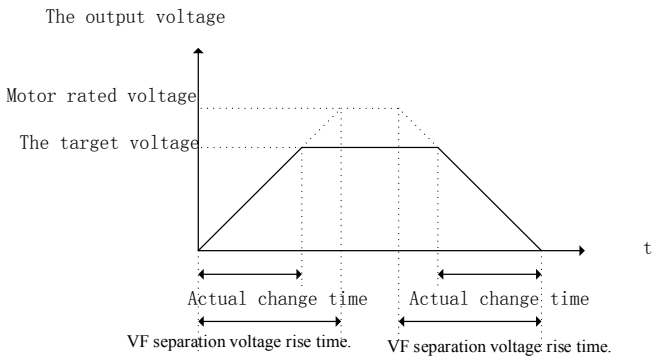


Figure 6-8 V/F separation diagram.

6.6 F5 Group: Input Terminals Parameters

The VM1000 series inverter standard unit has 6 multi-function digital input terminals (DI6 can be used as a high speed pulse input terminal) and 2 analog input terminals.

F5.00	DI1 terminal function	Factory default setting	1（Forward）
F5.01	DI2 terminal function	Factory default setting	2（Reverse）
F5.02	DI3 terminal function	Factory default setting	9（Reset）
F5.03	DI4 terminal function	Factory default setting	12（Multiple speed terminal 1）
F5.04	DI5 terminal function	Factory default setting	13（Multiple speed terminal

			2)
F5.05	DI6 terminal function	Factory default setting	0
F5.06~ F5.09	Reserved		
F5.10	VDI function	Factory default setting	0

This parameter is used to set the function of the digital multifunction input terminal.

Setting Values	Functions	Descriptions
0	No function	Even has signal input and the VFD will not act. The unused terminals can be set as no function in case of preventing malfunction.
1	Run forward (FWD)	Control the external terminals to control forward and reverse of the inverter.
2	Run reverse (REV)	
3	3-wire control	The terminal is used to determine the operation mode of inverter as 3-wire control. For details, please refer to the description of function code in F5.16 about introduction on 3-wire control mode function code.
4	Jog forward (FJOG)	FJOG is inching forward running while RJOG is inching reverse running. As for the frequency and the acceleration & deceleration time in inching running state, refer to the detailed description of function code of F8.00, F8.01 and F8.02.
5	Jog reverse (RJOG)	
6	Terminal UP	Modify increasing instruction and the descending instruction when the frequency is given. When the frequency source is set to the number setting, the setting frequency can be adjusted up and down.。
7	Terminal DOWN	
8	Stopping freely	When the VFD blocks output, the shutdown process of electric motor is not controlled by the VFD. As for the condition when there is large inertia load and no requirements for the time of shutdown, this is the usual method. The definition of this method is the same as

Setting Values	Functions	Descriptions
		that defined in F1.10.
9	Fault reset (RESET)	External fault reset function. This function is the same as that of RESET key on keyboard. Remote fault reset is implemented by this function.
10	Pause running	The VFD slows down, but all the operating parameters are in memory state, such as PLC, the swing frequency, and PID parameters. As soon as this signal disappears, the VFD returns to the status before shutdown.
11	External fault input in normal open state	When the external fault signal is sent to the inverter, the inverter will report the failure and deal with the fault as per the protection action mode (FA.13 ~ FA.16).。
12	Multistage speed terminal 1	16 stages of speed can be set as per the combination of digital state of these 4 terminals. For details, please refer to annex 1.
13	Multistage speed terminal 2	
14	Multistage speed terminal 3	
15	Multistage speed terminal 4	
16	Acceleration/deceleration time selection terminal 1	Select 4 settings of acceleration and deceleration time by the combination of the digit status of these two terminals. For details, please refer to annex 2.
17	Acceleration/deceleration time selection terminal 2	
18	Frequency source switching (terminal, keyboard)	When the frequency source selection (F0.07 single-digit) is set to 2, switching between the main frequency source X and the auxiliary frequency source Y is performed through this terminal. When the frequency source selection (F0.07 single-digit) is set to 3, switching between the main frequency source X and the main & auxiliary operation results is performed through this terminal. When the frequency source selection (F0.07 single-digit) is set

Setting Values	Functions	Descriptions
		to 4, switching between the main frequency source Y and the main & auxiliary operation results is performed through this terminal.
19	UP/DOWN setting clear (terminal, keyboard)	When the frequency is given as the number frequency, the frequency change value done the UP/DOWN key can be cleared with this terminal, so that the given frequency can be restored to the value set by F0.08.
20	Running command switch terminal.	When the command source (F0.02) is set to 1, switching between the terminal control and keyboard control can be performed through this terminal. When the command source (F0.02) is set to 2, switching between communication control and keyboard control can be performed through this terminal.
21	Acceleration/deceleration prohibited	Keep the VFD not influenced by outer signals (except the stop command), and maintain the present output frequency.
22	PID pause	PID is invalid temporarily, and the VFD maintains the present output of frequency, will not adjust by PID.
23	PLC state reset	The PLC is suspended during execution and can be effectively restored to the initial state of the simple PLC through this terminal.
24	Swing frequency pause	The inverter is output at the center frequency. Theswing frequency suspends.
25	Counter input	The input terminal of the number pulse.
26	Counter reset	This will clear up the status of counter
27	Length count input	Length counts the input terminal.
28	The length reset	clear the length.
29	Torque control prohibited	It is forbidden to set the inverter in the torque control mode.
30	PULSE frequency input (only valid for DI6)	Input terminal for the pulse.
31	Reserved	

Setting Values	Functions	Descriptions
32	Immediate dc braking	The terminal is effective and the inverter is directly switched to dc braking.
33	External failures often close input	When the external fault signal is sent to the inverter, the inverter reports the failure and stops.
34	The frequency sets the terminal	If the terminal function is set, it can be effectively controlled the state upon modification when the frequency is modified.
35	The PID action direction is reversed	The terminal is effective, and the PID direction is opposite to the direction set by F9.03.
36	External stop terminal 1	When the keyboard is in control, the inverter can be stopped by the terminal, which is equivalent to the STOP button on the keyboard.
37	Control command switch terminal.	For switching between terminal control and communication control, this terminal is valid. If F0.02 is set as terminal control, then switch to communication control; If F0.02 is set to communication control, switch to terminal control.
38	PID integral suspend	The terminal is effective, and PID integral action is suspended, but proportional adjustment and differential adjustment still play a role.
39	Switching between frequency source X and preset frequency	The terminal is valid and the frequency source X is replaced by the preset frequency (F0.08).
40	Switching between frequency source Y and preset frequency	The terminal is valid and the frequency source y is replaced by the preset frequency (F0.08).
41~42	Reserved	
43	PID parameter switching terminal.	When F9.18 (the PID parameter switching condition) is the DI terminal, the terminal is valid, and the PID uses F9.15 ~ F9.17 as parameters. Terminal is invalid, use F9.05 ~ F9.07 as parameters.
44	User-defined fault 1.	When the external fault signal is sent to the inverter, the inverter will report the fault and deal with it as per the fault protection action mode (FA.13 ~ FA.16).
45	User-defined fault 2	When the external fault signal is sent to the inverter, the inverter

Setting Values	Functions	Descriptions
		will report the fault and deal with it as per the fault protection action mode (FA.13 ~ FA.16).
46	Speed control/torque control switching.	Switch the inverter to operate on torque control or speed control mode. The terminal is invalid and operates in the mode defined by F3.09 (speed/torque control), and effectively switches to another mode when it is valid.
47	Emergency stop	The terminal is valid and the inverter stops at the fastest speed.
48	External stop terminal 2.	Under any control mode, this terminal can be used to stop the inverter as per the deceleration time 4.
49	Deceleration dc braking	This terminal is invalid, the inverter first slows down to the stop dc braking frequency and then switches to dc braking mode.
50	This running time returns to zero.	The terminal is valid, and the running time of the inverter of this time returns to zero. This function operates on a timed running (F8.42).

Attached Table 1- Multistage speed function description

K_4	K_3	K_2	K_1	Frequency setting	Corresponding parameters
OFF	OFF	OFF	OFF	Multistage speed 0	FD.0
OFF	OFF	OFF	ON	Multistage speed 1	FD.01
OFF	OFF	ON	OFF	Multistage speed 2	FD.02
OFF	OFF	ON	ON	Multistage speed 3	FD.03
OFF	ON	OFF	OFF	Multistage speed 4	FD.04
OFF	ON	OFF	ON	Multistage speed 5	FD.05
OFF	ON	ON	OFF	Multistage speed 6	FD.06
OFF	ON	ON	ON	Multistage speed 7	FD.07
ON	OFF	OFF	OFF	Multistage speed 8	FD.08

ON	OFF	OFF	ON	Multistage speed 9	FD.09
ON	OFF	ON	OFF	Multistage speed 10	FD.10
ON	OFF	ON	ON	Multistage speed 11	FD.11
ON	ON	OFF	OFF	Multistage speed 12	FD.12
ON	ON	OFF	ON	Multistage speed 13	FD.13
ON	ON	ON	OFF	Multistage speed 14	FD.14
ON	ON	ON	ON	Multistage speed 15	FD.15

Attached Table 2 Acceleration/Deceleration Time Selection Description

Terminal 2	Terminal 1	Selection of accleration/deceleration time	Corresponding parameters
OFF	OFF	Acceleration time1	F0.17、F0.18
OFF	ON	Acceleration time2	F8.03、F8.04
ON	OFF	Acceleration time3	F8.05、F8.06
ON	ON	Acceleration time4	F8.07、F8.08

F5.15	DI filtering time	Factory default setting	0.010s
	Setting range	0.000s～1.000s	

Set the sensitivity of the DI terminal. If the digital input terminal is susceptible to interference and the wrong action is caused, this parameter can be increased, and the anti-interference ability is enhanced, but the sensitivity of the DI terminal is reduced.

F5.16	Terminal command mode.		Factory default setting	0
	Setting Options	0	two-wire type 1	
		1	two-wire type 2	
		2	three-wire type 1	

		3	three-wire type 2

This parameter defines four different ways to control the operation of the inverter through external terminals.

0: two-wire pattern 1: this pattern is the most commonly used two-wire mode.

FWD, REV terminal commands are used to determine the motor's positive and reverse.

1: two-wire mode 2: REV is the enabled terminal in this mode.

The direction is determined by the state of FWD.

2: three-wire mode control mode 1: Din is the enabled terminal in this mode and direction is controlled by FWD and REV respectively.

But the pulse is effective and must be completed by disconnecting the Din terminal signal when stopping.

Din is the multi-function input terminal of DI1 ~ DI6, and the corresponding terminal function should be defined as "three-wire type operation control" of the number 3 function mode.

3: three-wire type control mode 2: Din is the enabled terminal in this mode, and the operation command is given by FWD, and the direction is determined by the state of REV.

The halt command is completed by disconnecting the Din signal.

Din is the multi-function input terminal of DI1 ~ DI6, and the corresponding terminal function should be defined as "three-wire type operation control" of the number 3 function mode.

F5.17	Frequency changing rate through UP/ DOWN terminal adjusting	Factory default setting	0.50Hz
	Setting range	0.01Hz～65.535Hz	

This parameter is used to adjust the frequency changing rate of terminal UP/DOWN.

F5.18	AI1 minimum input	Factory default setting	0.00V
	Setting range	0.00V～F5.15	

F5.19	AI1 minimum input corresponding setting.	Factory default setting	0.0%
	Setting range	-100.00%～100.0%	
F5.20	AI 1 maximum input	Factory default setting	10.00V
	Setting range	F5.13～10.00V	
F5.21	AI 1 maximum input corresponding Setting.	Factory default setting	100.0%
	Setting range	-100.00%～100.0%	
F5.22	AI1 input filtering time.	Factory default setting	0.10s
	Setting range	0.00s～10.00s	

These parameters are used to define the relationship between the analog input voltage and the setting value represented by analog input. When the analog input voltage exceeds the maximum input range set, the external part will be counted as the maximum. When the analog input voltage exceeds the minimum input range set, the external part will be counted as the minimum.

When the analog input is current input, 1 mA current equals to 0.5 V voltage. In different applications, the corresponding 100% nominal value of the set analog input will vary from each other. For details, refer to the description of different application parts.

The following examples illuminate the setting situations.

:

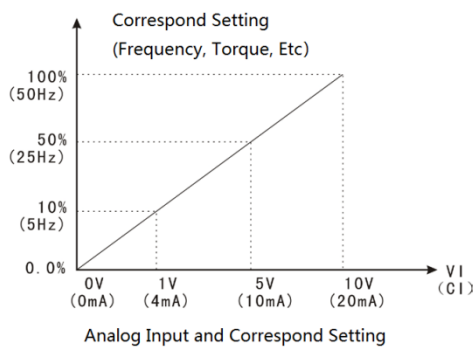


Figure 6-9 Analog Input and correspond Setting

F5.23	AI2 minimum input	Factory default setting	0.00V
	Setting range	0.00V～F5.25	
F5.24	AI 2 minimum input corresponding setting.	Factory default setting	0.0%
	Setting range	-100.00%～100.0%	
F5.25	AI 2 maximum input	Factory default setting	10.00V
	Setting range	F5.23～10.00V	
F5.26	AI 2 maximum input corresponding Settings.	Factory default setting	100.0%
	Setting range	-100.00%～100.0%	
F5.27	AI2 input filtering time.	Factory default setting	0.10s
	Setting range	0.00s～10.00s	

The function and setting of AI 2 is similar to that of AI 1.

F5.28	PULSE input the minimum frequency	Factory default setting	0.00kHz
	Setting range	0.00kHz～F5.30	
F5.29	PULSE input minimum frequency corresponding setting.	Factory default setting	0.0%
	Setting range	-100.00%～100.0%	
F5.30	PULSE input maximum frequency.	Factory default setting	50.00kHz
	Setting range	F5.28～50.00kHz	
F5.31	PULSE input maximum frequency corresponding setting.	Factory default setting	100.0%
	Setting range	-100.00%～100.0%	
F5.32	PULSE input filtering time.	Factory default setting	0.10s
	Setting range	0.00s～10.00s	

This group of function codes defines the corresponding relationship when the pulse is

used as the frequency setting mode.

The pulse frequency input can only be input through the DI6 channel.

Application of the function of this group is similar to that of AI1.。

F5.33	DI1 enabled delay time.	Factory default setting	0.0s
	Setting range	0.0s～3600.0s	
F5.34	DI1 disabled delay time.	Factory default setting	0.0s
	Setting range	0.0s～3600.0s	
F5.35	DI2 enabled delay time.	Factory default setting	0.0s
	Setting range	0.0s～3600.0s	
F5.36	DI2 disabled delay time.	Factory default setting	0.0s
	Setting range	0.0s～3600.0s	

Set the DI terminal state to change the delay time of the inverter response.

At present, only DI1\DI2 has the function of setting delay time.

F5.37	DI Input terminal valid state setting.1		Factory default setting: 00000
	Setting Options	single-digit	DI1 Terminal valid state setting.
		0	High level
		1	Low level
		Ten-digit	DI2 The terminal valid state setting (0 ~ 1, same as above)
		Hundred-digit	DI3 The terminal valid state setting (0 ~ 1, same as above)
		Thousand-digit	DI4 The terminal valid state setting (0 ~ 1, same as above)

		Ten thousand-digit	DI5 The terminal valid state setting (0 ~ 1, same as above)	
F5.38	DIInput terminal valid state setting.2		Factory default setting	00000
	Setting Options	single-digit	DI6 Terminal valid state setting.	
		0	High level	
		1	Low level	
		Ten-digit	Reserved	
		Hundred-digit	Reserved	
		Thousand-digit	Reserved	
		Ten thousand-digit	Reserved	

Define the valid state setting for the input terminal.

High level: DI terminal and COM connected is valid and invalid when disconnected.

Low level: DI terminal and COM connection is invalid and valid when disconnected.

6.7 F6 Group: Output Terminals Parameters

VM1000 series inverter standard cell has 2 multi-function relay output terminals and an FM terminal (of which D16 can be used as high-speed pulse output terminals, also can be used as open collector output) and two multi-function analog output terminals.

F6.00	FM terminal output mode selection.	Factory default setting	0

	Setting Options	0	Pulse output（FMP）
		1	Open collector output.（FMR）

The FM terminal is a programmable reuse terminal.

As a high speed pulse output terminal (FMP), the maximum pulse frequency is 100kHz.

FMP related functions are shown as in F6.06.

It can also be used as open collector output terminal (FMR).

FMR function is as in F6.01.

F6.01	FMR(open-circuit collector output Terminals) output selection	Factory default setting	0
F6.02	Relay 1 Output selection	Factory default setting	2
F6.03	Relay 2 Output selection	Factory default setting	1
F6.06	VDO Output selection	Factory default setting	0

The function of multifunction output terminals is as follows:

Set Value	function	Description
0	No output	Output terminal has no function
1	Inverter in operation	Indicates that the inverter is running with an output frequency (which can be 0) to output the ON signal at this time.
2	Fault output (downtime)	The ON signal is output when the inverter fails and the outage occurs.
3	Frequency level detection FDT arrives	Refer to the function code F8.19, F8.20 for more information.
4	Frequency arrival	See the detailed description of the feature code F8.21 .
5	0-Speed operation	When the inverter runs and the output frequency is 0, output the ON signal.

Set Value	function	Description
6	Motor Overload warning Alarm	Before the motor electronic thermal protection action, according to the overload forecast value, output the on signal as per the forecast value. The motor overload parameter is set to FA.00~FA.02.
7	Inverter overload warning alarm	After checking out overload of the inverter, output the ON signal 10s in advance before the protection occurs.
8	Set count pulse value arrival	The ON signal is output when the count value reaches the value set by FB.08 .
9	Specifies that pulse value arrival	The ON signal is output when the count value reaches the value set by FB.09 . Count function Reference FB Group function description
10	Length of arrival	The ON signal is output when the actual length of the detection exceeds the length set by FB.05 .
11	PLC Loop complete	Output a pulse signal with a width of 250ms when a simple PLC is run to complete a loop.
12	Cumulative runninf time arrival	The ON signal is output when the inverter runs longer than the time set by F8.17 .
13	Frequency in limit	Output the ON signal when the set frequency exceeds the upper and lower limits and the output frequency of the inverter reaches the upper and lower frequencies.
14	Torque in Limited	When the torque limit function enables, the stall protection function automatically, to automatically change the output frequency, simultaneously outputs the ON signal to indicate that the output torque is in limit. This output signal can be used to reduce the load or to display an overload status signal on the monitoring device.
15	Ready to run	The main loop and control loop power is established, the Inverter protection function does not enable. When the inverter is in the operational state, output ON signal.
16	AI1>AI2	The output on signal when the value of the analog input AI1 is greater than the AI2 input.
17	Upper frequency arrival	Output the on signal when the operating frequency reaches the upper limit frequency.

Set Value	function	Description
18	Lower Limit frequency arrival	Output the on signal when the operating frequency reaches the lower limit frequency.
19	Undervoltage State output	The inverter outputs the ON signal when it is in a undervoltage state.
20	Communication settings	See the relevant instructions in the communication protocol.
21	Location complete	Reserved
22	Positioning approach	Reserved
23	0-Speed Running 2	Inverter output frequency is 0, output ON signal (shutdown also output).
24	Power on time to arrive	The ON signal is output when the F7.13 (inverter accumulative on power time) exceeds the time set by F8.16 .
25	Frequency level detection FDT2 output	Refer to the feature code F8.28,F8.29 for more details.
26	Frequency reaches 1 output	Refer to the feature code F8.30,F8.31 for more details.
27	Frequency reaches 2 output	Refer to the feature code F8.32,F8.33 for more details.
28	Current reaches 1 output	Refer to the feature code F8.38,F8.39 for more details.
29	Current reaches 2 output	Refer to the feature code F8.40,F8.41 for more details.
30	Timed Arrival output	When the F8.42 (timing function selection) is valid, when this running time of the inverter reaches the set timing time, output ON signal is reached
31	AI1 input exceeds the upper or lower limit	When the value of the analog input AI1 is greater than the F8.46 (AI1 input protection upper limit) or less than F8.45 (AI1 input protection down limit) , FM(FMR) output ON signal.
32	Drop in	Output the ON signal when the inverter is in the off load state.
33	Load in loss	The inverter outputs the ON signal in reverse operation
34	0 Current detection	Refer to the feature code F8.34,F8.35 for more information

Set Value	function	Description
35	Module temperature arrival	F7.07 (inverter module radiator temperature) when the F8.47 (module temperature arrival) value is reached, output ON signal
36	Software overcurrent output	Refer to the function code F8.36,F8.37 for more information.
37	Lower limit frequency reaches (irrelevant to running)	Output the ON Signal (downtime is also output)when the run frequency reaches the lower limit frequency.
38	Fault output	Output ON signal when inverter fails
39	Reserved	
40	Reserved	
41	User-defined output 1	Users can define their own conditions for output terminals, specifically, see f6.28~f6.32.
42	User-defined output 2	Users can define their own conditions for output terminals output, specifically see f6.33~f6.37.

F6.11	FMP (pulse output terminal) Output selection	Factory default setting	0
F6.12	A01 Output selection (analog output terminal 1)	Factory default setting	0
F6.13	A02 Output selection (Analog output terminal 2)	Factory default setting	1

The standard output of analog output (0 is 0, gain is 1) is 0ma~20ma (or 0v~10v), FMP Output range is 0Hz to function code F5.09 setting.

The scope of the corresponding amount represented in the following table is as follows:

Set Value	function	Range
0	Operating frequency	0~ Maximum Output frequency

1	Set frequency	0~ Maximum Output frequency
2	Output current	0~2 times motor rated current
3	Output torque	0~2 times rated torque of motor
4	Output power	0~2 times rated power
5	Output voltage	0~1.2 inverter rated voltage
6	PULSE input	0.01kHz~100.00kHz
7	AI1	0V~10V
8	AI2	0V~10v/0~20mA
9	AI3	0V~10V
10	Length	0~ Maximum set length
11	Count value	0~ Maximum count
12	Communication settings	-10000~10000
13	Motor speed	rotational speed 0~ Maximum output frequency
14	Output current	0-1000A, corresponding to0-10V 0-1000v, corresponding to 0-10V
15	Output voltage	0.0v~1000.0v

F6.14	FMP Maximum output frequency	Factory default setting	50.00kHz
	Setting range	0.01kHz～100.00kHz	

When FM terminal selection is used as pulse output, pulse maxium frequency can be output.

F6.15	AO1 zero offset coefficient	Factory default setting	0%
	Setting range	-100.0%~100.0%	
F6.16	AO1 gain	Factory default setting	1.00
	Setting range	-10.00~10.00	
F6.17	AO2 zero offset coefficient	Factory default setting	0%

	Setting range	-100.0%~100.0%	
F6.18	AO2 gain	Factory default setting	1.00
	Setting range	-10.00~10.00	

If zero offset is expressed in "B", the gain is expressed in K, the actual output is represented by Y, the standard output is represented by X, the actual output is

Y=KX+B; AO1, A02 0 offset coefficient 100% corresponds to 10V (20mA). Standard output means that the output 0v~10v (20mA) corresponds to the maximum amount 0~ the analog output. Generally used to modify the analog output of the 0 drift and output amplitude deviation. You can also customize any desired output curve: For example: If the analog output is operating frequency,and you hope to output 8V (16mA) when the frequency is 0; when the frequency is the maximum frequency output 3V (6mA), the gain should be set to ". 0.50", zero offset coefficient should be set to "80%".

F6.19	FMR connection delay time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	
F6.20	RELAY1 connection delay time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	
F6.21	RELAY2 v time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	
F6.22	VDO connection delay time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	
F6.23	FMR disconnection delay time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	
F6.24	RELAY1 disconnection delay time	Factory default setting	0.0s

	Setting range	0.0s~3600.0s	
F6.25	RELAY2 disconnection delay time	Factory default setting	0.0s
	Setting Options	0.0s~3600.0s	
F6.26	VDO disconnection delay time	Factory default setting	0.0s
	Setting range	0.0s~3600.0s	

Set the delay time for the output terminal FMR, relay 1, Relay 2, VDO from the state changed to the change of output.

F6.27	Do output terminals valid state selection		Factory default setting	00000
	Setting Options	Single-digit	FMR Valid state selection	
		0	Positive logic	
		1	Inverse logic	
		Top	RELAY1 Valid state settings (0~1, IBID.)	
		Hundred-digit	RELAY2 Terminal valid state setting (0~1, IBID.)	
		Thousand-digit	Reserved	
		Ten thousand-digit	Reserved	

Define the positive and negative logic of output terminal FMR, Relay 1, relay 2.

Normal logic: Digital output terminals and the corresponding public terminal connectivity is valid, invalid when disconnected;

Anti-logic: digital output terminals and corresponding public terminal connectivity is invalid, valid when disconnected;

F6.28	User-defined output variable selection (EX)1	Factory default setting	00
	Setting range	0~ $	

This parameter is used to select the reference variable for the user-defined output. Choose the selected variable ex as an operation comparing object.

F6.29	User-defined output and comparison test mode	Factory default setting	00
	Setting range	0 ~	

Single-digit choice comparison test mode, with F6.28 selected variables as comparison test object, with the comparison and the test value set by f6.31~f6.32.

10-digit selection output mode. False-value output, that is, output it when the condition is not satisfied and don't output it when the condition is satisfied; truth outpu, tthat is, output it when the condition is satisfied and don't output it when the condition is not satisfied

F6.30	User-defined output processing dead-zone	Factory default setting	0
	Setting Options	0~65535	

When the F6.29 comparison test is set to be greater than or equal to or less than or equal to, F6.30 is used to define the processing dead value that is centered on the comparison value X1; the processing dead zone is only valid to the F6.29 comparison test Way 1 and 2, invalid to 0, 3, 4. For example, if F6.29 set to 11, when EX increases from 0 upward, to greater than or equal to x1+f6.30, the output is valid; when the EX reduces down, to less than equal to x1.f6.30, the output is invalid.

F6.31	User-defined output comparison value X1	Factory default setting	0
	Setting range	0~65535	
F6.32	User-defined output comparison value X2	Factory default setting	0
	Setting range	0~65535	

These two parameters are used to set the comparison value user-defined.

The following are usage examples of user-defined output:

When the setting frequency is greater than 20.00HZ, the relay closes;

Set the parameters as follows: F6.02 = 41,F6.28 = 1,F6.29 = 11,F6.30 = 0,F6.31 = 2000;

2. When the bus voltage is less than 500.0V, the relay closes; In order to avoid the when the frequent movement of the relay when the detection voltage fluctuates in 5.0V by 500.0V, it is requested that the (500.0-5.0) ~ (500.0+5.0) scope shall be processed into dead zone.

Set the parameters as follows: F6.02 = 41, F6.28 = 2, F6.29 = 01, F6.30 = 50, F6.31 = 5000; When the inverter is required to reverse, the relay closes:

Set the parameters as follows: F6.02 = 41, F6.28 = 5, F6.29 = 14, F6.31 = 8, F6.32 = 8;

When the AI1 input is greater than 3.00V and is less than or equal to 6.00V, the relay closes:

Set the parameters as follows: F6.02 = 41, F6.28 = 13, F6.29 = 13, F6.31 = 300, F6.32 = 600;

F6.33~ F6.37 with F6.28~ F6.32.

6.8 F7 Group: Keyboard & Display Interface Parameters

F7.00	LCD Keyboard parameter copy		Factory default setting	0
	Setting Options	0	No action	
		1	Upload the native function parameters to the LCD keyboard	
		2	LCD Keyboard function parameters are downloaded to this computer	

Note: This feature only supports LCD keyboards.

F7.01	The MF.K key Feature Selection		Factory default setting	0
	Setting Options	0	MF.K key function is invalid	
		1	Operator Panel command channel switch with remote command channel (remote command channel includes communication and terminal control)	
		2	Forward and reverse switch	

		3	Forward moving order
		4	Reverse moving order.
		5	Menu Mode switching

MF.K key, the multifunction key. You can define the functionof MF.K key on the keyboard by using parameter settings. This key can be used to realize such a switch between downtime and operation.

0 : Set to 0 and this key has no function.

1 : Keyboard command orders switch with remote operation. It refers to the switch from the command source to keyboard control (local operation) from the current command source. This command does not work if the current command source is keyboard controlled.

2 : Forward and backward switch

The frequency order direction can be switched from the MF.K key on the keyboard and this is only valid when the operation panel command channel is effective.

3: FJOG

Forward moving (FJOG) is achieved through MF.K key on the keyboard.

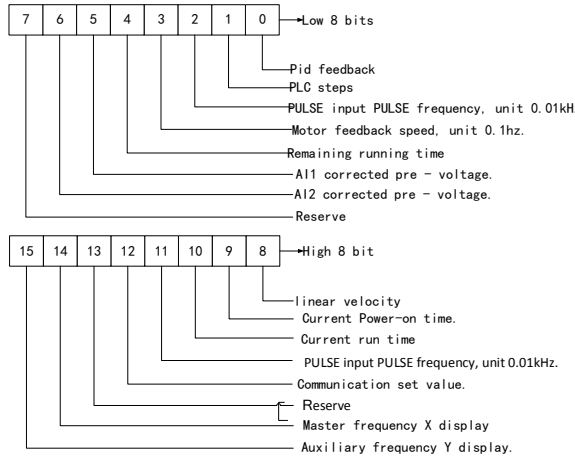
4: RJOG

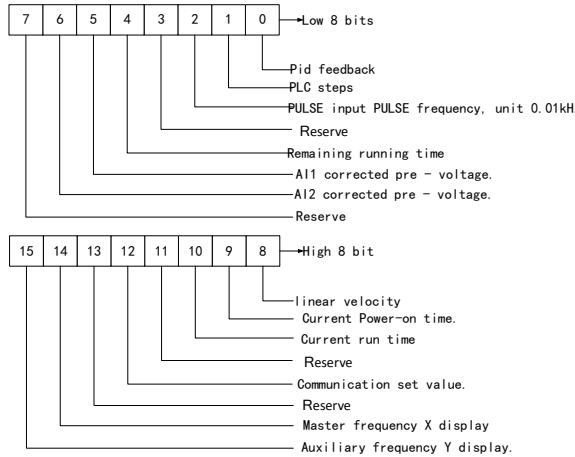
Reverses moving (FJOG) is achieved through MF.K key on the keyboar.

5: Menu Mode switching

The menu mode switching is implemented through MF.K key on the keyboard.

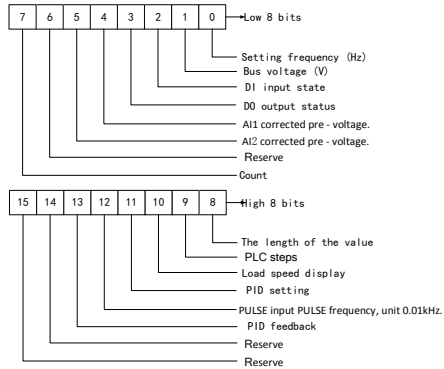
F7.02	The stop/reset key feature		Factory default setting	1
	Setting Options	0	Stop/RES key downtime is only effective in the keyboard control mode.	
		1	Stop/ RES key downtime is all available under any control mode.	
F7.03	LED running display parameters 1		Factory default setting	1F

	Setting Options	0000 ~ FFFF	 When the above parameters need to be displayed during the running time, set the corresponding position to 1 to convert the binary number to hexadecimal and set to F7.03.
F7.04	LEDs Run display parameters 2	Factory default setting	0

	Setting Options	0000 ~ FFFF	 When the above parameters need to be displayed during the running time, set the corresponding position to 1 to convert the binary number to hexadecimal and set to F7.04.

The running display parameter is used to set the status parameters to be viewed when the inverter is running. The maximum number of status parameters available for viewing is 32., select the status parameters need to be displayed according to the parameter values of F7.03 and F7.04, and the display sequency starts with the F7.03 lowest bit.

F7.05	LED downtime display parameters	Factory default setting	0

	Setting Options	0000 ～ FFFF	 When the above parameters need to be displayed when the shutdown occurs, set the corresponding position to 1 to convert the binary number to hexadecimal and set to F7.05.

F7.06	Loading speed display coefficient	Factory default setting	1.0000
	Setting Options	0.0001～6.5000	

The output frequency and load speed of the inverter are corresponded with this parameter. Set it when load speed needs to be displayed.

The specific calculation method is shown as in F7.12.

F7.07	Inverter module radiator temperature	Factory default setting	0
	Setting range	0.0℃~100.0℃	

Show inverter Modules IGBT temperature, IGBT over-temperature protection values of different inverter models may vary .

F7.08	Rectifier module radiator temperature	Factory default setting	0

	Setting range	0.0℃~100.0℃

Show the rectifier module temperature, over temperature protection value of different models of the rectifier module may be different.

F7.09	Cumulative running time	Factory default setting	0h
	Setting range	0h~65535h	

Shows the cumulative running time of the inverter as so far. When this time reaches the set running time (F8.17), the inverter multi-function digital output (12) movement will act.

F7.10	Product number	Factory default setting	
	Setting options	Inverter Product number	
F7.11	Software version number	Factory default setting	
	Setting options	The Dashboard software version number.	
F7.12	Load speed display decimal point position	Factory default setting	0
	Setting options	0	0 decimal point
		1	1 decimal point
		2	2 decimal point
		3	3 decimal point

The load speed is calculated by: If the load speed display coefficient is 2.000, the load speed fractional electricity position is 2:2 decimal places.

When the inverter is in operation: If the operating frequency is 40.00Hz, 4000*2.000 = 8000, 2-digital decimal point display load speed is 80.00.

When the inverter is in downtime: If the set frequency is 50.00Hz, 5000*2.000 = 10000, 2-digital decimal point display load speed is 100.00.

F7.13	Cumulative power on time	Factory default setting	0h
	Setting range	0h~65535h	

It shows the cumulative power-on time of the inverter so far. When this time reaches the set power time (F8.17), the inverter multi-function digital output (24) action will act.

F7.14	Cumulative power consumption	Factory default setting	0
	Setting range	0~65535	

It shows the cumulative power consumption of the inverter so far.

6.9 F8 Group: Auxiliary Function Parameters

F8.00	inch action running frequency	Factory default setting	2.00Hz
	Setting range	0.00Hz~ Maximum frequency	
F8.01	inch action acceleration time	Factory default setting	20.0s
	Setting range	0.0s~6500.0s	
F8.02	inch action deceleration time	Factory default setting	20.0s
	Setting range	0.0s~6500.0s	

It referst to the given frequency and acceleration & deceleration time of the inverter when defines the inch action. The inching process is started and stopped as per the starting mode (F1.00, direct start) and stopping mode(F1.10, slow down to stop).

Inching acceleration refers to the time requested by acceleration of the inverter from 0Hz to the maximum frequency (F0.10).

Inching deceleration refers to the time requested by deceleration of the inverter from the maximum frequency (F0.10) to 0Hz..

F8.03	Acceleration Time 2	Factory default setting	20.0s
	Setting range	0 0s~6500.0s	
F8.04	Deceleration time 2	Factory default setting	20.0s
	Setting range	0 0s~6500.0s	
F8.05	Acceleration Time 3	Factory default setting	20.0s
	Setting range	0 0s~6500.0s	
F8.06	Deceleration time 3	Factory default setting	20.0s
	Setting range	0 0s~6500.0s	
F8.07	Acceleration Time 4	Factory default setting	20.0s
	Setting range	0 0s~6500.0s	
F8.08	Deceleration time 4	Factory default setting	20.0s
	Setting Options	0 0s~6500.0s	

The acceleration & deceleration time can be selected as F0.17 and F0.18 or the above three acceleration & deceleration times. These two ways contain the same meaning, see the F0.17 and F0.18 for details. You can select the acceleration and deceleration time 1~4 during the inverter running by different combinations of the multifunction digital input terminals DI. See the function code F5.01~F5.05.

F8.09	Hopping frequency 1	Factory default setting	0.00Hz ~ Maximum Frequency
	Setting range	0.00Hz~ Maximum frequency	
F8.10	Hopping frequency2	Factory default setting	0.00Hz~ Maximum Frequency
	Setting range	0.00 Hz~ Maximum frequency	
F8.11	Hopping frequency range	Factory default setting	0.01Hz~ Maximum Frequency

	Setting range	0.00~ Maximum Frequency

When the set frequency is within the jump frequency range, the actual operating frequency will run at the jump frequency boundary near the set frequency. By setting the hopping frequency, the inverter avoids the mechanical resonance point of the load. The inverter can set two jump frequency points. This feature does not work if you set the two jump frequencies to 0.

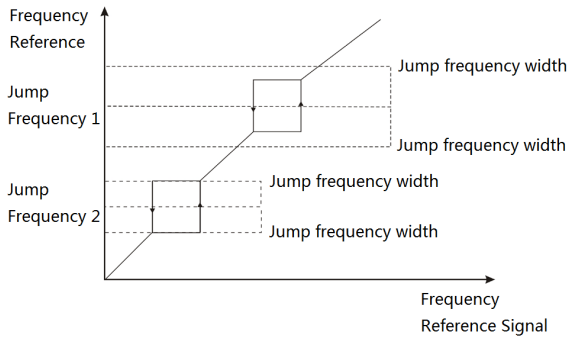


Figure 6-10 Jump frequency schematic

F8.12	Forward and reverse moving dead time	Factory default setting	0.0s
	Setting range	0.00s~3000.0s	

The transition time at 0 frequency when setting the inverter during the forward and reverse moving transition process is as shown in the following diagram:

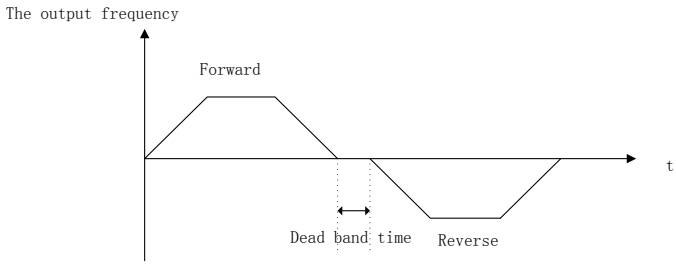


Fig. 6-11 the time diagram of positive and negative dead zone

F8.13	Reverse control		Factory default setting	0
	Setting range	0	Reverse allowed	
		1	Reverse prohibited	

When this parameter is 0: reverse control can be realized by keyboard, terminal, or communication.

When this parameter is 1: validity of reverse control function is not related with command souce selections, that is, when controlled by the keyboard, terminal or communication,the reverse control function is invalid.

F8.14	Carrier frequency can be adjusted with the temperature		Factory default setting	0
	Setting options	0	no	
		1	yes	

Provide both fixed and random PWM as the carrier frequency adjustment method. Random PWM motor noise frequency domain wide is random; Fixed PWM motor noise frequencies are fixed.

Carrier temperature adjustment is effective, means that the inverter can automatically adjust the carrier frequency according to its own temperature. Select this function to reduce the frequency of overheating alarm chances.

F8.15	Droop control	Factory default setting	0.00Hz
	Setting range	0.00Hz~10.00Hz	

When multiple inverters drive the same load, the load distribution is unbalanced due to the different speed, which makes the inverter with larger speed bear heavier load. The Droop control characteristic is that as the load increases, the speed droop changes and the load balance can be distributed.

This parameter adjusts the frequency variation of the speed droop inverter.

F8.16	Set the on power time	Factory default setting	0h
	Setting range	0h~65000h	

Preset the on power time of the inverter. When the cumulative power time (F7.13) arrives at this set on power time, the inverter multifunction digital DO will output running time arrival signal.

F8.17	Set running arrival time	Factory default setting	0h
	Setting range	0h~65000h	

Preset the on power time of the inverter. When the cumulative running time (F7.09) arrives at this set running time, the inverter multifunction digital DO will output running time arrival signal.

F8.18	Start protection selection	Factory default setting	0
	Setting options	0	Does not protect
		1	Protect

This feature code is used to increase the security protection coefficient. If set to 1, it has two functions: one is that if the inverter is running when the command is there, you must first remove the running command to eliminate the running protection status. The second is that if the command order still exists when the inverter failed to reset, you must first remove the

running command to eliminate the running protection status. This prevents the motor from automatically running without knowing, which will cause danger.

F8.19	Frequency detection value (FDT1 level)	Factory default setting	50.00Hz
	Setting range	0.00Hz~ Maximum frequency	
F8.20	Frequency detection lagged value (FDT1 latency)	Factory default setting	5%
	Setting range	0.0%~100.0%(FDT1 level)	

Set the detection value of the output frequency and the lagged value unpon releasing of the output action.

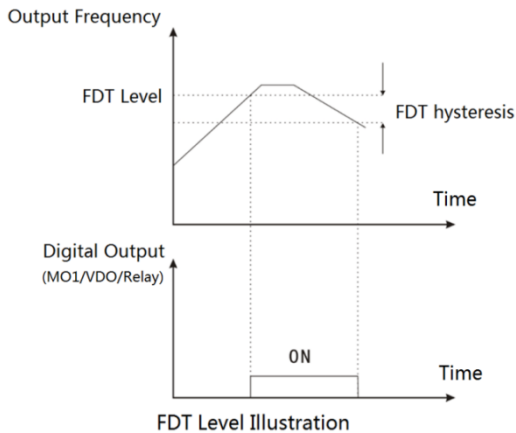


Figure 6-12 FDT1 level diagram

F8.21	Frequency arrival detection amplitude	Factory default setting	0%

	Setting range	0.00~100% Maximum frequency

When the output frequency of the inverter reaches the set frequency value, this function can adjust its detected amplitude, as shown in the following diagram:

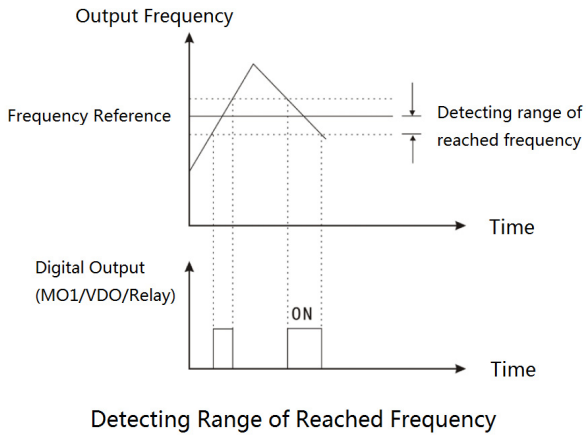


Figure 6-13 frequency arrival detected amplitude diagram

F8.22	Whether the jump frequency is effective during acceleration & deceleration	Factory default setting	0
	Setting options	0: invalid 1: Valid	

The function code is set to be valid, when the running frequency is within the jump frequency range, the actual operating frequency will skip the set jump frequency boundary directly.

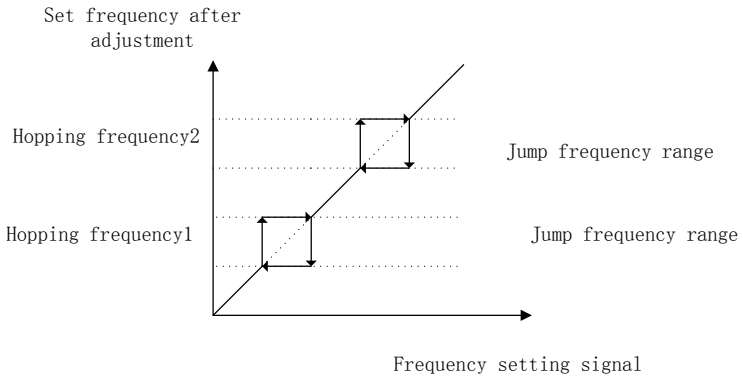


Figure 6-14 effective diagram of jump frequency during acceleration & deceleration

F8.23	Running time arrival action selection		Factory default setting	0
	Setting options	0: Continue running 1: Fault display		
F8.24	Power-on time arrival action selection		Factory default setting	0
	Setting options	0: Continue running 1: Fault display		

set to 1: When the fault displays, if rununing time or power-on time arrives, then select as per he FA Group fault protection actio; inverter free stopping, deceleration stopping or continue running (refers to the detailed description of the function code FA.13~FA.16).

F8.25	Acceleration time 1/2 switching frequency point	Factory default setting	0.00Hz
	Setting range	0.00Hz~ Maximum frequency	
F8.26	Deceleration time 1/2 switching frequency point	Factory default setting	0.00Hz
	Setting Options	0.00Hz~ Maximum frequency	

When the motor is selected as motor 1 and the acceleration and deceleration time is not selected by the terminal, the function of this parameter is effective, which can be used to realize the dynamic switching of acceleration and deceleration time in the process of inverter operation.

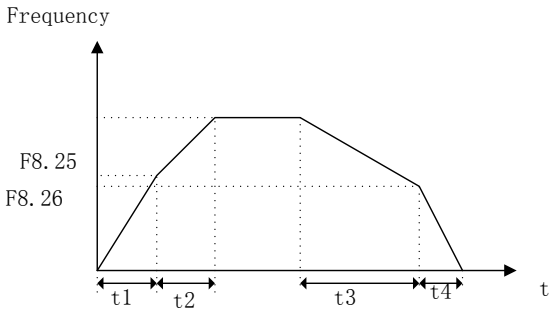


Figure 6-15 acceleration & deceleration time switch schematic diagram

Acceleration Time Selection switch

If the operation frequency is less than F8.25 (Acceceleration time 1/2 switching frequency point), then select Acceleration Time 2, otherwise, choose Acceleration Time 1.

Deceleration time selection switch

In the deceleration process if the operating frequency is less than F8.26 (deceleration time 1/2 switching frequency point), then select Deceleration Time 2, the other is selected Deceleration Time 1.

F8.27	Terminal inch action priority	Factory default setting	0
	Setting options	0 : Invalid 1 : Valid	

This parameter is used to set the priority of the terminal inch action movement. When the parameter is set to be valid, once the DI terminal receives the inch action movement

command,and the inverter is switched from other running state to the terminal operation state.

F8.28	Frequency detection value (FDT2 level)	Factory default setting	50.00Hz
	Setting range	0.00Hz~ Maximum frequency	
F8.29	Frequency detection lagged value (FDT2 latency)	Factory default setting	5%
	Setting range	0.0%~100.0%(FDT2 level)	

Setting of the FDT2 function is similar to the FDT1 (F8.19, F8.20) setting method.

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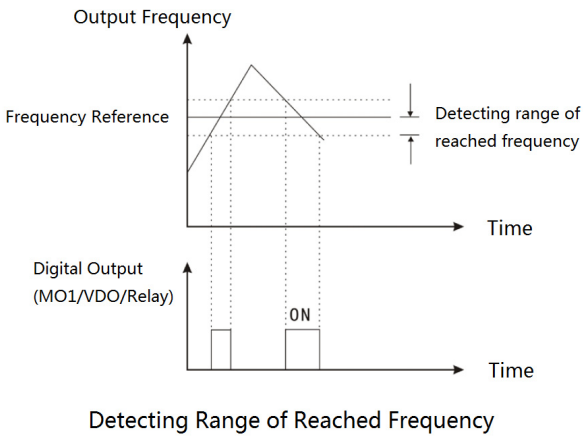

Figure 6-16 FDT2 level diagram

F8.30	Arbitrary arrival frequency detection value 1	Factory default setting	50.00Hz
	Setting range	0.00Hz~ Maximum frequency	

F8.31	Arbitrary arrival frequency detected amplitude 1	Factory default setting	0%
	Setting range	0.0%~100.0%(Maximum frequency)	
F8.32	Arbitrary arrival frequency detection value 2	Factory default setting	50.00Hz
	Setting range	0.00Hz~ Maximum frequency	
F8.33	Arbitrary arrival frequency detected amplitude 2	Factory default setting	0%
	Setting range	0.0%~100.0%(Maximum frequency)	

When the output frequency of the inverter is detected as in range of the positive and negative detected value of 1 and 2 of the arbitrary arrival frequency, output pulse signal as in the following diagram:

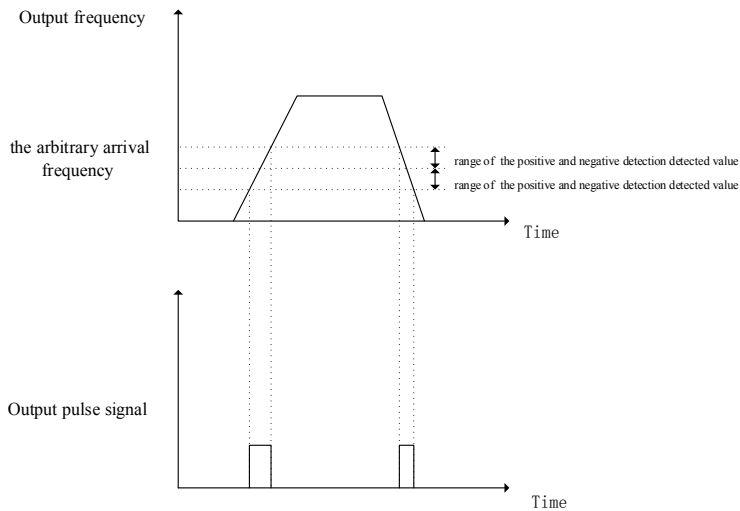

Figure 6-17 arbitrary srrival frequency detection schematic

F8.34	0 current detection level	Factory default setting	5%
	Setting range	0.0%~300.0%(motor rated current)	

F8.35	0 current detection delay time	Factory default setting	0.00s
	Setting range	0.00s~600.00s	

When the output current of the inverter is less than or equal to the zero current detection level and lasts longer than 0 current detection delay time, output pulse signal, as shown in the following diagram:

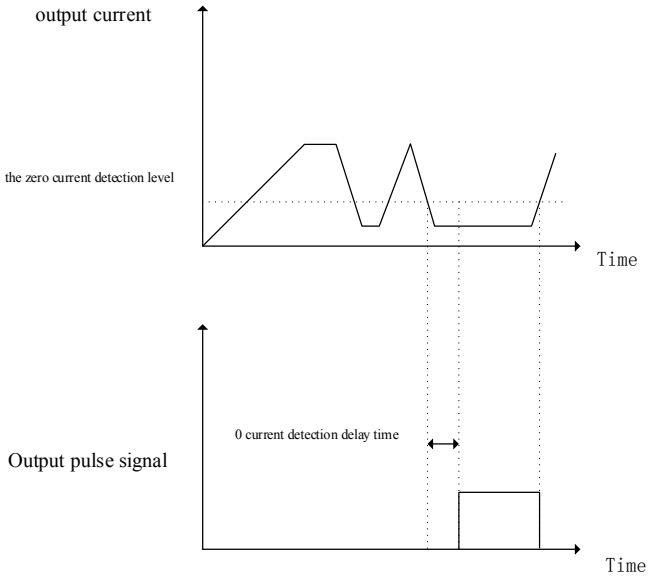

Figure 6-18 0 current detection schematic

F8.36	Software overcurrent point	Factory default setting	200%
	Setting range	0.0% (does not detect) ; 0.1%~300.0%(motor rated current)	
F8.37	Software overcurrent point detection delay time	Factory default setting	0.00s
	Setting range	0.00s~600.00s	

When the output current of the inverter is greater than or equal to the software overcurrent point and lasts longer than the software overcurrent point detection delay time, output pulse signal, as shown in the following diagram:

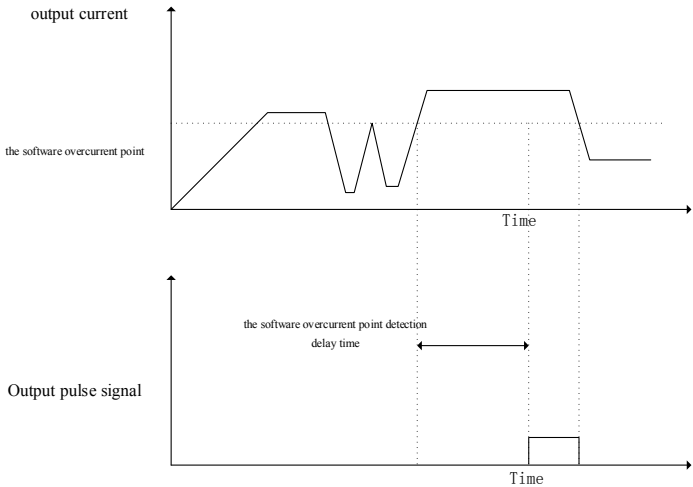

Figure 6-19 software over current detection diagram

F8.38	Arbitrary arrival current 1	Factory default setting	100%
	Setting range	0.0%~300.0%(motor rated current)	
F8.39	Arbitrary arrival current 1 width	Factory default setting	0%
	Setting range	0.0%~300.0%(motor rated current)	
F8.40	Arbitrary arrival current 2	Factory default setting	100%
	Setting range	0.0%~300.0%(motor rated current)	
F8.41	Arbitrary arrival current 2 width	Factory default setting	0%
	Setting range	0.0%~300.0%(motor rated current)	

When the output current of the inverter is in the positive and negative detection width of the arbitrary arrival current 1, 2, output pulse signal as in the following diagram:

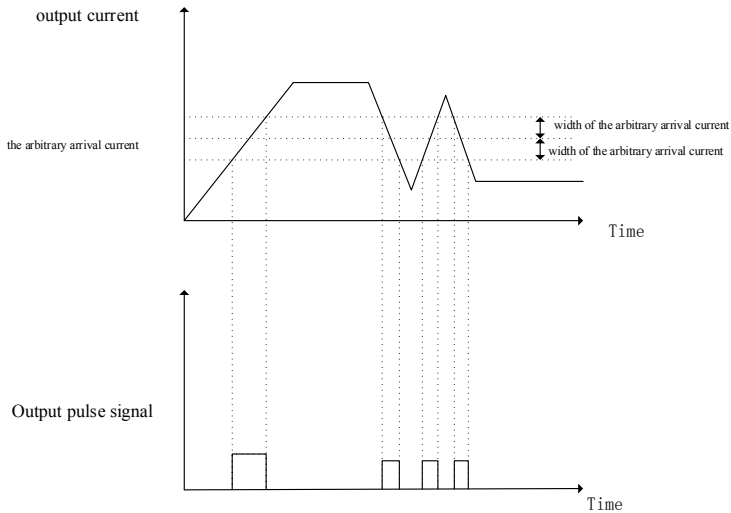

Figure 6-20 arbitrary arrival frequency detection schematic

F8.42	Timing function Selection		Factory default setting	0
	Setting options	0	Invalid	
		1	Valid	
F8.43	Timing running time selection		Factory default setting	0
	Setting options	0	F8.44 Settings	
		1	AI1	
		2	AI2	
		3	Reserved	

F8.44	Timed Run time		Factory default setting	0.0Min
	Setting options	0.0Min~6500.0Min		

This function is used to complete timing running of the inverter. When the F8.42 timing function is available, time counts when the inverter runs and it will stop and output pulse signal when the inverter stops upon reaching the set timing running time. The time counted will be cleared at the beginning of its start the next time. The remained timing running time can be checked and viewed through D0.20.

Set timing running time as per F8.43, F8.44.

F8.45	AI1 input voltage protection lower limit value		Factory default setting	3.10V
	Setting range	0.00V~F8.46		
F8.46	AI1 input voltage protection upper limit value		Factory default setting	6.80V
	Setting range	F8.45~10.00V		

FM (FMR) outputs a pulse signal when the analog input AI1 value is greater than F8.46 (AI1 input protection upper limit) or less than F8.47 (AI1 input protection lower limit).

F8.47	Module temperature arrival		Factory default setting	℃
	Setting range	0.00V~F8.46		

When F7.07 (Inverter module radiator temperature) reaches this value, output pulse signal.

F8.48	Fast current limiting enables		Factory default setting	1
	Setting options	0	Not enabling	
		1	Enable	

Enabling fast current limiting function can minimize inverter over-current fault and protect continuous operation of the inverter. When entering the fast current limit state for a

period of time, it will report a fast current limit failure (ERR40), indicating overload of the inverter, then please refer to Err10 for processing.

6.10 F9/FE Group: PID Control Parameters

PID The control is a common method used in Process control, which adjusts the output frequency of the inverter by proportional, integral and differential operation of the feedback signal of the controlled amount and the difference of the target signal, which makes the controlled quantity stable in the target quantity. It is applicable to process control such as traffic flow control, pressure control and temperature control. The basic principle of control diagram is as follows:

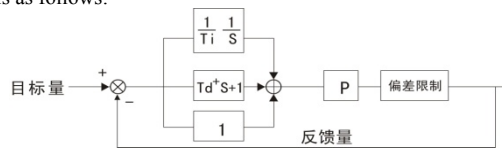

Figure 6-21 procedure PID diagram

F9.00	PID Given the source		Factory default setting: 0
	Set Range	0	function code F9.01 Setting
		1	AI1
		2	AI2
		3	Reserved
		4	PULSE (DI6)
		5	Communication settings
		6	Multistage speed instruction given

When the frequency source is selected as PID and the F0.03 or F0.04 selected as 8 , the group function works. (See also function code F0.03-F0.04). This parameter determines the target-given channel of the procedure PID. The set target of the procedure PID is relative, and the set 100% corresponds to 100% of the feedback signal of the controlled system. The quantum (F9.04) of PID is not required because, regardless of the amount of range, the

system operates by relative value the (0~100%). However, if you set the PID quantum, you can visually observe the actual value of the signal corresponding to the given and feedback of the PID through the keyboard display parameters .

F9.01	The PID keyboard given		Factory default setting	50%
	Setting range	0.0%~100.0%		

When select f9.00=0, that is, the target source is given by the keyboard. You need to set this parameter. The base value of this parameter is the amount of feedback for the system.

F9.02	PID feedback source	Factory default setting	0
	Setting range	0	AI1
		1	AI2
		2	Reserved
		3	AI1-AI2
		4	PULSE (DI6)
		5	Communication setting
		6	Ai1+ai2
		7	MAX (| ai1|,| ai2|)
		8	MIN (| ai1|,| ai2|)

Use this parameter to select PID feedback channel.

F9.03	PID control attribute		Factory default setting	0
	Setting options	0	Positive effect	
		1	Reaction	

Positive effect: When the feedback signal is less than the given PID, the inverter will be required to output frequency upward to achieve balance of PID, such as the rewinding tension PID control.

Negative effect: When the feedback signal is less than the given PID , the inverter will be required to output frequency downward, so the PID can be balanced, such as the unwinding tension PID control.

This function results are affected by the terminal 35 function: The PID action direction takes the opposite effect.

F9.04	PID given feedback quantum		Factory default setting	1000
	Setting Options	0~65535	PID A given feedback quantum is a dimensionless unit. Used as a display for PID given and feedback.	
F9.05	Proportional Gain P1		Factory default setting	20.0
	Setting Options	0.0~100.0		
F9.06	Integration Time I1		Factory default setting	2.00s
	Setting Options	0.01s~10.00s		
F9.07	Differential time D1		Factory default setting	0.000s
	Setting Options	0.00~10.000		

Proportional gain P: it determines the adjustment strength of the whole PID regulator, the larger P is, the greater the adjustment strength. When the parameter is 100, it indicates that when the deviation between PID feedback quantity and the given value is 100%, the amplitude of the PID regulator to the output frequency instruction is the maximum frequency (ignoring the integral action and differential action).

Integration time I: it determines the PID regulator on the adjustment of the speed of integration on the deviation between PID feedback and the given value. The integration time means that when the deviation between PID feedback and the given value is 100% , the integral adjuster (ignoring the proportional action and differential action) is continuously adjusted over that time and the adjustment reaches the maximum frequency (F0.09). The shorter the integration time, the greater the adjustment intensity.

Differential time D: it determines the PID regulator on the intensity of the speed of integration on the deviation between PID feedback and the given value. Differential time means that if the feedback amount changes 100% in that time, the adjustment of the differential adjuster is the maximum frequency (F0.09) (ignoring the proportional action and integral action). The longer the differential time, the greater the adjustment intensity.

F9.08	Reverse cutoff frequency	Factory default setting	0.00Hz
	Setting range	0. ~ Maximum frequency	
F9.09	Deviation limit	Factory default setting	0.01%
	Setting range	0. vs~100.0%	

Deviation limit: When PID feedback deviation is within that range, PID will stop adjustment;

F9.10	Differential limit	Factory default setting	5%
	Setting range	vs~100%	

F9.11	PID given change time	Factory default setting	0.00s
	Setting range	0.00s~650.00s	

PID given change time refers to the time required for the actual PID value to change from 0% to 100%.

When the PID given changes, the PID given actual value will not respond immediately and linear change will occur according to the given change time, preventing sudden change of the given value.

F9.12	PID feedback filter time	Factory default setting	0.00s
	Setting range	0.00s~60.00s	
F9.13	PID output filter time	Factory default setting	0.00s
	Setting range	0.00s~60.00s	

The PID feedback and output value are filtered and processed to eliminate sudden change.

F9.14	Proportional gain P2		Factory default setting	20.0
	Setting range	0.0~100.0		
F9.15	Integration time I2		Factory default setting	2.00s
	Setting range	0.01s~10.00s		
F9.16	Differential time D2		Factory default setting	0.000s
	Setting range	0.00~10.000		

The setting is similar to F9.05, F9.06 and F9.07. For situations where PID parameter changes are required, see F9.18.

F9.17	PID parameter switching conditions		Factory default setting	0
	Setting Options	0	Do not switch	
		1	Switching via DI terminals	
		2	Automatic switching based on deviation	
F9.18	PID parameter switch deviation 1		Factory default setting	20%
	Setting range	0.0%~F9.20		
F9.19	PID parameter switch deviation 2		Factory default setting	80%
	Setting range	F9.19~100.0%		

In some applications, a set of PID parameters may not satisfy the entire running process. Multiple sets of PID parameters may be required to realize switch**.**

When not switching, the PID parameter is constant as the parameter group 1.

In DI terminal switch, multi-function terminal function selection refers to the 43:PID parameter switching terminals, and when the terminal is valid, select the parameter group 2, otherwise, select the parameter group 1.

In order to achieve automatic switch as per the deviation, the deviation between the given and feedback is less than the PID parameter switching deviation 1 (F9.19), F9.05, F9.06, F9.07 shall be referred to as PID regulation parameter; when the deviation between the given and feedback is greater than the PID switching deviation 2 (F9.20) , F9.15, F9.16, F9.17 shall be referred to as PID adjustment parameters. The PID parameters of the deviation segment between the switching deviation 1 and the switching deviation 2 are linear switches of the two groups of PID parameters.

F9.20	PID initial value		Factory default setting	0%
	Setting range	0.0%~100.0%		
F9.21	PID initial value hold time		Factory default setting	0.00s
	Setting range	0.00s~650.00s		

When PID is in operation, the inverter firstly gives the output running as per the PID initial value (F9.21) and the duration time shall be F9.22 (PID initial value hold time), and then starts the normal PID adjustment.

F9.22	Two times output deviation forward maximum value		Factory default setting	1%
	Setting range	0.00%~100.00%		
F9.23	Two times output deviation reverse maximum		Factory default setting	1%
	Setting range	0.00%~100.00%		

This function code is used to limit the difference value between the two PID output beats (2ms/), so as to inhibit too fast change of the PID output. F9.23 and F9.24 respectively correspond to the maximum output deviations during forward and reverse state.

F9.24	PID integral property		Factory default setting	00
	Setting	Single-digit	Integral separation	

	Options	0	Invalid
		1	Valid
		Ten-digit	Output to limit, whether to stop integral
		0	Continue integral
		1	Stop integral

Integral separation

If it is valid and the terminal function 22: integral suspension is valid, the PID integral will stop. Only scale and differential are counted.

Output to a limit, stop integral

If it is in integral stop state and the PID output value reaches the maximum or the minimum value, the PID integral ceases to be counted.

If the integral is continued, the PID integral is counted at any time

F9.25	PID feedback loss detection value		Factory default setting	0%
	Setting range	0.0%: Do not judge feedback loss 0.1%~100.0%		
F9.26	PID feedback loss detection time		Factory default setting	0.0s
	Setting range	0.0s~20.0s		

This feature code is used to determine if PID feedback is missing. When the PID feedback is less than the feedback loss detection value (F9.26) and the duration reaches F9.27 (feedback loss detection time), the inverter reports a failure and runs according to the fault handling mode.

F9.27	PID downtime operation		Factory default setting	0
	Setting options	0	Downtime not operational	
		1	Downtime operation	

F9.28	PID assistant function	Factory	0

	selection		default setting	
	Setting options	0	Normal PID Run	
		1	Sleep PID Run	

0: Inverter runs under normal PID control mode, sleep function is invalid.

1: Inverter runs under sleep PID control mode, sleep function is enabled.

F9.29	Sleep threshold		Factory default setting	60%
	Setting range	0.0% ~ 100.0%		
F9.30	Sleep delay		Factory default setting	3.0s
	Setting range	0.0 ~ 3600s		
F9.31	Wake up threshold		Factory default setting	20%
	Setting range	0.0% ~ 100.0%		
F9.32	Wake up delay		Factory default setting	3.0s
	Setting range	0.0 ~ 3600s		

When you select the sleep PID, if the feedback is higher than the F9.29 sleep threshold setting, the inverter starts the sleep timer; after the sleep delay time set by F9.30, if the feedback amount is higher than the F9.29 set, then the PID stops running and the inverter goes into sleep mode; if the feedback is lower than the F9.31 wake up threshold, then the inverter starts the wake timer. After the F9.32 wake delay setting time, if the amount of feedback is lower than the F9.31 wake threshold set, then the wake-up is realized and PID control is achieved. The figure 6-22 as below can be referred to to know about parameters as above.

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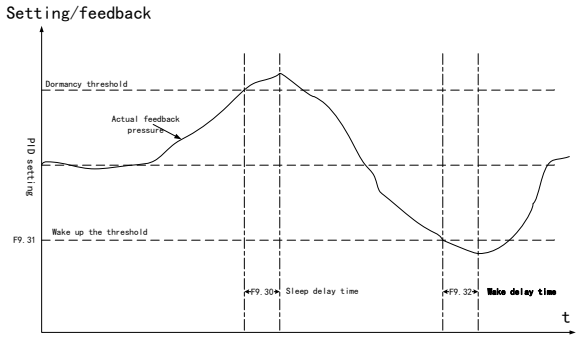

Figure 6-22 PID sleep and wake sequence diagram

6.11 FA Group: Fault & Protection

FA.00	Motor overload protection selection	Factory default setting	1
	Setting range	0	Prohibited
		1	Allowed

Select 0: Inverter has no overload protection to overload motor and by then the relay may be heated in the front of the motor.

Select 1: At this time the inverter has overload protection function to the motor. The protection value is as shown in FA.01.

FA.01	Motor overload protection gain	Factory default setting	1.00
	Setting range	0.20~10.00	

Motor overload protection is in the form of the inverse time curve; 220%x (FA.01) x motor rated current 1 minutes, 150%x (FA.01) x motor rated current 60 minutes.

FA.02	Motor overload warning coefficient	Factory default setting	90D
	Setting range	50%~100%	

The reference quantity of this value is motor overload current. When the inverter detects that the output current reaches (FA.02) the overload current of the × motor and the warning letter is forecasted from DO or relay output after the continuous inverse time curve.

FA.03	Over-voltage speed loss gain	Factory default setting	0
	Setting range	0 (no overvoltage stall) ~MB	

Adjust the inverter to suppress the over voltage loss speed ability. The greater the value, the stronger the ability to suppress overvoltage.

For small inertia load, this value should be small. Otherwise, the system may be caused slow down of the dynamic response.

For large inertia load, this value should be large. Otherwise, the inhibition effect is not good, there may be overvoltage fault.

FA.04	Overvoltage speed loss protecting voltage	Factory default setting	130%
	Setting range	120%~150% (three- phase)	

Select the protection point of the overvoltage speed loss protecting voltage. In condition of over this value the inverter starts to perform overvoltage speed loss protecting function.

FA.05	Overcurrent speed loss gain	Factory default setting	20
	Setting range	0~%	

Adjust the inverter to suppress the overcurrent loss speed ability. The greater the value, the stronger the ability to suppress overcurrent.

For small inertia load, this value should be small. Otherwise, the system may be caused slow down of the dynamic response.

For large inertia load, this value should be large. Otherwise, the inhibition effect is not good, there may be overvoltage fault.

FA.06	Overcurrent speed loss protecting current	Factory default setting	150%

	Setting range	100%~200%

Select the current protection point of the overcurrent speed loss protecting function. Over this value the inverter begins to perform overcurrent speed loss protecting function.

FA.07	Earthing short circuit protection in power-on state		Factory default setting	1
	Setting Options	0	Prohibited	
		1	Allowed	

Whether the motor has a short circuit fault protection in power-on state can be selected. If this function is effective, then the inverter will output in short time as soon as it is powered on.

FA.08	Faults automatic reset frequency number	Factory default setting	0
	Setting range	0~5	

When the inverter is selected to automatic reset in fault condition, it can be used to set the frequency number of automatic reset. If it surpasses this value, the inverter will be in fault and waiting for repair.

FA.09	Fault relay action selection during fault automatic reset period	Factory default setting	1
	Setting range	0: No action; 1: Action	

After selecting the automatic reset function of the inverter, it can decide whether to need the fault relay action in order to shield the malfunction alarm caused by the failure and make the equipment continue running.

FA.10	Fault automatic reset interval time	Factory default setting	1.0s
	Setting range	0.1s~100.0s	

Inverter from fault alarm to automatic reset the waiting time between the failure.

The waiting time from fault warning of the inverter to automatic reset faults.

FA.11	Input phase-loss protection selection	Factory default setting	1

	Setting range	0: Prohibited 1: Allowed

Select whether to protect the input missing phase.

FA.12	Output phase-loss protection selection	Factory default setting	1
	Setting range	0: Prohibited 1: Allowed	

Select whether to protect the output phase-loss condition.

FA.13	Fault protection action selection 1		Factory default setting	00000
	Setting range	Single-digit	Motor Overload (ERR11)	
		0	Free Downtime	
		1	Stop as per the stopping mode	
		2	Continue running	
		Ten--digit	Input the default phase (Err12) (0~2, same digit)	
		Hundred-digit	Output the default phase (Err13) (0~2, same digit)	
		Thousand-digit	External fault (ERR15) (0~2, same digit)	
		Ten thousand-digit	Communication abnormal condition (ERR16) (0~2, same digit)	
FA.14	Reserved		Factory default setting	
	Setting range	Single-digit	Reserved	
		0	Reserved	
		1	Reserved	
		2	Reserved	
		Ten-digit	Reserved	
		0	Reserved	
		1	Reserved	
		Hundred-digit	Reserved	

		Thousand-digit	Reserved
		Ten thousand-digit	Reserved
FA.15	Fault protection action selection 3		Factory default setting: 00000
	Setting range	Single-digit	User-defined fault 1 (Err27) (0~2, same as FA.13)
		Ten-digit	User-defined fault 2 (Err28) (0~2, same as FA.13)
		Hundred-digit	Power on time reach (Err29) (0~2, same as FA.13)
		Thousand-digit	Load loss (ERR30)
		0	Free shutdown
		1	Stop as per the machine stopping way
		2	Run the inverter when decelerate it to 7% of the motor. When it is not in load loss state, the inverter will automatically restore to the set frequency.
		Ten thousand-digit	PID Feedback was lost at run time (Err31) (0~2, same as FA.13 digit)
FA.16	Reserved		Factory default setting:
	Setting Options	Single-digit	Reserved
		Ten-digit	Reserved
		Hundred-digit	Reserved
		Thousand-digit	Reserved
		Ten thousand-digit	Reserved

When choosing "Free Parking": The inverter prompts err** and stops directly.

When you choose to "stop as per the machine stopping way": Inverter prompts A** and stop the machine as per the machine stopping mode, and it will prompt ErrXX upon stopping of the machine.

When selected as "Continue running": The inverter will “continue running” and when the inverter continues running and prompts A**, see FA.20, FA.21 description for run frequency.

FA.18	Undervoltage point setting	Factory default setting	100%
	Setting range	60.0%~140.0%	

The voltage point reporting undervoltage (Err09) will be adjusted by adjusting this parameter, the 100% corresponds to 350V.

FA.19	Overpressure point setting	Factory default setting	810.0V
	Setting range	200.0V ~ 2500.0V	

The inverter generally does not adjust this parameter upon delivery from the factory. If there is phenomena such as over pressure caused by frequent running, please readjust it after consultation with the factory client service department.

FA.20	Continue running frequency selection in case of failure		Factory default setting	0
	Setting range	0	Run at current operating frequency	
		1	Run at a set frequency	
		2	Run at upper limit frequency	
		3	Run at down limit frequency	
		4	Run with abnormal standby frequency	
FA.21	Abnormal standby frequency		Factory default setting	100.0%(current target frequency)
	Setting range		60.0%~100.0%	

The inverter prompts shiver and runs at the set frequency determined by the inverter when it is running and the fault handling mode is continued.

The inverter is in fault during the running process and this fault treatment method is continue running. The inverter prompts A** and this functions is confirmed to be run in the set frequency.

FA.22	Instant stop action selection		Factory default setting	0
	Setting range	0	Invalid	

		1	Deceleration time 1	
		2	Deceleration time 2	
FA.23	instant stop & immediate pause judging voltage		Factory default setting	90%
	Setting range		80.0%~100.0% (standard bus voltage)	
FA.24	Instant stop non-stop voltage rise judgment time		Factory default setting	0.50s
	Setting range		0.00s~100.00s	
FA.25	Instant stop non-stop action judging voltage		Factory default setting	80%
	Setting range		60.0%~100.0% (standard bus voltage)	

This function means that the inverter will not stop during the instantaneous power outage. In the case of instantaneous power failure or sudden decrease of voltage, the inverter can reduce the output speed and compensate the reduced voltage by the load, so as to keep the inverter running in a short time.

If the instant stop non-stop function is selected effectively and the bus voltage is lower than the instant stop non-stop action judging voltage (FA.25), the inverter will choose deceleration according to the instant stop action. When the bus voltage rise surpasses the instant stop non-stop action judging voltage (FA.25) and the continuous time remains at the instant stop non-stop voltage rise judging time (FA.24), the inverter will recover the set frequency operation. Otherwise, the inverter will continue to reduce the running frequency and stop when the running frequency comes to 0. The instant stop and non-stop function is as below:

When the instant stop deceleration speed is too long, the load feedback energy will be relatively less and the low voltage cannot be effectively compensated; when the instant stop deceleration speed is too short, the load feedback energy will be relatively more and over-voltage protection may be caused. By then deceleration shall be reasonably adjusted as per the load inertia and weight of the load.

FA.26	Off-load protection options		Factory default setting	0
	Setting range	0	Invalid	
		1	Effective	

FA.27	Drop-load detection level	Factory default setting	10%
	Setting range	0.0%~100.0%(motor rated current)	
FA.28	Drop load detection time	Factory default setting	1.0s
	Setting range	0.0s~60.0s	

If the function is effective, then when the inverter is in load dropping state, the inverter will report Err30 fault; the output frequency is 7% of the rated frequency; if load dropping is recovered, it will run as per the set frequency. Drop-load detection level and time can be set.

FA.29	Frequency decimal point in fault	Factory default setting	222
	Setting range	Single-digit	Third Fault frequency decimal point
		1	1 decimal point
		2	2 decimal points
		Ten-digit	Second fault frequency decimal point (1~2, same digit)
		Hundred-digit	Second fault frequency decimal point (1~2, same digit)

Because the frequency decimal point can be set, the function code is used to record the decimal point of the frequency at which the failure occurs (for frequency display in failure condition).

Note: This function code display data as H.xxx, where H. is represented as a hexadecimal data.

6.12 FB Group: swing frequency, fixed length and counting parameters

The swing frequency function is applied to the textile and chemical fiber industry etc. and the applications where traversing and winding functions are required.

The swing frequency function indicates that the VFD will swings up and down with the output frequency as the setting frequency (frequency orders as selected as per F0.07). The running frequency at the time axis is as shown in the following figure, among which the swing amplitude is set by FB.00 and FB.01. When FB.01 is set as 0， namely the swing amplitude is 0, then the swing frequency is disable.

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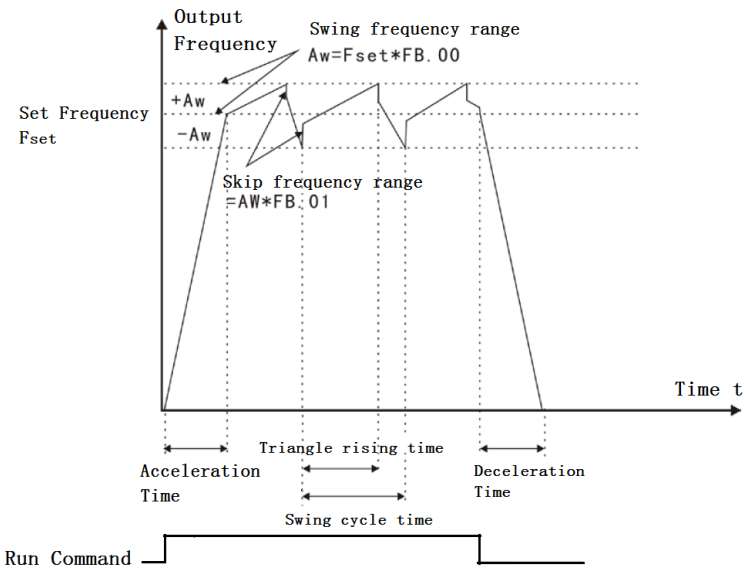

Swing Frequency Function

Figure 6-23 Swing frequency work Diagram

FB.00	Setting mode of swing amplitude		Factory default setting	0
	Setting range	0	Relative to the center frequency	
		1	Relative to Maximum frequency	

This parameter is used to determine the datum quantity of the swing amplitude.

0 : Relative center frequency (F0.07 frequency source selection) is the variable swing system. The swing amplitude varies with the center frequency (the setting frequency).

1: Relative Maximum frequency (F0.10 the maximum output frequency) is a fixed swing system. Swing amplitude is fixed.

FB.01	Swing frequency range	Factory default setting	0%
	Setting range	0.0%~100.0%	
FB.02	hopping frequency range	Factory default setting	0%
	Setting range	0.0%~50.0%	

This parameter is used to determine the amplitude of swing and the frequency of jump. The running frequency of swing frequency is restrained by upper and lower frequencies.

The swing amplitude phase is relative to the center frequency (variable swing amplitude, select FB.00=0): The amplitude AW= frequency source f0.07 × swing amplitude FB.01.

The swing amplitude phase is relative to the maximum frequency (fixed swing amplitude, select FB.00=1): The amplitude AW= maximum frequency f0.12× swing amplitude FB.01.

Sudden adjustment frequency = swing amplitude AW × hopping frequency amplitude FB.02. That is, the sudden adjustment frequency relative to the swing amplitude value.

If the swing amplitude is relative to the center frequency (variable swing amplitude, select FB.00=0), the sudden adjustment frequency is a change value.

If the swing amplitude is relative to the maximum frequency (variable swing amplitude, select FB.00=0), the sudden adjustment frequency is a fixed value.

FB.03	Swing frequency cycle	Factory default setting	10.0s
	Setting range	0.0s~3000.0s	
FB.04	Trangular wave rise time coefficient	Factory default setting	50%
	Setting range	0.0%~100.0%	

Swing frequency period: A complete time value for the swing frequency period. The FB.04 trangular wave rise time coefficient is relative to the FB.03 swing frequency cycle.

Trangular wave rise time = swing frequency period FB.03 × trangular wave rise time coefficient FB.04 (unit: s)

Trangular wave down time = swing cycle FB.03 × (1 -Trangular wave rise time coefficient FB.04) (unit: s)

FB.05	Setting length	Factory default setting	1000m
	Setting range	0m~65535m	
FB.06	Actual length	Factory default setting	0m
	Setting range	0m~65535m	
FB.07	m pulse number per m	Factory default setting	100.0
	Setting range	0.1~6553.5	

The three function codes - setting length, actual length, every m pulse number are mainly used for fixed-length control. The length is calculated by the inputted pulse signal from the switch amount input terminal, and the corresponding input terminal must be set as the length counting input terminal. Generally, when the pulse frequency is high, you need to enter with the DI5.

Actual length = length count input pulse number / every m pulse number

When actual length FB.06 is over the set length FB.05, the multifunction digital output terminals length reach the terminal, then output On Signal (refer to F1.04 function code).

FB.08	Set the count value	Factory default setting	1000

	Setting range	1~65535	
FB.09	Specify count value	Factory default setting	1000
	Setting range	1~65535	

The count value is input pulse signal count through the counter input terminal of multifunction switch input terminal.

The count value counts as per the counter input terminal input pulse signal from the multi-functional switch volume input terminal.

When the counting value reaches the set count value, the switch volume output terminal will output the signal that the set count value arrives. Counter stops count.

When the count value reaches the specified count value, the switch volume output terminal will output the signal that the specified count value arrives. The counter continues counting, till "the set count value" stops.

Specify the count value FB.09 shall be no greater than the set count value FB.08.

This function is illustrated as below:

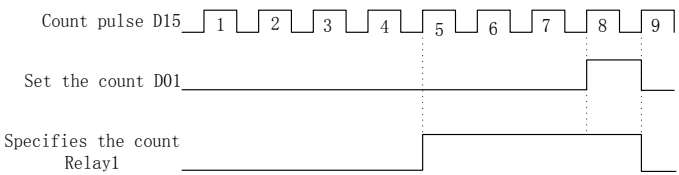

Figure 6-24 schematic of setting the given and specified count values

6.13 FC Group: communication parameters

For details please refer to Chapter 7 — "VM1000 Communication Protocol"

6.14 FD Group: multistage speed and simple PLC parameters

Easy PLC the function refers that the inverter has a built-in programmable controller (PLC) to automate the logic control of multiple-segment frequency. The running time, running direction and running frequency can be set, to meet the technical requirements. This series of inverter can implement change control on 16 segments speed and there are 4 types of acceleration and deceleration time for selection. When the set PLC has completed a loop, an ON signal can be output by multifunctional digital output terminal DO1, DO2 or multifunctional relay 1 and relay 2. For more information, see F1.02~F1.05. When the frequency source selects F0.07, F0.03, F0.04 and it is determined to run at multiple-speed speeds, you need to set the FD.00~FD.15 to determine its attributes.

FD.00	Multistage-speed 0	Factory default setting	0%
	Setting range	-100.0%~100.0%; 100.0% corresponds to Maximum frequency (F0.10)	
FD.01	Multistage-speed 1	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.02	Multistage-speed 2	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.03	Multistage-speed 3	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.04	Multistage-speed 4	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.05	Multistage-speed 5	Factory default setting	0%

	Setting range	-100.0%~100.0%	
FD.06	Multistage-speed 6	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.07	Multistage-speed 7	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.08	Multistage-speed 8	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.09	Multistage-speed 9	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.10	Multistage-speed 10	Factory default setting	0.0Hz
	Setting range	-100.0%~100.0%	
FD.11	Multistage-speed 11	Factory default setting	0%
	Setting range	-100.0%~100.0%	
FD.12	Multistage-speed 12	Factory default setting	0%
	Setting Options	-100.0%~100.0%	
FD.13	Multistage-speed 13	Factory default setting	0%
	Setting Options	-100.0%~100.0%	
FD.14	Multistage-speed 14	Factory default setting	0%
	Setting Options	-100.0%~100.0%	
FD.15	Multistage-speed 15	Factory default setting	0%
	Setting Options	-100.0%~100.0%	

When the frequency source parameters F0.07, F0.03 and F0.04 are determined as the operation mode of PLC, it is necessary to set FD.00 ~ FD.15, FD.16, FD.17, FD.18~FD.49 to determine its characteristics.

Note: Symbols of FD.00~FD.15 determines the simple operation direction of PLC. A negative value indicates that it is running in the opposite direction.

Simple schematic diagram of PLC:

FD.16	PLC operation mode		Factory default setting	0
	Setting range	0	Single run end shutdown	
		1	Maintain final value at the end of single run	
		2	Always in cycle	
FD.17	PLC power off memory selection		Factory default setting	00
	Setting range	Single-digit	Power off Memory selection	
		0	No memory.	
		1	Memory	
		Ten-digit	Downtime Memory Options	
		0	Downtime, no memory.	
		1	Downtime Memory	

PLC Operation Mode

0: Single running ends & shutdown

When the inverter completes a single cycle of automatic shutdown, it needs to give the running command to start again.

1: Single running ends and maintains the final value

When the inverter completes a single cycle, it will automatically maintain the last section of the operating frequency and direction.

2: Always in cycle

When the inverter completes a cycle and it will automatically starts the next loop, and the system stops when there is a shutdown command.

3: Power off memory selection

PLC power off memory refers to the running stage and operating frequency before the memory power loss occurs.

4: Shutdown memory selection

PLC shutdown memory is a record of the previous PLC running stage, operating frequency during the shutdown time.

FD.18	PLC Segment 0 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.19	PLC Segment 0 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.20	PLC Segment 1 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.21	PLC Segment 1 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.22	PLC Segment 2 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.23	PLC Segment 2 to increase deceleration time	Factory default setting	0
	Segment Options	0~3	
FD.24	PLC Segment 3 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.25	PLC Segment 3 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.26	PLC Section 4 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.27	PLC Segment 4 to increase deceleration time	Factory default setting	0

	Setting Options	0~3	
FD.28	PLC Segment 5 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.29	PLC Segment 5 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.30	PLC Segment 6 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.31	PLC Segment 6 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.32	PLC Segment 7 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.33	PLC Segment 7 to increase deceleration time	Factory default setting	0
	Setting Options	0~3	
FD.34	PLC Segment 8 running time	Factory default setting	0.0s (h)
	Setting range	0.0s (h)~6553.5s (h)	
FD.35	PLC Segment 8 to acceleration & deceleration time	Factory default setting	0
	Setting range	0~3	
FD.36	PLC Segment 9 running time	Factory default setting	0.0s (h)
	Setting Options	0.0s (h)~6553.5s (h)	
FD.37	PLC Segment 9 to increase deceleration time	Factory default setting	0
	Setting range	0~3	
FD.38	PLC Segment 10 elapsed time	Factory default setting	0.0s (h)
	Setting range	0.0 s (h)~6553.5s (h)	
FD.39	PLC Segment 10 acceleration & deceleration time	Factory default setting	0
	Setting range	0~3	
FD.40	PLC Segment 11 running time	Factory default setting	0.0s (h)
	Setting range	0.0s (h)~6553.5s (h)	
FD.41	PLC Segment 11 acceleration & deceleration time	Factory default setting	0
	Setting range	0~3	

FD.42	PLC Segment 12 run time		Factory default setting	0.0s (h)
	Setting range		0.0s (h)~6553.5s (h)	
FD.43	PLC Segment 13 increase deceleration time		Factory default setting	0
	Setting range		0~3	
FD.44	PLC Segment 13 running time		Factory default setting	0.0s (h)
	Setting range		0.0s (h)~6553.5s (h)	
FD.45	PLC Segment 13 deceleration time		Factory default setting	0
	Setting range		0~3	
FD.46	PLC Segment 14 running time		Factory default setting	0.0s (h)
	Setting range		0.0s (h)~6553.5s (h)	
FD.47	PLC Segment 14 deceleration time		Factory default setting	0
	Setting range		0~3	
FD.48	PLC Segment 15 running time		Factory default setting	0.0s (h)
	Setting Options		0.0s (h)~6553.5s (h)	
FD.49	PLC Segment 15 acceleration & deceleration time		Factory default setting	0
	Setting range		0~3	
FD.50	PLC running time unit selection		Factory default setting	0
	Setting range	0	s: Seconds	
		1	h: Hours	
		2	min : Minutes	

FD.51	Multi-speed 0 given way		Factory default setting	0
	Setting range	0	function code FD.00 given	
		1	AI1	
		2	AI2	
		3	Reserved	
		4	PULSE	
		5	PID	

		6	Preset frequency (F0.08) given,up/down can be modified

This parameter determines the target-given channel for a multi—stage speed 0.

6.14 FE Group: user password

FE.00	User password	Factory default setting	0
	Setting Options	0~65535	

Set any Non-zero numberas the password and then the password protection function takes effect.

00000 : Clears the previously set users' password value and invalidates password protection.

When the user password is set and takes effect, if the user password is incorrect when it reenters the parameter setting state, only the parameters can be viewed and the parameters cannot be modified. Keep in mind the user password you set. If you accidentally or forget, please contact the manufacturer.

FE.01	Fault records display frequency	Factory default setting	5
	Setting range	0~15	

The function code is used to set the number of times the fault record is displayed.

6.15 FF Group: factory parameters（Reserved）

6.16 DO Group: monitoring parameters

function code	Name	Minimum unit
D0.00	Operating frequency (Hz)	0.01Hz
D0.01	Set frequency (Hz)	0.01Hz
D0.02	Bus voltage (V)	0.1V

D0.03	Output voltage (V)	1V
D0.04	Output current (A)	0.01A
D0.05	Output power (KW)	0.1kW
D0.06	Output torque(%)	0.1%
D0.07	DI Input Status	1
D0.08	Do Output Status	1
D0.09	AI1 voltage (V)	0.01V
D0.10	AI2 voltage (V)	0.01V
D0.11	Reserved	—
D0.12	Count value	1
D0.13	Length value	1
D0.14	Load Speed Display	1
D0.15	PID Settings	1
D0.16	PID Feedback	1
D0.17	PLC Stage	1
D0.18	PULSE input Pulse frequency (Hz)	0.01kHz
D0.19	Feedback Speed (unit 0.1Hz)	0.1Hz
D0.20	Remaining elapsed time	0.1Min
D0.21	AI1 Pre-correction voltage	0.001V
D0.22	AI2 Pre-correction voltage	0.001V
D0.23	Reserved	—
D0.24	Line speed	1m/min
D0.25	Current power on time	1Min
D0.26	Current Run time	0.1Min
D0.27	Reserved	—
D0.28	Communication Set Value	0.01%
D0.29	Reserved	—
D0.30	Main frequency X display	0.01Hz
D0.31	Secondary frequency Y display	0.01Hz

D0.32	View any memory address values	1
D0.33	Reserved	—
D0.34	Reserved	—
D0.35	Target torque (%)	0.1%
D0.36	Reserved	—
D0.37	Reserved	—
D0.38	Reserved	—
D0.39	VF Detach target Voltage	1V
D0.40	VF Detach Output Voltage	1V
D0.41	DI visual display of input status	—
D0.42	Do visual display of output status	—

This group of function code users displays the state of inverter operation information, where D0.00~D0.31 is the running, and stop monitoring parameters defined in F7.03, F7.04.

Chapter 7 VM1000 Communication Protocol

VM1000 Series inverter provides RS485 communication interface and supports Modbus communication protocol. Users can achieve centralized control by computer or PLC, set inverter operation commands, modify or read function code parameters, read the working state and fault information of the inverter.

7.1 Protocol Contents

The serial communication protocol defines the information content and the use format of the transmission in serial communication. These include: function code of the requested actions, transmission data and fault checking, etc. The subordinate machine also applies the same structure, including: action confirmation, data returning and fault checking. If the subordinate machine has errors in the process of receiving information, or if the subordinate machine cannot finish the actions required by the main maching, it will organize a fault information to give feedback to the main machine.

7.2 Application way

Inverter accessing is equipped with RS485 bus “single main machine and multiple subordinate machine” PC/PLC control network.

7.3 Bus Structure

(1) Interface mode: RS485 hardware interface

(2) Transmission mode: asynchronous serial, half-duplex transmission mode. At the same time, only one of the host machine or subordinate machine can send message while the other can receive message. In the process of serial asynchronous communication, the data is sent in the form of a message by frame.

(3) Topological structure: it's a single main machine multiple subordinate machine system. Address of the subordinate machine is 1~31; 0 is the broadcast communication address. The subordinate machine address in the internet must be only one.

7.4 Protocol Description

VM1000 Series Inverter communication protocol is an asynchronous serial host-subordinate modbus communication protocol, in which only one device (host machine) can establish an agreement (called a "query/command"). Other devices (subordinate machine) can only be provided by providing a "query/command" of the data response host machine, or by acting on the host's query/command. Host machine here refers to personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc., while the subordinate machine refers to the VM1000 inverter. The host machine can communicate with one single subordinate machine and also can release broadcast information for all subordinate machines. As for the "query/command" of the host machine which shall be separately visited, the subordinate machine will return a message (which is called response); as for the broadcast information released by the host machine, there is no necesscity for the subordinate machine to feed back to the host machine.

7.5 Communication frame details

Using RTU mode, the message is sent upon an interval of at least 3.5-character-time pause. It is easiest to implement a variety of character time under the network baud rate. The first domain of transport is the device address. The transfer characters you can use are hexadecimal 0 ... 9, A ... F. Network devices constantly detect the network bus, including the pause interval. When the first domain (address field) is received, each device decodes to determine whether it is sending to its own. After the last transmission character, a pause of at least 3.5 characters time calibrated the end of the message. A new message can begin after this pause. The entire message frame must be transmitted as a continuous flow. If there is a pause time of more than 1.5 characters before the frame completes, the receiving device will refresh the incomplete message and assumes that the next byte is the Address field of a new message. Similarly, if a new message starts in less than 3.5 characters time after the previous message, the receiving device will assume that it is a continuation of the previous message. This will cause an error because the value in the final CRC field cannot be correct.

The **RTU frame format is as follows:**

Frame header START	3.5 character time
Subordinate machine address ADR	Communication address:1~247
Command code CMD	03: read from machine parameters; 06: write from machine parameters
data content (N-1)	Data content: function code parameter address, function code parameter reference number, function code parameter value and so on.
data content (N-2)	
.....	
Data content DATA0	
CRCCHK High	Detection value: CRC value.
CRCCHK Low	
End	3.5 detection value: CRC

Table 7-1 RTU Frame format

Read from subordinate machine register data

Example 1: address of the subordinate machine is F002 continuous 2 value.

Host machine command information:

ADR	01H
CMD	13)
Starting address high	f0h
Starting address Low	02H
register number high	00H
register number low	02H
CRCCHK Low order	The CRCCHK value to be evaluated
CRCCHK High order	

Table 7-2 host machine read command frame format

Machine response information：

ADR	01H
CMD	13)
Number of bytes	04H
Data F002h high level	00H
Data f002h low level	00H
Data f003h high level	00H
Data f003h low level	01H
CRCCHK high level	The CRCCHK value to be evaluated
CRCCHK low level	

Table 7-3 the subordinate machine reads feedback information frame format

Write into register data of the subordinate machine

Example 2: Writes the 5000 (1388H) to the F00AH address of the subordinate address 02H inverter.

Host machine command information:

ADR	02H
CMD	06H
Data address high level	f0h
Data address low level	0AH
High data high level	13H
Low data low level	88H
CRCCHK low level	The CRCCHK value remains to be evaluated
CRCCHK high level	

Table 7-4 host machine writes to command frame format

Machine Response Information:

ADR	02H
CMD	06H
Data Address high level	f0h
Data address low level	0AH
High data content high level	13H
Low data content low level	88H
CRCCHK low level	The CRCCHK value remains to be evaluated

Table 7-5 Subordinate machine writes into response information frame format

Verification mode--CRC check mode:

Use the RTU frame format; the message includes the error detection domain based on the CRC method. The CRC domain detects the contents of the entire message. The CRC field is two bytes and contains a 16-bit binary value. It is evaluated by the transmission device and added to the message. The receiving device recalculates the CRC of the received message and compares the values in the CRC field received to indicate that there are errors in the transmission if the two CRC values are not equal. CRC is deposited in 0xFFFF, and then a procedure is invoked to process the continuous 8-bit byte in the message with the value in the current register. Only 8Bit data in each character is valid for CRC, starting and stopping bits, and parity bits are not valid. In the CRC generation process, each 8-bit character is independently different from the register content or XOR. The result will move forward the lowest efficient position and the highest effective position shall be filled with 0. LSB is selected for detection. If LSB is 1, the register will be independently different from the preset value. If the LSB is 0, this process will not be done. The whole process will go through 8 times. Upon finishing of the last bit (the 8^{th} bit), the next 8^{th} bit will also be different from the current value. The value in the final register is the CRC value unpon implement of all digits. When CRC is added into the message, the low byte will be added first and then comes the high byte.

When CRC is added to a message, the lower byte is added first, then the high byte. The CRC simple function is as follows:

```
unsigned int crc_chk_value (unsigned char *data_value,unsigned char length)
{
        unsigned int crc_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);
}
```

Address definition of communication parameters: This part is the content of communication, used to control the operation of inverter, inverter state and related parameter settings (some of the function code cannot be changed, only for manufacturers to use).

Function code parameter address is labeled with rules: high byte (F0~FF), low byte (00~FF), such as F3.12, address expressed as F30C.

Note： FF Group: cannot read parameters or change parameters, some parameters cannot be changed when the inverter is in running; some parameters, regardless of the state of the inverter, cannot be changed; to change the function code parameters, you need also pay attention to the range of parameters, units, and related instructions.

As the EEPROM is frequently stored, it will reduce the life of the EEPROM, so it's better that the host computer communication design or configuration shall avoid frequent write operations.

7.6 Register Address

Shutdown/run parameters section:

Parameter address	Parameter description	Unit
1000H	Communication Set Value (-10000~10000) (decimal)	0.01%
1001H	Operating frequency	0.01Hz
1002H	Bus voltage	0.1V
1003H	Output voltage	1V
1004H	Output current	0.01A
1005H	Output power	0.1kW
1006H	Output torque	0.1%
1007H	Running speed	0.01Hz
1008H	DI Input Flags	1
1009H	DO output flag	1
100AH	AI1 Voltage	0.01V
100BH	AI2 Voltage	0.01V
100CH	Reserved	—
100DH	Count value input	1 Time
100EH	Length value input	1 Time
100FH	Load speed	1rpm
1010H	PID Setting	0.1%
1011H	PID Feedback	0.1%

1012H	PLC Step	1(range 0~)
1013H	PULSE input pulse frequency, unit 0.01KHz	0.01Hz
1014H	Reserved	—
1015H	Remained running time	1min
1016H	AI1 pre-correction voltage	0.001V
1017H	AI2 pre-correction voltage	0.001V
1018H	Reserved	—
1019H	Line speed	1m/min
101AH	Current power-on time	1 minutes
101BH	Current running time	0.1 Minutes
101CH	Reserved	—
101DH	Communication set value	Traffic Set Value (-10000~10000)
101EH	Reserved	—
101FH	Main frequency X display	0.01Hz
1020H	Secondary frequency Y display	0.01Hz

Table 7-6 Shutdown/Running parameter address table

Note: The communication setting value is the percentage of the relative value, 10000 corresponds to 100.00%, while -10000 corresponds to -100%. For the data of the frequency dimension, the percentage is the relative maximum frequency (f0-10), and for the torque dimensional data, the percentage is f2-10 (torque upper limit setting).

Control command input to Inverter: (writes only)

Command word address	Command features
2000H	0001: Running
	0002: Reverse Running
	0003: Forward inching movement

	0004: Reverse inching movement
	0005: Free downtime
	0006: slowing down
	0007: Failed reset

Table 7-7 control command function table

Reads the inverter state: (read-only)

Command word address	Command features
3000H	0001: forward running
	0002: reverse running
	0003: Inverter standby
	0004: Inverter failure
	0005: Inverter undervoltage
	0006: Forward and backward switch

Table 7-8 reading inverter status information table

The parameter locked password checking:

(If it returns to 8888H, that means the password checking passes)

Password address	Enter the contents of the password
1f00h	*****

Table 7-9 Password verification address and format

Digital output terminal control: (write only)

Command word address	command content
2001H	bit0~bit1:Reserved
	BIT2:RELAY1 Output control
	BIT3:RELAY2 Output control

	BIT4:FMR Output control
	BIT5:VDO
	bit6~bit9:Reserved

Table 7-10 Digital output control

Analog output AO1 control: (write only)

Command address	Command content
2002H	0 ~ 7FFF = 0~%

Table 7-11 Analog output A01 control

Analog output AO2 control: (write-only)

Command address	Command content
2003H	0 ~ 7FFF = 0~%

Table 7-12 Analog output A02 control

Pulse (PULSE) output control: (write-only)

Command address	Command content
2004H	0 ~ 7FFF = 0~%

Table 7-13 Pulse output control

Inverter fault description:

Inverter fault address	Inverter fault information

8000H	0000: no fault 0001:Reserved 0002: Accelerating overcurrent 0003: Decelerating overcurrent 0004: Constant speed overcurrent 0005: Accelerating overvoltage 0006: Decelerating overvoltage 0007: Constant speed overvoltage 0008: Buffer resistor overload failure 0009: Undervoltage failure 000A: Inverter overload 000B: Motor overload 000C: Input missing phase 000D: Output missing phase 000E: Module overheating 000F: External failure 0010: Communication abnormal condition 0011:Reserved 0012: Current detection failure 0013: Motor tuning failure 0015: Parameter read-write abnormal condition 0016: Power-on EEPROM checking failure 0017: Motor to ground short circuit fault 001A: Running time arrives 001B: User- defined failure 1 001C: User- defined failure 2 001D: Power up time arrives 001E:Reserved 001F: Running time PID feedback is missing 0028: Fast current limit timeout failure 0029:Reserved

Table 7-14 inverter fault information table

Communication fault information description data (fault code):

Communication fault address	Description of failure function
8001H	0000: No fault 0001: Password error 0002: Command code Error 0003:CRC Check error 0004: Invalid Address 0005: Invalid parameter 0006: Invalid parameter change 0007: System Locked 0008: EEPROM in operation

Table 7-15 Communication fault information description datasheet

FC Group communication parameters description

FC.00	Native address	Factory default setting	1
	Setting options	00~31	

When the local address is set to 0, that is broadcast address, to achieve broadcast function of the host computer. The native address is unique (except the broadcast address), which is the basis for realizing the point-to-point communication between the host computer and the inverter.

FC.01	Baud rate	Factory default setting	5
	Setting options	0	bps
		1	bps
		2	1200 bps
		3	2400 bps
		4	4800 bps
		5	9600 bps
		6	19200 bps
		7	38400 bps

This parameter is used to set the data transfer rate between the host computer and the inverter. Note that the host computer and the inverter set the baud rate must be consistent, otherwise, communication cannot be carried out. The greater the baud rate, the faster the communication speed.

FC.02	Data bits and check settings	Factory default setting	3
	Setting options	0	(8.n.2) 8 bit, no check, 2 bit Stop bit
		1	(8.E.1) 8 bit, even check, 1 bit Stop bit
		2	(8.o.1) 8 bit, odd check, 1 bit Stop bit
		3	(8.N.1) 8 bit, no check, 1 bit Stop bit

The data format set by the host computer and the inverter must be consistent; otherwise, communication cannot be carried out.

FC.03	Response delay	Factory default setting	2ms
	Setting Options	0~20ms	

Response delay: Refers to the intermediate interval time between the end of receiving the inverter data to the host machine sending data. If the response delay is less than the system processing time, then the response delay is based on the system processing time; if the response delay is longer than the system processing time, delay waiting time is still needed

upon the data processing, delay wait until the response delay time to the host computer to send data.

FC.04	Communication timeout	Factory default setting	0.0 s
	Setting range	0.0 s(not valid),0.1~60.0s	

The communication timeout parameter is invalid when the feature code is set to 0.0 s.

When the feature code is set to a valid value, if the time between communication and the next communication exceeds the communication timeout, the system will report a communication failure error (ERR16). Typically, it is set to an invalid. If you set the secondary parameter in a continuously communicating system, you can monitor the communication status.

FC.05	Communication reading current resolution	Factory default setting	0
	Setting options	0	0.01A
		1	0.1A

It is used to output current value unit when confirming communication reading output current.

Chapter 8 Troubleshooting and Countermeasures

8.1 Fault code table

VM1000 Inverter has a number of warning information and protection function, once abnormal fault occurrs, protection function action will be enabled, the inverter will stop output, the inverter fault relay will act by connecting points, and the display fault code will be displayed on the inverter display panel.Before search for services, the users can firstly carry out self-check according to self-examination of this section and analyze the causes of failure to find solutions. If the reason is in the dotted box, please seek service with the agent of the inverter you purchased or contact with our company directly.

Fault Code	Fault Type	Reason	Solution
Err02	Over-current during acceleration	1: Accelerate too fast	1: Increase acceleration time
		2: Input voltage is too low	2: Inspect the input power supply or wiring
		3: Drive capacity is too low	3: Select larger capacity drive
Err03	Over-current during deceleration	1: Decelerate too fast	1: Increase deceleration time
		2: Load is too heavy and has large inertia	2: Add suitable braking units
		3: Drive capacity is too low	3: Select larger capacity drive
Err04	Over-current at constant speed	1: Sudden change of load	1: Check the load
		2: Input voltage is too low	2: Inspect the input power supply or wiring
		3: Drive capacity is too low	3: Select larger capacity drive

Err05	Over-voltage during acceleration	1: Input voltage abnormal 2: Restart the motor when instantaneous trip-off occurs	1: Inspect input power 2: Avoid prompt restart when trip-off
Err06	Over-voltage during deceleration	1: Decelerate too fast 2: Load is too heavy and has large inertia 3: Input voltage abnormal	1: Increase deceleration time 2: Add suitable braking units
Err07	Over-voltage at constant speed	1: Input voltage abnormal 2: Load inertia is too large	1: Install input AC reactor 2: Add suitable braking units
Err08	Control power failure	Input voltage abnormal	Inspect the input power supply or wiring
Err09	Undervoltage fault	1.The instantaneous power failure 2.Input voltage abnormal	1:reset 2: Inspect the input power supply or wiring
Err10	Drive overload	1: Accelerate too fast 2: Restart the motor when instantaneous trip-off occurs 3: Input voltage is too low 4: Load is too heavy	1:Increase acceleration time 2: Avoid prompt restart when trip-off 3: Inspect power grid 4: Select larger capacity drive

Err11	Motor overload	1: Input voltage is too low	1: Inspect voltage of power grid
		2: Improper setting of motor rated current	2: Properly setting of motor rated current
		3: Improper motor's overload protection threshold	3: Inspect load and boost the torque
		4: Drive capacity is too low	4: Select larger capacity drive
Err12	Phase-lack of input	Phase-lack of R, S, T	Inspect the input power supply or wiring
Err13	Phase-lack of output	1: There is a broken wire in the output cable 2: There is a broken wire in the motor winding. 3.: Output terminals are loose	Check the wiring and installation
Err14	Module overheat	1:Instantaneous over current of inverter	1: Refer to over current solutions
		2:Output short circuit	2: Use the good wire
		3: Cooling fans of inverter stop or damaged. Obstruction of ventilation channel	3: Replace cooling fan and clear the ventilation channel
		4: Ambient temperature is too high	4:Decrease the ambient temperature

		5: The cables or terminals are loose 6: Power circuit abnormal 7: Control PCB board abnormal	5:Inspect and tighten the wire and terminals 6 and 7: Ask for support
Err15	External fault	External fault input terminals take effect	Inspect external equipment
Err16	Communication fault	1: Improper baud rate setting 2: Receive wrong data 3: Communication is interrupted for long time	1: Set proper baud rate 2: Push STOP/RESET to reset and ask for support 3: Check communication devices and cables
Err18	Current detection fault	1: Wires or connectors of control board are loose 2: Amplifying circuit abnormal 3: Hall sensor is damaged 4: Power circuit abnormal	1:Check the wiring and connectors 2,3 and 4: Ask for support
Err19	Motor tuning fault	1:Improper setting of motor rated parameters 2:Overtime of autotuning	1:Set rated parameters according to motor nameplate 2: Check motor's wiring
Err21	Data overflow	Main control board anomaly	Ask for support
Err22	Power-on EEPROM check	Main control board anomaly	Ask for support

	fault.		
Err23	Ground fault	The motor is short circuit fault.	1:Replace the motor or cable. 2:Replace drive plate
Err26	The accumulated running time reaches the fault.	1:The cumulative running time reaches the set value. 2:The cumulative running time does not reach the set value.	1:Reset 2:Parameter initialization
Err27	User-defined fault 1.	1:The DI terminal detects the user-defined fault 1 signal. 2:The DI terminal does not detect a user-defined fault 1 signal.	1:Check and rule out user-defined fault 1. 2:Reset
Err28	User-defined fault 2.	1:The DI terminal detects the user-defined fault 2 signal. 2:The DI terminal does not detect a user-defined fault 2 signal.	1:Check and rule out user-defined fault 2. 2:Reset
Err29	The accumulative time of electricity is reached.	1:The accumulative time reaches the set value. 2:The accumulative time does not reach the set value.	1:Reset 2:Parameter initialization

Err31	Runtime PID feedback is lost.	1: No feedback signal of system 2:The actual feedback value of PID is less than the feedback loss detection value.	1:Check the PID feedback signal source. 2:Set PID feedback loss detection value and time.
Err40	The wave limit flow failure.	1:Excessive load or motor block rotation. 2: Drive capacity is too low	1:Reduce load and check the motor. 2: Select larger capacity drive

8.2 Fault diagnosis and Countermeasures

The following failure conditions may be encountered during the use of the inverter, please refer to the method below for simple fault analysis:

Number	Symptom	Possible causes	Solution
1	No display on power	Inverter input power is not connected. The driver board has a bad contact with the 8 core line that is connected to the Control Panel. Inverter internal device damage.	Check the input power. Reseat the 8 core line. Seek for factory services.
2	Power on display Err23 alert	The motor or output line to the ground is in short-circuit. Inverter is damaged.	Use the shaking table to measure the insulation of the motor and the output line. Seek factory services.
3	Frequently reported Err14(module	The carrier frequency setting is too high.	Reduce the carrier frequency (F0.16).

Number	Symptom	Possible causes	Solution
	overheating) failure	The fan is damaged or the duct is clogged. Inverter internal device damage (thermocouple or other)	Replace the fan and clear the air duct. Seek factory services.
4	The motor does not rotate after the inverter is running.	The motor is damaged or blocked. Incorrect parameter settings (mainly F2 Group motor parameters)	Replace the motor or remove mechanical failure. Check and reset the F2 group parameters.
5	The DI terminal is invalid.	Parameter is set incorrectly. The OP and +24v short-circuit slices are loose. Control Panel failure.	Review and reset the F5 group-related parameters. Reconnect. Seek factory services.
6	When the closed loop vector control, the motor speed cannot be improved.	The code plate is damaged or connected incorrectly. Inverter internal device damage.	Replace the code plate and reconfirm the wiring. Seek service.
7	Inverter frequently reported overcurrent and overvoltage failure.	The motor parameter is set incorrectly. The acceleration & deceleration time is not suitable. Load fluctuations.	Reset the F2 Group parameter or motor tuning. Set the appropriate acceleration & deceleration time. Seek factory services.

Appendix A External electrical Component selection

A.1 Frequency Inverter external electrical connection diagram

The following table A-1 the list of various external electrical components and their function descriptions.

Accessory Name	Installation location	Function description
Air switch	Input loop front end	Downstream equipment overcurrent break power supply
Contactor	Between the air opening and the inverter input side	Inverter through the power operation. The inverter should be avoided through the contactor for frequent up and down Operation (less than two times per minute) or Direct start operation.
AC Input Reactor	Input side of inverter	Improve the input side of the power factor, effectively eliminate the input side of high harmonics, to prevent the voltage waveform distortion caused by other equipment damage; Eliminate the imbalance between the power supply and the input current imbalance caused.
EMC Input Filter	Input side of inverter	Reduce the external conduction and radiation interference of the inverter, reduce the conduction interference from the source to the inverter, and improve the anti-interference ability of the inverter.
DC reactor	DC reactor for external selection, connected between the + and P (for ~ 400kW model)	Increase the power factor of the input side and improve the efficiency and thermal stability of the inverter. It can effectively eliminate the influence of high harmonics on the inverter and reduce the external conduction and radiation interference.
AC Output reactor	Between the inverter output side and the motor. Near the inverter installation.	Inverter output side generally contains more high harmonics. When the distance between the motor and the inverter, because the line has a larger distribution capacitor. One of the harmonics may have resonance in the circuit, bringing about two effects: damage to the motor insulation performance and long time damage to the motor. Produce large leakage current, which causes inverter to protect

		frequently. General distance between the inverter and motor is more than 100m, it is recommended to install output AC reactor.

Table A-1 Inverter external electrical components table

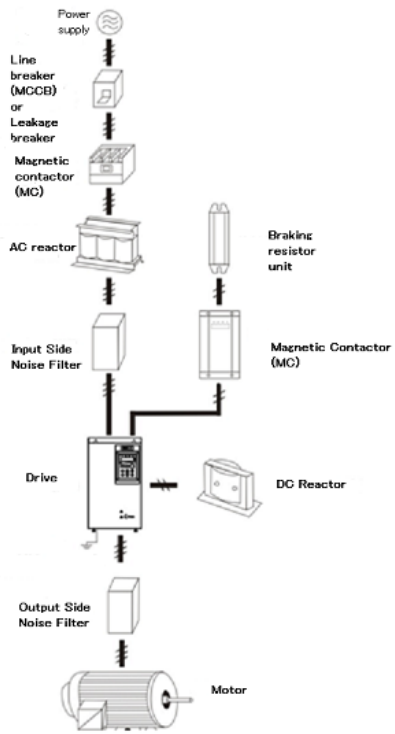

Figure A-1 Inverter external electrical Connection diagram

A.2 Brake components selection guide

Table A-2 is the guidance data and users can choose different resistance and power according to the actual situation (but the resistance must not be less than the recommended value in the table, while the power can be greater than the recommended value) The choice of braking resistance needs to be determined according to the power of the electric power in the actual application system, which is related to the system inertia, deceleration time, energy load and so on. The greater the inertia of the system, the shorter the deceleration time needed, the more frequent the braking resistance, the greater the power of the brake resistor and the smaller the resistance.

Resistance selection

When braking, the regenerative energy of the motor is consumed almost entirely on the braking resistance.

According to the formula: U*U/R=PB

U in the formula — the braking voltage of the stable when the system is stable.

(Different systems are not the same, for 380VAC system, generally take 700V)

Pb — braking power

Power selection of the braking resistor

Theoretically, the power of the braking resistance is the same as the braking power, considering that the reduction is 70%,

According to the formula: 0.7*pr=pb*d

Pr — Resistance power

D — braking frequency (the proportion of the regeneration process in the whole process)

Elevator — 20% ~ 30%

Uncoiling and coiling — 20 ~ 30%

Centrifuge — 50% ~ 60%

Accidental braking load----5%

Generally take 10%

Inverter model (by G type)	Recommended power for brake resistance	Recommended resistance for brake resistance	Braking unit
VM1000-4T011GB 注2	800W	≥43Ω	Standard built-in
VM1000-4T015GB	1000W	≥32Ω	Standard built-in
VM1000-4T18R5G	1300W	≥25Ω	Standard built-in
VM1000-4T022G	1500W	≥22Ω	Standard built-in
VM1000-4T030G	2500W	≥16Ω	External
VM1000-4T037G	4kW	≥12.6Ω	External
VM1000-4T045G	4.5kW	≥9.4Ω	External
VM1000-4T055G	5.5kW	≥9.4Ω	External
VM1000-4T075G	7.5kW	≥6.3Ω	External
VM1000-4T090G	4.5kW×2 注1	≥9.4Ω×2	External
VM1000-4T110G	5.5kW×2	≥9.4Ω×2	External
VM1000-4T132G	6.5kW×2	≥6.3Ω×2	External
VM1000-4T160G	16kW	≥6.3Ω	External
VM1000-4T200G	20kW	≥2.5Ω	External
VM1000-4T220G	22kW	≥2.5Ω	External
VM1000-4T250G	12.5kW×2	≥2.5Ω×2	External
VM1000-4T280G	14kW×2	≥2.5Ω×2	External
VM1000-4T315G	16kW×2	≥2.5Ω×2	External

VM1000-4T355G	17kW×2	≥2.5Ω×2	External
VM1000-4T400G	14kW×2	≥2.5Ω×2	External

Table A-2 Brake element configuration suggestion table

Note 1:x2 means that two brake units are in parallel use with their respective brake resistance, X3 and other numbers can be similar.

Note 2:VM1000-4T011PB Press 11kW G-machine to match .

A.3 Air switch, contactor and cable selection

Inverter model (by G type)	Open (MCCB) A	Recommended Contactor A	Recommended input side main loop wire mm2	Recommended output side main circuit wire mm2	Recommended control loop wire mm2
VM1000-4T011GB 注	63	40	4.0	4.0	1.0
VM1000-4T015GB	63	40	6	6	1.0
VM1000-4T18R5GB	100	63	6	6	1.5
VM1000-4T022GB	100	63	10	10	1.5
VM1000-4T030G	125	100	16	10	1.5
VM1000-4T037G	160	100	16	16	1.5
VM1000-4T045G	200	125	25	25	1.5
VM1000-4T055G	200	125	35	25	1.5
VM1000-4T075G	250	160	50	35	1.5
VM1000-4T090G	250	160	70	35	1.5
VM1000-4T110G	350	350	120	120	1.5
VM1000-4T132G	400	400	150	150	1.5
VM1000-4T160G	500	400	185	185	1.5
VM1000-4T200G	600	600	150×2	150×2	1.5
VM1000-4T220G	600	600	150×2	150×2	1.5
VM1000-4T250G	800	800	185×2	185×2	1.5
VM1000-4T280G	800	800	185×2	185×2	1.5
VM1000-4T315G	800	800	150×3	150×3	1.5
VM1000-4T355G	800	800	150×4	150×4	1.5
VM1000-4T400G	1000	1000	150×4	150×4	1.5

Table A-3 distribution equipment and cable selection table

Note: VM1000-4T011PB Press 11kW G-type machine to support.

Appendix B Manual Revision History

Release date (1)	Data code	Revision content	Version
2018 - 2	Vm1000-e201802-1mb	Full manual editing	V1.0

Note (1): Date of release is subject to electronic document filing and release time

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