# **Inverter CM520**

**User Manual** 

Shenzhen Coolmay Technology Co., Ltd V7.11

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## **Chapter 1 Safety Instructions**

In order to ensure the safety of your equipment and property, please read this chapter carefully before using the inverter and follow it in the future handling, installation, operation, commissioning and maintenance. Safety precautions in the manual are classified as "dangerous" and "warning".

#### 1.1 Security Definition



This symbol indicates that it will cause death, serious injury, or serious property damage if not handled as required.



This symbol indicates that if you do not follow the instructions, you may get bodily injury or equipment damage.

In some cases, it can cause to big accidents if failure to follow the instructions, even if it just violates the "warning". So in all cases, follow these important considerations.

#### 1.2 Installation Precautions

- ◆ Install the inverter on a non-combustible object such as metal to prevent fire.
- ◆ Keep flammable materials away from the inverter, otherwise there is a danger of fire.
- ◆ Do not install the inverter in a flammable or explosive environment, otherwise there is a danger of explosion.
- ◆ It is strictly forbidden to disassemble and modify the inverter privately, otherwise the consequences will be at your own risk.
- ◆ Wiring must be performed by a qualified technician to avoid the risk of

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electric shock.

- ◆ Do not open the cover or perform wiring work while the inverter is powered.
- ◆The cover must be covered before the inverter is energized, otherwise there is danger of electric shock and explosion.
- ◆For inverters that have been stored for more than 2 years, the voltage should be gradually increased by the voltage regulator before power-on, otherwise there is danger of electric shock or explosion.
- ◆ Do not touch the terminals by hand when power is on, otherwise there is danger of electric shock.
- ◆ Do not operate the inverter with wet hands, otherwise there is danger of electric shock.
- ◆ The maintenance operation can only be performed after the power is turned off for ten minutes. At this time, the indicator of the power supply is completely extinguished or the positive and negative bus voltages (P, N) are below 25V, otherwise there is danger of electric shock.
- ◆ Maintenance operations such as replacement parts must be carried out by professional technicians. It is strictly forbidden to leave metal objects such as wires or screws in the machine, otherwise there is a risk of fire.
- ◆ After the inverter is replaced with the new control board, the relevant parameters must be set correctly before its operating.
- ◆ Don't connect the output terminals U, V, W of the inverter to the AC power supply.



- ▲ Do not allow the operation panel and cover to be stressed during transportation. Otherwise, the inverter may be partially damaged due to injury or damage to property.
- ▲ Installation should be carried out where it can withstand the weight of the inverter.



- ▲ Avoid installing the inverter in a place where water droplets may splash, otherwise there is a danger of damage to property.
- ▲ External objects are not allowed to put into the inverter.
- ▲ The ground terminal of the inverter must be well grounded.
- ▲ Do not touch the radiator with your hands within 10 minutes after power-on or power-off to prevent burns.
- ▲ If the inverter is damaged or the parts are not in conformity, please do not install or operate, otherwise there is danger of injury or property damage.
- ▲ Do not install in a place exposed to direct sunlight, otherwise there is a danger of damage to property.
- ▲ Do not short connect P/P(B)/N, otherwise there is a danger of fire and damage to property.
- ▲ The main circuit terminals and wires must be firmly connected.
- ▲ It is forbidden to connect the control terminal other than TA-TB-TC to AC 220V signal, otherwise there is danger of damage to property.

#### 1.3 Precautions for use

Please pay attention to the following points when using the CM520 series inverter:

#### 1.3.1 Motor and mechanical loads

#### Compared with power frequency operation

The CM520 series inverter is a voltage type inverter, and its output voltage is PWM wave, which contains certain high-order harmonics. The temperature rise and vibration of the motor may occur during use, which is slightly increased compared with the power frequency operation.

#### Constant torque low frequency operation

When the inverter drives the ordinary motor for long-term low-speed and large-load operation, the increase of heat will deteriorate the insulation



performance of the motor and reduce the service life of the motor as the heat dissipation effect of the motor itself becomes worse. It is recommended to use the inverter motor or derating to use.

#### Electronic thermal protection value of the motor

When the adapter motor is selected, the inverter can thermally protect the motor. If the rated capacity of the motor and the inverter do not match, the protection value must be adjusted or other protective measures must be taken to ensure the safety of the motor.

#### Running above 50Hz

When the inverter's output frequency with the motor exceeds 50 Hz, consider the vibration and noise of the motor, and also ensure that the mechanical components such as the motor bearings are within the speed range used.

#### Lubrication of mechanical devices

This inverter drives gearboxes such as gearboxes and gears that require lubrication. When the long-term low-speed operation is performed, the lubrication effect may be deteriorated, which may cause damage. It is recommended to check or maintain in advance.

#### **Negative torque load**

In the case of lifting the load, there is often a negative torque, and the inverter often trips with overcurrent and overvoltage faults. At this time, the brake component with the appropriate parameters should be selected.

#### Mechanical resonance point of the load device

The inverter may encounter the mechanical resonance point of the load device within a certain output frequency range, and can be avoided by setting the jump frequency.

#### Frequent start and stop occasions

For frequent start and stop, please start and stop the inverter through external



terminals or panels. It is strictly forbidden to use the switching device such as contactor on the input side of the inverter for direct frequent start and stop operation, otherwise the equipment may be damaged.

#### Motor insulation check before connecting to the inverter

Before using the motor for the first time or after long-term use, please check the motor insulation to prevent damage to the inverter due to motor insulation failure. For the test, please use the 500V voltage type megohmmeter, and ensure that the measured insulation resistance is not less than  $5M\Omega$ .

#### 1.3.2 About the inverter

#### Capacitors and varistors with improved power factor

Since the inverter output U, V, W voltage waveform is PWM wave, if the capacitor with improved power factor or varistor for lightning protection is installed on the output side, it will cause the inverter to malfunction or damage the device. Please remove it. The schematic diagram of disabling the capacitor at the output of the inverter is shown in Figure 1-1:

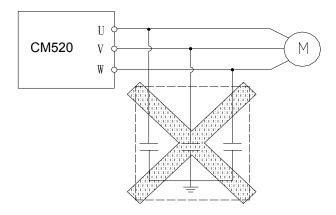


Figure 1-1 Schematic diagram of capacitors disabled at the output of the inverter

# Switching device such as contactor installed at the output of the inverter

If it is necessary to install a switching device such as a contactor between the inverter output and the motor, please ensure that the inverter performs the



on/off operation when there is no output, otherwise the inverter may be damaged.

#### Use outside of rated voltage

The inverter is not suitable for use outside the operating voltage range. If necessary, use a corresponding step-up or step-down device for voltage transformation.

#### Three-phase input to two-phase input

It is recommended not to change the two-phase to two-phase, if it is really necessary to change to two-phase input and derate it.

#### Altitude and derating

In areas where the altitude is more than 1000 meters, the heat dissipation efficiency of the inverter is reduced due to the thin air, and it needs to be derated. Figure 1-1 below shows the relationship between the rated output current of the inverter and the altitude derating.

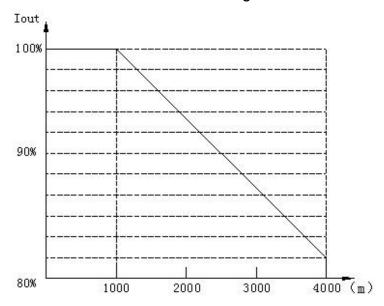


Figure 1- 1 The relationship between the rated output current of the inverter and the altitude derating

#### Inverter output reactor

When the wiring between the inverter and the motor is long, a high dV/dt will be generated inside the coil of the motor, which will damage the interlayer insulation of the motor. Please use a variable frequency motor or install an AC



output reactor on the output side.

#### 1.4 Disposal considerations

When dealing with scrapped inverters and components, please consider the notes below.

**Electrolytic Capacitor**: Electrolytic capacitors in the inverter may explode when incinerated.

**Plastic**: Plastic and rubber products on the inverter may produce toxic and harmful gases when burning. Please be careful when burning.

**Cleaning**: Please dispose of the scrapped inverter as industrial waste.

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## **Chapter II Installation and Wiring**

#### 2.1 Installation environment requirements

- 1. Install it in an indoor place with a vent or ventilator. It should be installed vertically.
- 2. The ambient temperature is -10  $^{\circ}$  C  $\sim$  40  $^{\circ}$  C. If the temperature exceeds 40  $^{\circ}$ C, forced cooling or derating should be used.
- 3. Try to avoid high temperature and humidity, humidity less than 95%, and no frost and water condensation.
- 4. Avoid installation in direct sunlight.
- 5. Avoid installation in environments with flammable, explosive and corrosive gases and liquids.
- 6. It should be installed in an environment free of dust, floating fibers and metal particles.
- 7. The mounting surface is rugged, vibration free, or vibration less than 5.9 m/s2 (0.6 g).
- 8. Keep away from sources of electromagnetic interference.

#### 2.2 Installation method

This series of frequency converters are wall-mounted inverters, which should be installed vertically to facilitate air circulation and heat dissipation. There should be enough space around the inverter. The location of the ventilation fan in the installation environment of the inverter is shown in Figure 2-1.

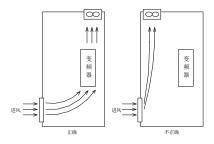
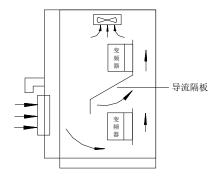


Figure 2-1 Fan position in the inverter installation environment



For the installation of multiple wall-mounted inverters, as shown in Figure 2-2 and Figure 2-3; if installing in the same vertical direction, please pay attention to the intermediate application of the baffle, as shown in Figure 2-2.



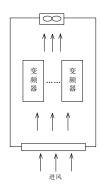


Figure 2-2

Figure 2-3

#### 2.3 Wiring of the inverter

#### 2.3.1 Main circuit terminal wiring

Firstly, the connection between the inverter and optional accessories.

- 1. Between the power grid and the inverter, an obvious disconnecting device such as an isolating switch must be added to ensure the safety of the equipment during maintenance.
- 2. There must be a circuit breaker or fuse with overcurrent protection before the inverter to avoid the scope of the fault of the rear equipment.
- 3. When the inverter is used for power supply control, it cannot be used to control the start and stop of the inverter.
- 4. When the waveform distortion of the power grid is serious, or the inverter reacts with the DC reactor, the mutual influence of the higher harmonics between the power supply and the inverter cannot meet the requirements, or the power factor of the input side of the inverter can be increased. AC input reactor.
- 5. The input side EMI filter can suppress high frequency noise interference from the inverter power line.
- 6. In order to protect the inverter and suppress higher harmonics, protect the



power supply from affecting the inverter. In the following cases, please configure the DC reactor.

- a. When there is a switch-type reactive compensation capacitor cabinet or a thyristor phase-controlled load on the same power supply node that supplies power to the inverter, the reactive voltage transient is caused by the switching of the capacitor cabinet switch, resulting in sudden change of the network voltage and phase-controlled load. The resulting harmonics and grid gaps may cause damage to the inverter input rectifier bridge circuit.
- b. When it is required to increase the power input of the inverter to 0.93 or above, when the unbalance of the three-phase power supply exceeds 3%, when the inverter is connected to the large-capacity transformer, the current flowing through the input power supply loop of the inverter May cause damage to the rectifier circuit. When the capacity of the inverter power supply is greater than 550KVA, or when the power supply capacity is greater than 10 times the inverter capacity, a DC reactor is required.

#### Secondly, the main circuit terminal block description

The wiring diagram of the main circuit terminal block is shown in Figure 2-4. The function description table of each terminal is as follows.

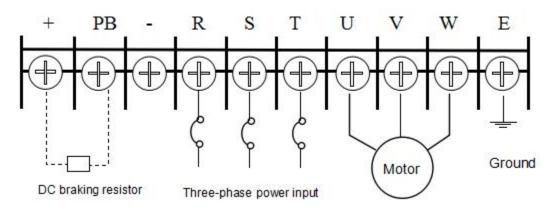


Figure 2-4 Main circuit terminal block wiring diagram

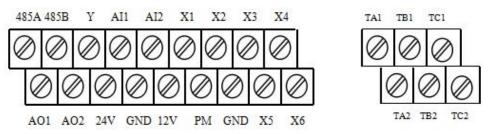


## **Terminal functions description**

Terminal symbols	Functions description
+、-	DC side voltage positive and negative terminals
PB	+, PB can be connected to DC braking resistor
R、S、T	Connect to the grid three-phase AC power supply
U、V、W	Connect to three-phase AC motor
E	Ground terminal

## 2.3.2 Control circuit wiring

## Firstly, control circuit terminal diagram



a) Standard model control board terminal



b) Mini machine control board terminal

Figure 2-5 Wiring diagram of the control circuit terminal block

## Secondly, the control circuit terminal function description

Туре	Terminal symbols	Terminal functions	Remark
	12V	12V/10mA	
Power output	GND	The common end of the frequency setting voltage signal (12V, power ground), the analog current signal input negative terminal (current inflow end)	



		24V/50mA power supply provided	
	24V	externally (GND terminal is the power ground)	
Analog input	Al1	Analog voltage signal input 1	0~10V
Input Al1	7 11	7 maiog voltage digital impat i	
analog voltage signal input 1 Al2 analog voltage / current signal input 2	AI2	Analog voltage/ current signal input 1	0~10V/0~20MA
	PM	Terminal active level selection terminal	PM is connected to the power supply, and the
	X1	Multi-functional input terminals 1	multi-function terminal
	X2	Multi-functional input terminals 2	and GND terminal are closed. PM is
Digital input	Х3	Multi-functional input terminals 3	connected to GND, and
Digital input (control	X4	Multi-functional input terminals 4	the multi-function
terminals)	X5	Multi-functional input terminals 5	terminal and power terminal are closed.
	X6	Multi-function input terminal 6, can also be used as input terminal for external pulse signal	The specific functions of the multi-function input terminal are set by parameters (F5-16~F5-21)
Analog	AO1	Programmable voltage output (F5-34~F5-36 parameter determination).	Voltage output 0∼10V
outputs	AO2	Programmable voltage, current and frequency output terminals (F5-39~F5-43 parameters are determined).	The highest output signal frequency is 50KHz and the amplitude is 10V.
OC output	Y	Programmable open collector output, set by parameter F5-27.	Maximum load current 50mA, maximum withstand voltage 24V.
Programmabl	TA-TB-TC	Programmable relay output, set by	Contact capacity:
e relay output	1	parameter F5-28 F5-29	AC250V 1A



	TA-TB-TC		Resistive load
	2		
RS485 COM	485A	RS485 COM terminals	
K3403 COM	485B	R3403 CON Terminals	

### Thirdly, jumper instructions

#### 1. Standard machine control board

SW1 dial switch: AO2 output selection

The DIP switch is at the top, and the AO2 output is 0~10V.

The DIP switch is dialed in the middle, and AO2 outputs 0~20mA.

The DIP switch is dialed at the bottom, and AO2 outputs a high-speed pulse signal.

#### **SW2 DIP switch: Al2 output selection**

The DIP switch is dialed at the top and AI2 is input 0~10V.

DIP switch is dialed below, Al2 input 0~20mA.

#### 2. Mini machine control board

CN1: Dialed on top, PM is connected to GND, multi-function terminal (X?) is valid when connected to power supply; dialed below, PM is connected to 12V, and multi-function terminal (X?) is connected to ground.



## 2.3.3 Basic operation wiring

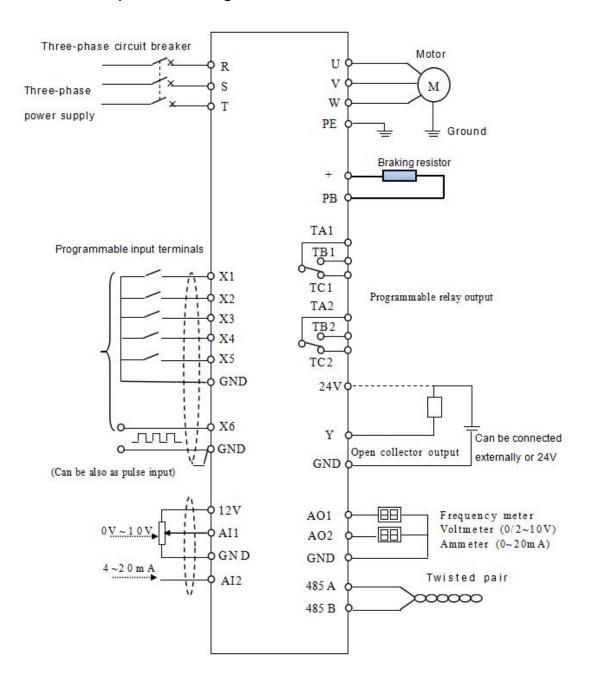


Figure 2-6 Basic operation wiring diagram



## **Chapter III Operation Instructions**

#### 3.1 Explanation

The nouns describing the control, operation and status of the frequency converter are used several times in later chapters. Please read this chapter carefully to help understand and use the features mentioned later.

#### 3.1.1 Inverter operation command channel

It refers to the physical channel that the inverter accepts operations such as running, stopping, jogging, etc. It has three types:

Operation panel: Control through the RUN, STOP and MF.K keys on the operation panel

External terminal: controlled by FWD, REV, COM, Si (three-wire control)

485 interface: start and stop control through the host computer

The command operation channel selection can be determined by F0-02. When the external terminal is selected for control, the external terminal control mode must be further determined by F5-15, including two-wire type 1, two-wire type 2 and three-line control 1, and three-wire control 2.

#### 3.1.2 Frequency converter given channel

The CM520 has several independent frequency reference channels.

- 0: Keyboard potentiometer given
- 1: The keyboard rises and the down button determines the running frequency.
- 2: AI1 (0-10V/0~20mA)
- 3: AI2 (0-10V/0~20mA)
- 4: Reserved
- 5: PID closed loop given frequency
- 6: Multi-speed control
- 7: PLC given
- 8: UP/DW terminal given
- 9: Communication Control



10: Reserved

11: Given high speed pulse

Various frequency reference channels can also be given as the last frequency after various combinations (see the description of F0-03~F0-06 for details)

#### 3.1.3 Working status of the inverter

The working status of the CM520 is divided into stop status, running status and fault status.

Stop status: After the inverter is powered on, if the inverter is not input to the inverter or the stop command is input during operation, the inverter will enter the stop command.

Operating status: After receiving the running command, the inverter enters the running state.

Fault status: The inverter is notified of fault or external fault. The inverter blocks the output (the output voltage is 0 at this time) and is in a fault state.

#### 3.2 Operation panel description

#### 3.2.1 Button function description

Button symbols	Name	Functions		
PRG	Menu	Menu entry or exit		
SET	Enter	Enter the menu step by step, set the parameter		
		confirmation		
<b>∧</b>	UP	Increment of data or function code		
₩	DW	Decrease in data or function code		
44	Shift	In the running monitoring state, press this button to cycle display the set monitoring parameters. While		
		modifying the parameters, you can select the parameter modification bits.		
RUN	RUN	In keyboard operation mode, used for running operations		



MF.K	Multifunction	Determined according to F4-31	
	key		
		In the running state, this button can be used to stop	
STOP	<u>STOP</u>	the running operation (F0-02 is determined). In the	
RESET	RESET	fault state, the fault operation can be reset.	

#### 3.2.2 Indicator instructions

Symbols	Indicator instructions
Hz	Frequency unit
Α	Current unit (Ampere)
V	Voltage unit (Volt)
FWD	Forward running indicator
DEV	Reverse running indicator
REV	FWD, REV flashes at the same time represents DC braking
A 1 N 4	Alarm indicator (overcurrent, overvoltage but alarm when the fault level
ALM	has not been reached)

#### 3.2.3 Digital display area

The 5-digit LED display can display various monitoring data such as set frequency and output frequency as well as alarm codes.

#### 3.3 Operation process

#### 3.3.1 Function parameter setting

The three levels of menu are:

- 1. Function code parameters (first level menu)
- 2. Function code label (secondary menu)
- 3. Function code set value (third level menu)

Note: During the three-level menu operation, you can press the PRG button or SET button to return to the secondary menu. The difference between the two is: press the SET button to save the setting parameters to the control panel, and then return to the secondary menu; press the PRG button to return



directly to the secondary menu, without storing parameters.

Example: Change the function code F1-01 from 0.00Hz to 5.00Hz, as shown in Figure 3-1.

#### 3.3.2 Monitoring parameter query

There are two situations for monitoring parameter query. On one hand, when the inverter is running, press " ◀◀ " to cycle display the three most commonly used parameters of the user (determined by F4-26, F4-27, F4-28). On the other hand, view the status parameters that the user cares about by checking the d parameter.

Example: Check the value of inverter d-02 (inverter output current value), as shown in Figure 3-2.

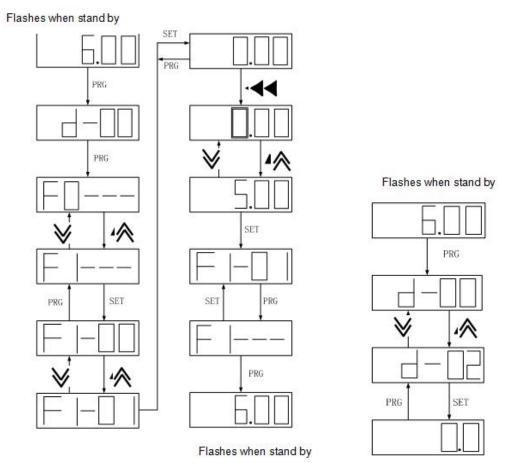


Figure 3-1 Flowchart for modifying function parameters

Figure 3-2 Flowchart for Viewing status parameters



#### 3.3.3 Fault reset

After the inverter fails, the inverter will prompt the relevant fault information. The user can reset by "STOP/RESET" on the keyboard or external terminal function (F5 group setting). After the inverter fault is reset, it is in the standby state. If the inverter is in a fault state and the user does not reset it, the inverter is in the running protection state and the inverter cannot be operated.

#### 3.4 Inverter operation

#### 3.4.1 Power-on initialization

During the power-on process of the inverter, the system first initializes, the DC bus voltage of the inverter is from low to high, and the LED display is "-SGd-". When the voltage value reaches a certain value, the inverter is in the standby state, and the LED is displayed as the set frequency. And it is always flashing.

#### 3.4.2 Inverter operation

The drive can be started via keypad control, external terminals or communication (see F0-02). The user can monitor 22 state variables (see d parameter) while the drive is running.

#### Firstly, the keyboard control ([F0-02] = 0)

Press the "RUN" button, the inverter runs in the forward direction, press "STOP/RESET" to stop the inverter. According to the F4-31 setting, "MF.K" can be used as the reverse button. If you press "MF.K", it will run in reverse.

#### Secondly, the terminal control ([F0-02] = 1)

When selecting the terminal control mode, you need to select specific terminal control mode according to the actual site needs. The CM520 inverter provides four terminal control modes, which are selected according to F5-15. FWD selects the forward rotation function for the external multi-function input terminal, which is recorded as FWD.

REV selects the invert function for the external multi-function input terminal,



which is referred to as REV.

#### 0: Two-wire control mode 1

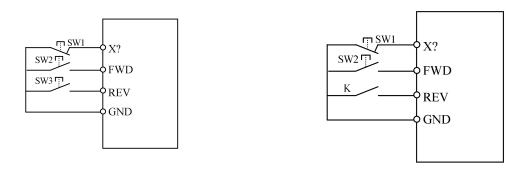
Command	Cton	Run	Forward	Reverse
Command	Stop		command	command
Terminal	FWD	FWD	REV	REV
state	GND	GND	TOND	GND

#### 1: Two-wire control mode 2

Command	Stop		Forward command	Reverse command
Terminal state	FWD REV GND	FWD REV GND	FWD	FWD REV GND

#### 2: Three-wire control mode 1

A three-wire control terminal must be selected (see parameters F5-16 to F5-21 for instructions). The wiring diagram of the three-wire control mode is shown in Figure 3-3.a.



- a) Three-wire control mode 1 wiring diagram
- b) Three-wire control mode 2 wiring diagram

Figure 3-3 Three-wire control mode wiring diagram

X? is the three-wire operation control terminal, one of the input terminals X1 to X6 is selected by parameters F5-16 to F5-21. SW1 is the inverter stop trigger switch, SW2 is the forward rotation trigger switch, and SW3 is the reverse rotation trigger switch.

#### 3: Three-wire control mode 2



X? is the three-wire operation control terminal, one of the input terminals X1 to X6 is selected by parameters F5-16 to F5-21. SW1 is the inverter stop trigger switch, SW2 is the forward rotation trigger switch, and K is the reverse switch.

Thirdly, the communication control refers to the appendix.



# **Chapter IV List of Function Parameters**

Instructions of the symbols in the table.

- ☆ The parameter can be changed during shutdown and operation.
- × ——The parameter can be changed in the stop state and cannot be changed during the running.
- \* ——The initial value of this parameter is related to the model number of the inverter.

#### 1. Basic operating parameters (F0 parameters)

Code	Name	Descriptions	Minimum unit	Factorty set	Change nit
F0-00	Model selection	0: universal 1: Type P machine	1	0	×
F0-01	Control	VFcontrol     Vectorized VF control     Non-inductive vector control 1     Non-inductive vector control 2	1	0	×
F0-02	Operation command channel selection	0: Panel control  1: External terminals  2: RS485 terminals	1	0	☆



	<u> </u>			r	,
		0:Keyboard potentiometer			
		given			
		1: The keyboard rises and the			
		down button determines the			
	The main	running frequency.			
	frequency	2: AI1 (0-10V)			
F0-03	setting	3: AI2 (0-10V/0~20mA)	4		☆
FU-03	source is	5: PID closed loop given	1	0	X
	selected as	frequency			
	А	6: Multi-speed control			
		7: PLC given			
		8: UP/DW terminal given			
		9:Communication control			
		11:High speed pulse given			
	Austiliant	0:Keyboard potentiometer			
	Auxiliary	1: AI1 ( 0- 10V )			
F0-04	frequency setting	2: AI2 (0-10V)	1	1	☆
0-04		3: F0-07	1		×
	source selection B	4: High speed pulse given			
	Selection B	5: Multi speed			
	Auxiliary				
	frequency				
E0.05	В	0: upper frequency limit	1		☆
F0-05	reference	1: Main frequency given A	1	0	A
	object				
	selection				



I <del>-</del>					
		0: Frequency A given			
	Set	1: Frequency B given			
F0-06	frequency	2: A+B	1	0	☆
0-00	combinatio	3: MAX (A, B)	'		A
	n	4: MIN (A, B)			
		5: A-B			
	Keyboard				
F0-07	up/down	0~Upper limit frequency	0.01	50.00	☆
FU-07	button	o~opper limit frequency	0.01	50.00	×
	setting				
F0-08	Upper limit	5.00~650.00 Hz	0.01	50.00	×
FU-06	frequency	3.00~030.00 HZ	0.01	50.00	^
F0-09	Lower limit	0.00Hz ~ F0-08	0.01	0.50	×
0-09	frequency	0.00112 ** 1 0-00	0.01	0.50	^
	Lower limit	0: run as Lower limit			
F0-10	frequency	frequency		0	×
0-10	RUN	1: power off	ı		^
	MODE	2: sleep standby			
	Sleep				
F0-11	wake-up	0.0~6000.0 s	0.1	0.0	×
	time				
F0-12	Acceleratio	0.1~6000.0 s	0.1	*	☆
FU-12	n time 1	0.1~6000.0 \$	0.1		X
E0 12	Decelerati	0.1~6000.0.0	0.1	*	
F0-13	on time1	0.1~6000.0 s	0.1		☆
E0 14	Carrier	1 - 10VH <del>-</del>	4	*	
F0-14	frequency	1 ~ 10KHz	1		☆



F0-15	Drive Run direction	o: run as set direction     run as opposite direction     reverse running is     prohibited	1	0	☆
F0-16	Parameter on standby	•	1	3	☆
F0-17	Factory reset	O: Does't work  11: Parameter initialization  22: Clear all fault records	1	0	×
F0-18	Parameter write- protect	No protection     Parameters can't be changed	1	0	×
F0-19	STOP key action range	O: Panel control is valid     1: all commands are valid	1	1	×

## 2. Start/Stop parameter (F1 parameter)

Code	Name	Description	Minimum unit		Change Limit
F1-00	Start mode	<ul><li>0: started by the start</li><li>frequency</li><li>1: brake first, restart</li><li>2: Speed tracking, restart</li></ul>	1	0	×
F1-01	Start frequency	0.00~10.00Hz	0.01	0.50	×
F1-02	Start frequency duration	0.0~20.0 s	0.1	0.0	×



F1-03	Start DC braking current	0~150.0%	1	50.0	×
F1-04	Start DC braking time	0.0~30.0 s	0.1	0.0	×
F1-05	Stop mode	0: Deceleration 1: Free stop	1	0	☆
F1-06	Stop DC braking start frequency	0.00~50.00Hz	0.01	3.00	×
F1-07	Stop DC braking current	0~150.0%	1	50.0	×
F1-08	Stop DC braking action time	0.0~60.0 s	0.1	0.0	×
F1-09		0: minimum current method 1: voltage frequency method	1	0	×
F1-10	Speed tracking wait time	0.0 ~ 10.0 s	0.1	1.0	×
F1-11	Speed tracking search time	$3.0\sim100.0\mathrm{s}$	0.1	6.0	×
F1-12	Speed tracking complete Current conditions	1.00~50.00%	0.01	15.00	×
F1-13	Brake brake starting voltage	105.0~140.0%	0.1	123.0	☆
F1-14	Brake brake termination voltage	105.0~150.0%	0.1	128.0	☆
F1-15		<ul><li>0: power-on running command is invalid</li><li>1: power-on running command is valid</li></ul>	1	0	×



F1-16	Stop speed	0.00~100.00%	0.01	1.00	☆
		0: Check out by speed			
F1-17	Stop speed detection	setting value	1	1	☆
	mode	1: Check out by actual		1	×
		speed (for vector control)			

## 3 .Motor Parameters (F2 Parameter)

Code	Name	Description	Minimum unit	Factory set	Change Limit
F2-00	Motor type	asynchronous motor     in magnet     synchronous motor	1	0	×
F2-01	Rated motor voltage	1~700V	1	*	×
F2-02	Rated motor frequency	5.00~600.00Hz	0.01	50.00	×
F2-03	Rated motor current	0.1~3000.0A	0.1	*	×
F2-04	Rated slip frequency	0.00~5.00Hz	0.01	*	×
F2-05	Number of pole pairs	1~50	1	2	×
F2-06	No-load current	10.0~ 80.0%	0.1	*	×
F2-07	Stator resistance	0.00~50.00%	0.01	*	×
F2-08	Rotor resistance	0.00~50.00%	0.01	*	×
F2-09	Leakage resistance	0.00~50.00%	0.01	*	×
F2-10	Motor parameter self-tuning	0: no action 1: static tuning 2: Complete tuning	1	0	×
F2-11	Permanent magnet	5.00~600.00Hz	0.01	50.00	×



	synchronous motor rated				
	frequency				
	Permanent magnet				
F2-12	synchronous motor rated	1~700V	1	*	×
	voltage				
	Permanent magnet				
F2-13	synchronous motor rated	0.1~3000.0A	0.1	*	×
	current				
	Permanent magnet				
F2-14	synchronous motor rated	1~700V	1	*	×
	back EMF				
	Permanent magnet				
F2-15	synchronous motor stator	0.00~50.00%	0.01	*	×
	resistance				
F2-16	Active damping detection	2~100	1	10	×
	time	2 100	'		
F2-17	Active damping coefficient	0~1000	1	100	×
	1	- 1000	•		
F2-18	Active damping coefficient	0~1000	1	100	×
	2		•		
F2-19	Active damping switching	0.00~100.00Hz	0.01	100.00	×
	frequency			. 55.55	
F2-20	Active damping limiter	0.00~3.00Hz	0.01	1.00	×
F2-21	Voltage compensation	0.0~60.00%	0.01	15.00	×
	coefficient	0.0 00.0070	0.01	10.00	



## 4. Vector control and VF control (F3 parameter)

Code	Name	Description	Minimum unit	Factory set	Change Limit
F3-00	Low speed ASR scale coefficient		0.01	0.60	☆
F3-01	Low speed ASR integral coefficient		0.01	1.00	☆
F3-02	ASR switching frequency 1	1.00~7.50Hz	0.01	5.00	☆
F3-03	High speed ASR scale coefficient	0.01 ~ 30.00	0.01	0.60	☆
F3-04	High speed ASR integral coefficient	0.01 ~ 10.00	0.01	1.00	☆
F3-05	ASR switching frequency 2	8.00~50.00Hz	0.01	10.00	☆
F3-06	Current loop proportional coefficient	0.01~10.00	0.01	0.20	×
F3-07	Current loop integral coefficient	1~100	1	10	×
F3-08	Slip compensation coefficient	50~200%	1	100	×
F3-09	Speed feedback filter time constant	1~100 ms	1	6	×
F3-10	Torque limit	0~200%	1	150	×
F3-11	Cross compensation coefficient	0.00 ~ 0.50	0.01	0.20	×



F3-12	Voltage closed loop proportional coefficient	0~ 1.00	0.01	0.20	×
F3-13	Voltage closed loop	0~ 1.00	0.01	0.20	×
F3-14	Magnetic domain control proportional coefficient		1	50	×
F3-15	Magnetic domain control integral coefficient		1	50	×
F3-16	Current given filter time constant	1~100 ms	1	10	×
F3-17	Whether torque control?	0: No torque control 1: In torque control	1	0	☆
F3-18	Torque given	0: Keyboard setting torque F3-19 1: Al1 2: Al2 3: Multi-stage torque 4: RS485 5: HDI	1	0	☆
F3-19	Keyboard setting torque	0.0~200.0%	0.1	50.0	☆
F3-20	Torque given direction	0: positive direction 1: reverse direction	1	0	☆



				I	
	Upper limit frequency	0: Upper limit frequency			
		1: Al1			
F3-21		2: AI2	4		.A.
F3-21	setting source	3: Multi-stage speed	1	0	☆
	selection	4: RS485			
		5: HDI			
		0: standard VF curve, V/F =			
F0 00	) // F	constant			
F3-22	V/F curve selection	1: square relationship VF curve	1	0	×
		2: Custom curve			
F3-23	Custom curve F1	0.0 ~100.0%	0.1	0.0	×
F3-24	Custom curve V1	0.0 ~100.0%	0.1	0.0	×
F3-25	Custom curve F2	0.0 ~100.0%	0.1	0.0	×
F3-26	Custom curve V2	0.0 ~100.0%	0.1	0.0	×
F3-27	Custom curve F3	0.0 ~100.0%	0.1	0.0	×
F3-28	Custom curve V3	0.0 ~100.0%	0.1	0.0	×
F3-29	Torque boost	0.0~20.0%	0.1	2.0	×
	Low frequency				
F3-30	oscillation	0~1000	1	100	×
	suppression strength				
	High frequency				
F3-31	oscillation	0~1000	1	0	×
	suppression strength				
	High and low speed				
F3-32	frequency turning	5.00∼50.00 Hz	0.01	20.00	×
	point				
	V/F control slip				
F3-33	compensation	0~200%	1	0	×
	coefficient				
F3-31	oscillation suppression strength High frequency oscillation suppression strength High and low speed frequency turning point V/F control slip compensation	0~1000 5.00∼50.00 Hz	0.01	20.00	×



# 5. Auxiliary operating parameters (F4 parameters)

Code	Name	Description	Minimum unit	Factory set	Change Limit
F4-00	Positive reversal dead time	0.0~5.0 s	0.1	0.1	☆
F4-01	Jump frequency 1	0.00 ~upper frequency	0.01	0.00	☆
F4-02	Jump frequency 1 amplitude	0.00 ~5.00Hz	0.01	0.00	☆
F4-03	Jump frequency 2	0.00 ~upper frequency	0.01	0.00	☆
F4-04	Jump frequency 2 amplitude	0.00 ~5.00Hz	0.01	0.00	☆
F4-05	Jump frequency 3	0.00 ~upper frequency	0.01	0.00	☆
F4-06	Jump frequency 3 amplitude	0.00 ~5.00Hz	0.01	0.00	☆
F4-07	Jog frequency	0.00~upper frequency	0.01	5.00	☆
F4-08	Jog acceleration time	0.1~6000.0s	0.1	10.0	☆
F4-09	Jog deceleration time	0.1~6000.0s	0.1	10.0	☆
F4-10	Acceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-11	Deceleration time 2	0.1~ 6000.0S	0.1	*	☆
F4-12	Acceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-13	Deceleration time 3	0.1~ 6000.0S	0.1	*	☆
F4-14	Acceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-15	Deceleration time 4	0.1~ 6000.0S	0.1	*	☆
F4-16	Acceleration and deceleration way	0: straight line, 1:S curve	1	0	×
F4-17	Terminal UP/DW rate	0.01~100.00Hz/s	0.01	1.00	☆
F4-18	FDT1 (frequency level) setting	0.00~upper frequency	0.01	50.00	☆



F4-19	FDT1 hysteresis detection value	0.0~100.0%	0.1	5.0	☆
F4-20	FDT2 (frequency level) setting	0.00~upper frequency	0.01	50.00	☆
F4-21	FDT2 hysteresis detection value	0.0~100.0%	0.1	5.0	☆
F4-22	Frequency arrival detection range	) 0.00~20.00Hz	0.01	1.00	☆
F4-23	PWM modulation method	Unit: Is it overmodulated?  0: no modulation  1: overmodulation  Ten digits: modulation  method  0: low frequency three-phase modulation, high frequency two-phase modulation  1: Three-phase modulation  Hundreds: low frequency processing  0: carrier frequency is greater than 3Khz, low frequency carrier is limited to  3Khz  1: Carrier frequency runs according to the setting	1	0	×
F4-24	Automatic voltage	0: no action	1	0	×



	regulation	1: action			
		2: no action only when			
		decelerating			
F4-25	Droop control	0.0~10.00Hz	0.01	0.0	×
F4-26	Operation monitoring	$0\sim$ 3939: The lower two	1	0100	☆
20	project selection	digits and the higher two		0100	^
F4-27	Operation monitoring	digits each represent a d		0002	☆
1 4-21	project selection 2	parameter, three parameters		0002	M
		can determine six monitoring			
F4-28	Operation monitoring	parameters, and cyclically	1	0201	☆
1 4-20	project selection 3	display as the shift key		0201	A
		during operation.			
F4-29	Speed display coefficient	0.1~999.9%	).1	100.0	☆
F4-301	Line speed display	0.01~99.99	).01	1.00	☆
4-301	coefficient	0.01~99.99	y.O 1	1.00	M
		0: REV			
	Multi function I toy MEK	1: Forward jog			
F4-31	Multi-function key MF.K	2: Reverse jog	1	0	×
	setting	3: Command channel			
		switching			

# 6. External input and output terminal definition (F5 parameter)

Code	Name	Description	Minimum	Factory	Change
		•	unit	set	Limit
F5-00	Al1 minimum input	0.00~10.00V	0.01	0.00	☆
F5-01	Al1 minimum input		0.1	0.0	☆
	corresponding setting				
F5-02	Al1 maximum input	0.00~10.00V	0.01	10.00	☆
F5-03	Al1 maximum input	-100.00~100.0%	0.1	100.0	☆



	corresponding setting				
F5-04	Al1 filter time constant	0.01~50.00S	0.01	0.10	$\stackrel{\wedge}{\sim}$
F5-05	Al2 minimum input	0.00~10.00V	0.01	0.00	☆
F5-06	Al2 minimum input corresponding setting	-100.00~100.0%	0.1	0.0	☆
F5-07	Al2 maximum input	0.00~10.00V	0.01	10.00	$\stackrel{\wedge}{\sim}$
F5-08	Al2 maximum input corresponding setting	-100.00~100.0%	0.1	100.0	☆
F5-09	Al2 filter time constant	0.01~50.00S	0.01	0.10	☆
F5-10	PLUSE Minimum given	0.00~50.00KHz	0.01	0.00	$\stackrel{\wedge}{\sim}$
F5-11	PLUSE Minimum given corresponding setting	-100.00~100.0%	0.1	0.0	☆
F5-12	PLUSE Maximum given	0.00~50.00KHz	0.01	50.00	☆
F5-13	PLUSE Maximum given corresponding setting	-100.00~100.0%	0.1	100.0	☆
F5-14	PULSE filter time constant	0.01~50.00S	0.01	0.10	☆
F5-15	External operation command mode selection	0: Two-wire control mode 1 1: two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	1	1	×
F5-16	X1 function selection (0~39)	0: no function 1: FWD forward command		1	×
F5-17	X2 function selection (0~39)	2: REV reverse command 3: External fault input (NO)		2	×
F5-18	X3 function selection( 0~39)	<ul><li>4: DC braking at stop</li><li>5: Emergency stop input</li></ul>		7	×



					ı	T	1
F5-19		function	selection	6: Fault reset input		8	×
		~39)		7: Multi-speed input 1		o .	
F5-20		function	selection	8: Multi-speed input 2		9	×
F3-20	(0~39)		9: Multi-speed input 3		9	^	
				10: Multi-speed input 4			
				11: Three-wire control			
				12: Terminal UP			
				13: Terminal DOWN			
				14: Terminal clear			
				15: Acceleration and deceleration			
				selection terminal 1			
				16: acceleration and deceleration			
			selection terminal 2				
				17: PLC is suspended			
		18: PLC status reset (method 1, 2)  19: Forward jog  (6 function selection	18: PLC status reset (method 1, 2)				
	X6						
F5-21		~40)	Selection	20: Reverse jog		10	×
		-40)		21: swing frequency is suspended			
				22: swing frequency reset			
				23: PID is suspended			
				24: Internal timer allows			
				25: Internal timer clear			
				26: Counter trigger input			
				27: Counter reset (reset to 0)			
				28: Frequency given A and B			
				switching			
		29: Frequency given A and A+B switching					
				30: Frequency given B and A+B			
			· · · · · · · · · · · · · · · · · · ·			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·



		switching			
		31:Acceleration and deceleration			
		speed stop			
		32: Torque control is prohibited			
		33: length counter input			
		34: Length counter clear			
		35: Command given source is			
		forced to LED keyboard			
		36: Command is given source			
		forced to terminal			
		37: Command given source is			
		forced to communication control			
		38: PID parameter selection			
		39: External fault normally			
		closed(NC) input			
		40: Pulse input (only valid for X6)			
F5-27	Y Output selection	0: no function		1	☆
		1: running status			
		2: Fault output			
		3: Frequency arrival			
		4: Detection frequency FDT1			
		arrives			
F5-28		5: Detection frequency FDT2	1	1	☆
1020	selection	arrives		•	^
		6: Running at zero speed			
		7: Lower limit frequency arrives			
		8:Upper limit frequency arrives			
		9: The counter specified value			
		arrives (greater than the specified			



		value, the output is ON)			
		10: The counter final value arrives			
		(equal to the final value, and			
		outputs an ON signal of one count			
		clock cycle)			
		11: Internal timer arrives (output			
		an ON signal in timing unit)			
		12: Run time arrives (more than			
		set time output ON)			
		13: PLC phase operation is			
		completed (output 0.5S ON signal)			
		14: PLC running cycle is			
		completed (output 0.5S ON signal)			
		15: Over-torque warning			
		16: Inverter standby			
		17: Length reached			
		18: Sleeping			
		19: Al1 input exceeds limit			
		20: Module temperature reached			
F5-29	Relay 2 output		1	1	☆
1 3-23	selection		1	'	<i>A</i>
		0: set frequency			
		1: running frequency			
		2: Output current			
F5-34	AO1 Output selection	3: Bus voltage	1	0	☆
1004		4: output voltage			
		5: Output power (100%			
		corresponds to 200% of rated			
		power)			



		6: Torque current 7: Al1			
		8: AI2			
		9: Reserved			
		10: High speed pulse input			
		11: RS485 setting			
		12: length			
		13: count value			
		14 ~ 20 Reserved			
	AO1 represents	0.0~100.0%, when the output is			
FE 25	variable 0%	0~10V, 100.0% corresponds to		0.0	
F5-35	corresponding to	10V; when the output is 0~20MA,	D.1	0.0	☆
	analog output	100.0% corresponds to 20MA			
	AO1 represents				
F5-36	variable 100%	0.0-100.09/	0.1	100.0	
F3-30	corresponding to	0.0~100.0%		100.0	☆
	analog output				
F5-39	AO2 output mode	O: Appleg 1: UDO pulse output	1	0	
II .	selection	0: Analog 1: HDO pulse output		0	☆
F5-40	HDO output frequency		0.01	50.00	☆
II .	upper limit	0.10 -30.00KHZ	0.01	30.00	M
E5_/1	AO2 output selection	Consistent with AO1 output	1	1	☆
J 3-41	AO2 output selection	selection range		1	M
	AO2 represents	$0.0\sim100.0\%$ , when the output is			
F5-42	variable 0%	0~10V, 100.0% corresponds to	D.1	0.0	☆
1 0-42	corresponding to	10V; when the output is pulse,		5.0	~
	analog output	100.0% corresponds to 50.00KHz			
	AO2 represents variable				
F5-43	100% corresponding to	0.0~100.0%	0.	100.0	☆
	analog output				



# 7. PID Parameter (F6 parameter)

Code	Name	Description	Minimu m unit	Factory	Change Limit
			III UIIII	SEL	LIIIII
		0: Keyboard potentiometer			
		1: Fb.01 given 2: F6.01			
		given			
F6-00	PID Set channel selection	3: Al1 4: Al2 5: RS485	1	0	☆
		given			
		6: PLUSE given			
		7: multi-speed given			
F6-01	PID given	0~100.0%	0.1	50.0	☆
E0.00	PID feedback channel	0: Al1 1: Al2			
F6-02	selection	2: HDI 3: RS485	1	0	☆
	Adjustment characteristics	0: Positive characteristic		0	☆
F6-03		1: Negative characteristic	1		
F6-04	Proportional gain	0.0~50.0	0.1	5.0	☆
F6-05	Integral time constant	0.1~100.0S	0.1	10.0	☆
F6-06	Differential gain	0.0~5.0	0.1	0.0	☆
E0.00		0.0 $\sim$ 100.0% Upper limit			
F6-08	Preset frequency	frequency	0.1	50.0	☆
F6-09	Preset frequency hold time	0.0 ~ 3000.0S	0.1	0.0	☆
	Feedback disconnection				
F6-10	detection threshold	0.0~100.0%	0.1	5.0	☆
II .	Feedback disconnection				
F6-11	judgment time	0.0~3000.0S, 0.0 No judgment	0.1	0.0	☆
F6-12	PID negative output limit	0~100.0%	0.1	0.0	☆
	Maximum of twice output				
F6-13	deviation	0.00~100.00%	0.01	1.00	☆



# 8. Multi-stage speed and PLC Parameter (F7 parameter)

	Name Description	-	Minimum	Factor	Change
Code		Description	unit	y set	Limit
		Units:			
		0: Single run end and shutdown			
		1: Maintain the final value after			
		single run end			
		2: Unlimited loop operation			
		Ten:			
F7.00	Programmable multi-speed	0: Running time is in seconds	4		
F7-00	operation setting	1: Running time is in minutes	1	2	×
		Hundreds: reserved			
		Thousands: restart mode selection			
		0:Each start starts from the 0th			
		paragraph			
		1: Each start starts from the interrupt	t		
		start frequency			
F7-01	Multi-speed frequency 0	0.0 ~ 100.0%	0.1	10.0	☆
F7-02	Multi-speed frequency 1	0.0 ~ 100.0%	0.1	20.0	☆
F7-03	Multi-speed frequency 2	0.0 ~ 100.0%	0.1	30.0	☆
F7-04	Multi-speed frequency 3	0.0 ~ 100.0%	0.1	40.0	☆
F7-05	Multi-speed frequency 4	0.0 ~ 100.0%	0.1	50.0	☆
F7-06	Multi-speed frequency 5	0.0 ~ 100.0%	0.1	70.0	☆
F7-07	Multi-speed frequency 6	0.0 ~ 100.0%	0.1	80.0	☆
F7-08	Multi-speed frequency 7	0.0 ~ 100.0%	0.1	100.0	☆
F7-09	Multi-speed frequency 8	0.0 ~ 100.0%	0.1	10.0	☆
F7-10	Multi-speed frequency 9	0.0 ~ 100.0%	0.1	20.0	☆
F7-11	Multi-speed frequency 10	0.0 ~ 100.0%	0.1	30.0	☆



F7-12	Multi-speed frequency 11	0.0 ~ 100.0%	0.1	40.0	☆
F7-13	Multi-speed frequency 12	0.0 ~ 100.0%	0.1	50.0	☆
F7-14	Multi-speed frequency 13	0.0 ~ 100.0%	0.1	70.0	☆
F7-15	Multi-speed frequency 14	0.0 ~ 100.0%	0.1	80.0	☆
F7-16	Multi-speed frequency 15	0.0 ~ 100.0%	0.1	100.0	☆
F7-17	Phase 0 run time	0.0~3000.0	0.1	10.0	☆
		Units: 0: Forward 1: Reverse			
		Ten:			
	Phase 0 running direction and	0: Acceleration/deceleration time 1			
F7-18	acceleration and deceleration	1: Acceleration/deceleration time 2	1	0	☆
	speed	2: Acceleration/deceleration time 3			
		3: Acceleration/deceleration time 4			
F7-19	Phase 1 run time	0.0~3000.0	0.1	10.0	☆
	Phase 1 running direction and				
F7-20	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-21	Phase 2 run time	0.0~3000.0	0.1	10.0	☆
	Phase 2 running direction and				
F7-22	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-23	Phase 3 run time	0.0~3000.0	0.1	10.0	☆
	Phase 3 running direction and				
F7-24	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-25	Phase 4 run time	0.0~3000.0	0.1	10.0	☆
	Phase 4 running direction and				
F7-26	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
	•		•		•



F7-27	Phase 5 run time	0.0~3000.0	0.1	10.0	☆
	Phase 5 running direction and				
F7-28	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-29	Phase 6 run time	0.0~3000.0	0.1	10.0	☆
	Phase 6 running direction and				
F7-30	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-31	Phase 7 run time	0.0~3000.0	0.1	10.0	☆
	Phase 7 running direction and				
F7-32	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-33	Phase 8 run time	0.0~3000.0	0.1	10.0	☆
	Phase 8 running direction and				
F7-34	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-35	Phase 9 run time	0.0~3000.0	0.1	10.0	☆
	Phase 9 running direction and				
F7-36	acceleration and deceleration	Same as phase 1	1	0	☆
	speed				
F7-37	Phase 10 run time	0.0~3000.0	0.1	10.0	☆
	Phase 10 running direction				
F7-38	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				
F7-39	Phase 11 run time	0.0~3000.0	0.1	10.0	☆
	Phase 11 running direction				
F7-40	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				
F7-41	Phase 12 run time	0.0~3000.0	0.1	10.0	☆



	Phase 12 running direction				
F7-42	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				
F7-43	Phase 13 run time	0.0~3000.0	0.1	10.0	☆
	Phase 13 running direction				
F7-44	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				
F7-45	Phase 14 run time	0.0~3000.0	0.1	10.0	☆
,	That That alle	0.0 0000.0	0.1	10.0	
	Phase 14 running direction				
F7-46	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				
F7-47	Phase 15 run time	0.0~3000.0	0.1	10.0	☆
	Phase 15 running direction				
F7-48	and acceleration and	Same as phase 1	1	0	☆
	deceleration speed				

# 9. Communication Parameter (F8 parameter)

Code	Name	Description	Minimu	Factory	Change
Couc	reamo	Becompact	m unit	set	Limit
		0: 300bps 1: 600bps			
		2: 1200bps 3: 2400bps			
F8-00	Baud rate selection	4: 4800bps 5: 9600bps	1	5	☆
		6: 19200bps 7: 38400bps			
F0.04	Data Francis	0: no parity 1: odd parity			_
F8-01	Data Format	2: even parity	1	0	☆
		0~247 0: broadcast address (no			
F8-02	Address	return data)	1	1	☆



F8-03	Local response delay	0~100ms	1	5	☆
F8-04	Timeout judgment time	0.0~100.0s; 0.0Communication Timeout,invalid	0.1	0.0	☆
F8-05	Master /slave selection	0: Slave 1: Master	1	0	☆
F8-06	RS485 set frequency proportional coefficient	0~999.9%	0.1	100.0	☆
F8-07	Whether the write operation returns data	0: Return 1: No return	1	0	☆

# 10. Advanced Parameter (F9 parameter)

Code	Name	Description	Minimum	Factory	Change Limit
F9-00	Swing frequency amplitude	0.0~100.0%	0.1	0.0	☆
F9-01	Kick frequency amplitude	0.0~50.0%	0.1	0.0	☆
F9-02	Triangle wave rise time	0.1~3600.0S	0.1	5.0	☆
F9-03	Triangle wave fall time	0.1~3600.0S	0.1	5.0	☆
F9-04	Counter specified value	0~65535	1	1000	☆
F9-05	Counter final value	0~65535	1	2000	☆
F9-06	Set length	0~65535M	1	1000	☆
F9-07	Pulse number per meter	0.1~6553.5	0.1	100.0	☆
F9-08	Internal timer timing unit	0.01~99.99S	0.01	1.00	☆
F9-09	Internal timer period	1~65535	1	10	☆
F9-10	Set running time	0~65535H	1	65535	☆
F9-10	X1 turn-on delay time	0.0~3600.0\$	0.1	0.0	☆
F9-12	X1 turn-off delay time	0.0~3600.0S	0.1	0.0	☆
F9-13	X2 turn-on delay time	0.0~3600.0\$	0.1	0.0	☆
F9-14	X2 turn-off delay time	0.0~3600.0\$	0.1	0.0	☆
F9-15	X3 turn-on delay time	0.0~3600.0\$	0.1	0.0	☆



F9-16	X3 turn-off delay time	0.0~3600.0S	0.1	0.0	☆
F9-17	Y1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-18	Relay 1 output delay time	0.0~3600.0S	0.1	0.0	☆
F9-19	Relay 2 output delay time	0.0~3600.0S	0.1	0.0	☆

# 11. Enhance control parameters (FA parameters)

Code	Name	Description	Minimu m unit	Facto ry set	Change Limit
FA-00	Whether VF separation?	0: no separation 1: semi-separation 2: full separation	1	0	×
FA-01	Voltage source selection	0: FA-02 1: Al1 2: Al2 3: Keyboard potentiometer 4: PID 5: Al1+PID	1	0	☆
FA-02	Keyboard setting voltage given	0~100.0%	0.1	0.0	☆
FA-03	Voltage acceleration and deceleration time	0.1~3600.0S	0.1	0.1	☆
FA-05	Vector 2 magnetic domain setting	80.00~100.00%	0.01	90.00	×
FA-06	UP/DW setting whether to stop and clear	0: Not clear 1:Clear	1	0	☆

# 12. Enhance PID Parameter (Fb parameter)

Code	Name			Description	Mini mum unit	Factor y set	Change Limit
Fb-00	Remote range	pressure	gauge	0.001~60.000MPA	0.001	1.600	☆



			Ι		
Fb-01	Keyboard pressure setting	0.001~20.000MPA	0.001	0.500	$\Rightarrow$
Fb-02	Modify the keyboard settings whether to store automatically	0:not store 1: automatic store	1	1	×
Fb-03	Sleep frequency	0.00~600.00Hz	0.01	0.00	☆
Fb-04	Sleep delay time	0.0~3000.0S	0.1	60.0S	☆
Fb-05	Wake pressure	0~100.0%	0.1	0.0	$\Rightarrow$
Fb-06	Wake delay time	0.0~60.0S	0.1	0.5	☆
Fb-07	Under load protection value	0.0~100.0%  0.0: No under load protection	0.1	0.0	×
Fb-08	Allowable under load time	5.0~600.0S	0.1	20.0	×
Fb-09	PID parameter selection	0~3	1	0	×
Fb-10	Proportional gain 2	0.0~50.0	0.1	5.0	☆
Fb-11	Integration time constant 2	0.1~100.0S	0.1	10.0	☆
Fb-12	Differential gain 2	0.0~5.0	0.1	0.0	☆
Fb-13	PID parameter switching deviation 1	0.0~100.0%	0.1	20.0	☆
Fb-14	PID parameter switching deviation 2	0.0~100.0%	0.1	80.0	☆
Fb-15	PID parameter switching deviation1	0.0~100.0%	0.1	20.0	☆
Fb-16	PID parameter switching deviation 2	0.0~100.0%	0.1	80.0	☆

# 13. Protection parameter (Fd parameter)

Code	Name	Description	Minimu	Factory	Change
	Trume	•	m unit	set	Limit
Fd-00	Current limit value	100.0~200.0%	0.1	*	☆
Fd-01	Current too large, frequency	1.0~200.0S	0.1	5.0	☆



	fall time				
Fd-02	Overvoltage limit value	110.0~145.0%	1	130.0	☆
Fd-03	Overvoltage suppression gain	0~10	1	2	☆
Fd-04	Unit: Input phase loss  0: no protection 1: protection  Ten digits: output phase loss  0: no protection 1: protection		1	11	☆
Fd-05	Motor overload protection	20.0~100.0%	0.1	100.0%	☆
Fd-06	Over torque warning value	20.0~200.0%	0.1	*	☆
Fd-07	Over torque detection time	0.0~60.0S	0.1	0.1	☆
Fd-08	Number of Fault automatic resets	0~5	1	0	☆
Fd-09	Fault Automatic reset interval time	0.1~600.0S	0.1	1.0	☆
Fd-10	Relay fault output during reset	0: No output 1: Output	1	0	☆
Fd-11	AI1 input voltage lower limit	0.00~10.00V	0.01	2.00	☆
Fd-12	Al1 input voltage upper limit	0.00~11.00V	0.01	8.00	☆
Fd-13	Module temperature reached	25.0~90.0℃	0.1	70.0	☆
Fd-14	First two fault	0~30	1	0	×
Fd-15	Previous fault	0~30	1	0	×
Fd-16	Current fault	0~30	1	0	×
Fd-17	Output frequency at current fault	0 ~Upper limit frequency	0.01	0.00	×
Fd-18	Output current at current fault	0 ~ 3000.0A	0.1	0.0	×



Fd-19 DC bus voltage at current 0	) ~ 800V	1	0	×
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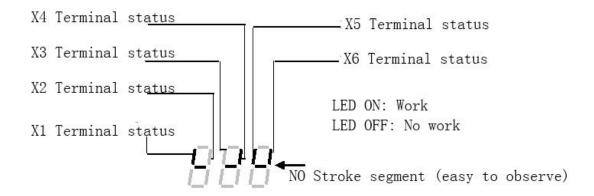
# 14. Status monitoring parameter list

Monitor Code	Content	Minimum Unit
d-00	Current output frequency of the inverter	0.01Hz
d-01	Current output voltage of the inverter	1V
d-02	Current output current of the inverter	0.1A
d-03	Current set frequency of the inverter	0.01Hz
d-04	current output frequency 2 of the inverter	0.01Hz
d-05	DC bus voltage	1V
d-06	Module temperature	0.1℃
d-07	PID setting value	0.1%
d-08	PID feedback value	0.1%
d-09	Rotating speed	rmp
d-10	Running line speed	0.01*
d-11	External pulse input	0.01KHz
d-12	RS485 setting	
d-13	Reserved	
d-14	Al1	0.1V
d-15	Al2	0.1V
d-16	DI terminal status	
d-17	DO terminal status	
d-18	Single continuous running time	1H
d-19	Running time accumulation	1H
d-20	External pulse count value	
d-21	Internal timer count value	
d-22	Actual length	m
d-23	Set pressure	MPa
d-24	Actual pressure	MPa
d-37	Inverter rated voltage	1V
d-38	Inverter rated current	0.1A
d-39	Product version number	

DI Terminal status description: The last three digits of the five digits display the digital tube input status.



DO Terminal status description: Y is the lowest bit, relay 1 output is the second, relay 2 output is the highest digit binary number, converted into decimal display.





# Chapter 5 Fault treatment and solution

CM520 all possible faults are summarized in Table 5-1.If inverter has fault, customer could process it according to the instructions in table before seeking service and record the processing and phenomena in detail. If the fault still cannot be solved, you can seek support from the manufacturer or local office.

Table 5-1

Fault Code	Fault description	Possible reason	Solution	SN
E. SC	Output short circuit fault	Output is short-circuit or is grounded     The load is too heavy	Check wiring     Ask help from manufacturers	1
E. OC1	Overcurrent in acceleration	1.The acceleration time is too short     2.The torque boost is too high or the V/F curve is not suitable	<ol> <li>Increase the acceleration time</li> <li>Reduce torque boost voltage</li> </ol>	2
E. OC2	Overcurrent in deceleration	Deceleration time is too short	Increase deceleration time	3
E.OC3	Overcurrent in operation	Load mutation	Reduce load fluctuations	4
E.OC4	Software overcurrent	Same as E.OC1, E.OC2, E.OC3	Same as E.OC1, E.OC2, E.OC3	5
E.232.	Internal downlink communication fault	Hardware problem	Ask help from manufacturers	6
E.Gnd	Ground Fault	1.Motor or inverter output is grounded     2.Inverter input and output wire contact	Check wiring     Check if the motor is aged?	7
E.OU1	Overpressure in acceleration	The input voltage is too high     Power is frequently turned     on and off	Check the power supply voltage	8
E. OU2	Overpressure in deceleration	1.Deceleration time is too short     2. Input voltage is abnormal	Increase the deceleration time     Check the power supply voltage     Install or re-select the braking	9



			resistor	
E.OU3	Overpressure in operation	1.Power supply voltage is abnormal. 2. Energy feedback load	1.Check the power supply voltage     2. Install or re-select the braking resistor	10
E. UL	Underload	<ol> <li>Inverter output line is weak connected</li> <li>Inverter load disappears</li> <li>Check wiring</li> <li>Check the inverter load</li> </ol>		14
E.OL1	Inverter overload	1.The load is too heavy 2.The acceleration time is too short 3.Torque boost is too high or V/F curve is not suitable 4.The grid voltage is too low	Reduce the load or replace it with a larger capacity inverter     Increase the acceleration time     Reduce torque boost voltage and adjust V/F curve     Check the grid voltage	15
Fault Code	Fault description	Possible reason	Solution	SN
E.OL2	Motor overload	<ol> <li>The load is too heavy</li> <li>The acceleration time is too short</li> <li>The protection coefficient setting is too small</li> <li>Torque boost is too high or V/F curve is not suitable</li> </ol>	2.Increase the acceleration time 3.Increase the motor overload	16
E.CUr	Current detection error	Current detection device or circuit is damaged     the auxiliary power supply fault	Ask help from manufacturers	17
E. LU	Under voltage in operation	<ol> <li>The power supply voltage is abnormal.</li> <li>There is a large load start in the grid</li> </ol>	Check the power supply voltage     Separate power supply	18
E.EF1	NO terminal external device fault	The external device fault input terminal of the inverter has signal input	Check signal source and related	19
E.EF2	NC terminal external device fault	The external device fault input terminal of the inverter has signal input	Check signal source and related	20
E.OH	Inverter overheating	Air duct obstruction     The Environment temperature is too high     Fan is damaged	Clean the air duct or improve ventilation     Reduce the carrier frequency     Replace the fan	21



E.SP1	Input phase loss	Input voltage phase loss     Input voltage is too low	Check the input wiring     Check if the grid is out of phase?	22
E.SP0	Output phase loss	Poor wiring or disconnection between inverter and motor	Check wiring	23
E.EEP	Memory fault	hardware malfunction	Ask help from manufacturers	24
E.End	Running time reach	Internal settings allow runtime reached	Ask help from manufacturers	25
E. PID	PID feedback fault	<ol> <li>PID feedback signal line is disconnected</li> <li>Sensor used to detect the transmission of feedback signals fault</li> <li>The feedback signal does not match the setting.</li> </ol>	Check the feedback channel     Check if the sensor is faulty     3.Verify that the feedback signal meets the set requirements	26
E.485	RS485communication n fault	Error in sending and receiving data during serial communication	Check wiring	27
E.doG	interference	Malfunction due to ambient electromagnetic interference	Add an absorbing circuit to the interference source around the inverter	28
E.232	Internal uplink communication fault	hardware malfunction	Ask help from manufacturers	29

This series of inverters records the fault code that occurred in the last 3 times and the inverter output parameters in the last fault. Querying these information will help user to find the cause of the fault.



# Appendix 1 RS485 Communication Protocol

CM520 series inverter provides RS485 communication interface, adopts international common ModBus communication protocol for master-slave control, user can realize centralized monitoring through PC/PLC (set inverter control command, running frequency, related function code modification, read operating status of the inverter to suit the specific application requirements.

### **1.Protocol Content**

The serial communication protocol defines the information content and usage format transmitted in serial communication. includes: host polling and broadcast frame, slave response frame format; host organization frame content includes: slave address (or broadcast address), execution commands, data and error check. The slaves also use the same structure, including: action confirmation, return data and error check. If an error occurs while accepting a frame from a slave, or if the action requested by the host cannot be completed, it will organize a fault frame as a response to the host.

### 2.Application method

CM520 serial inverter is with "single-master /multi-slave control" control network by RS232/RS485 bus.

### 3.Bus structure

#### (1) Method of interface

RS485 hardware interface

#### (2) transfer method

Asynchronization serial, half duplex transmission. The host and slave just send the data by only one, the other one accept the data at the same time. In the process of serial asynchronous communication, data is transmitted by each frame.

### (3) Topological structure



Single host and sever slave system. The setting range of slave address is 1~247.

0 is broadcast communication address. The net slave address is unique, which is the basis for guaranteed ModBus serial communication.

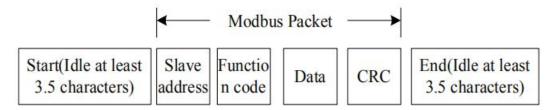
#### 4. Protocol introduction

CM520 series inverter protocol is an asynchronous serial master-slave communication protocol. Only one device (host) in the network can establish a protocol (called "query/command." Other devices (slave) can only provide data response according to data provided, or make the corresponding action according to the command/query of the host.

The host here refers to a personal computer (PC), a industrial computer, and a programmable controller (PLC).

The slave refers to a frequency converter or other control device with the same communication protocol.

The host can communicate with a single slave and broadcast information to all slaves. For a host query/command that is accessed separately, the slave returns a message (called a response); for broadcast messages sent by the host, the slave does not need to respond to the host.



#### 5. Communication frame structure

ModBus protocol communication of the CM520 series inverter data format is RTU (Remote Terminal Unit) mode. The new data frame is always silenced with a transmission time of at least 3.5 bytes as a start. On a network that calculates the transmission rate at baud rate, 3.5 bytes of transmission time can be easily grasped. The data domain that are transmitted next are: slave address, operation command code, data, and CRC check word. Each



domain transmission byte is hexadecimal data 0...9, A...F. Even during silent periods, network devices constantly monitor the activity of the communication bus. When the first domain information (address information) is received, each network device confirms the byte. As the transmission of the last byte is completed,

there is another 3.5-byte transmission time to indicate the frame end, after this,new frame transmission will start .

Once frame information must be transmitted in a continuous stream. If there is more than 1.5 bytes interval before the end of the entire frame transmission, the receiving device will clear these incomplete information and mistakenly think that the next byte is the address domain part of new frame, Similarly, if the interval between the start of a new frame and the previous frame is less than 3.5 bytes, the receiving device will think it to be the continuation of the previous frame, due to these frame confusion, the final CRC check value is incorrect, causing communication fault.

### **RTU frame standard structure**

Frame header	3.5 bytes transmission time's silence
Slave address domain ADDR	0~247(0: broadcast address)
Execute command CMD	03H: Read slave parameters
	06H: Write slave parameters
Data domain	2*N bytes data, this part is the main content
DATA(N-1)	of communication, and also the core of data
	exchange in communication
DATA(0)	
CRC CHK low bit	Check code: CRC check value
CRC CHK high bit	
End of frame	3.5 bytes transmission time's silence



# 6. Command code and communication data description

# **6.1 Command code**

Command code: 03H(0000 0011),Read N words(Word)(maximum can read 5 words constantly);

For example: If the slave address is 01H inverter, if the host(master) want to read F0-04 Parameter value, then frame structure should be described as below:

# **RTU Master command information**

Frame header	3.5 bytes transmission time's silence
Slave address domain ADDR	01H
Execute command CMD	03H
Start address high bit	F0H
Start address low bit	04H
Data numbers high bit	00H
Data numbers low bit	01H
CRC CHK low bit	F6H
CRC CHK high bit	СВН
End of frame	3.5 bytes transmission time's silence

### **RTU Slave command information**

Frame header	3.5 bytes transmission time's silence
Slave address domain ADDR	01H
Execute command CMD	03H
Number of bytes of data read	02H
F0-04 parameter value high bit	00H
F0-04 parameter value low bit	01H
CRC CHK low bit	79H
CRC CHK high bit	84H
End of frame	3.5 bytes transmission time's silence



Command code:06H (0000 0110) ,write a word to a parameter address. For example, write 20.00 to the F0-07 parameter of the inverter which slave address is 01H (actually write data 2000, corresponding to hexadecimal data is 7D0H).

# **RTU Master command information**

Frame header	3.5 bytes transmission time's silence
Slave address domain ADDR	01H
Execute command CMD	06H
Start address high bit	F0H
Start address low bit	07H
Data numbers high bit	07H
Data numbers low bit	D0H
CRC CHK low bit	08H
CRC CHK high bit	А7Н
End of frame	3.5 bytes transmission time's silence

### **RTU Slave command information**

Frame header	3.5 bytes transmission time's silence
Slave address domain ADDR	01H
Execute command CMD	06H
Start address high bit	F0H
Start address low bit	07H
Data numbers high bit	07H
Data numbers low bit	D0H
CRC CHK low bit	08H
CRC CHK high bit	A7H
End of frame	3.5 bytes transmission time's silence

There are two ways to indicate the starting address, such as: FX.YZ parameter, which can be expressed as FX YZ (high position first, low position



after), or 0X YZ. When the operation command is 06, the upper computer adopts the first address representation mode, and the written data is stored in the E2PROM. The second address representation mode is used to change only the data in the RAM, thereby reducing the number of operations of the E2PROM. The host computer may generate an exception regardless of whether it is a read command (03) or a write command (06). At this time, the inverter will return an error code.

### RTU slave returns error message

Frame header	Silence of 3.5 bytes of transmission time	
Slave address field ADDR	XX	
Abnormal prompt	86H	
Exception code high	00	
Exception code low	0X	
CRC CHK Low position	XX	
CRC CHK High position	XX	
End of frame	Silence of 3.5 bytes of transmission time	

The meaning of the exception code:

01H: Invalid command

02H: Invalid address

03H: Invalid data

04H: CRC error

05H: Parameters cannot be modified

#### 6.2 Communication frame check mode

The error check mode of the frame mainly includes two parts of the check, that is, the bit check of the byte (odd/even check) and the entire data check of the frame (CRC check).

### 6.2.1 Byte check

Users can choose different bit verification methods as needed, or they can



choose no parity. The meaning of odd parity: an odd parity bit is added before data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is odd, the check position is "0", otherwise it is set. "1" to keep the parity of the data unchanged.

The meaning of even parity: an even parity bit is added before data transmission to indicate whether the number of "1" in the transmitted data is odd or even. When it is even, the check position is "0", otherwise it is set. "1" to keep the parity of the data unchanged. For example, it is necessary to transmit "11001110", the data contains 5 "1", if even parity is used, its even parity bit is "1", if odd parity is used, its odd parity bit is "0", and the data is transmitted. When the parity bit is calculated and placed at the check digit of the frame, the receiving device also performs parity check. If the parity of the accepted data is found to be inconsistent with the preset, it is considered that the communication has an error.

# **6.2.2 CRC check method---CRC(Cyclical Redundancy Check)**

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

The CRC is first stored in 0XFFFF and then a procedure is called to process the bytes in the frame with the values in the current register. Only 8Bit data in each byte is valid for the CRC, and the start and stop bits as well as the parity bit are invalid.

During the CRC generation process, each 8-bit byte is individually different from the register contents (XOR), and the result moves to the least significant bit direction, and the most significant bit is padded with 0s. The



}

LSB is extracted and detected. If the LSB is 1, the register is individually or different from the preset value. If the LSB is 0, it is not performed. The entire process is repeated 8 times. After the last bit (bit 8) is completed, the next octet is individually different from the contents of the register. The value in the final register is the CRC value after all the bytes in the frame have been executed.

The calculation method of CRC adopts the international standard CRC check rule. When editing the CRC algorithm, the user can refer to the relevant CRC standard algorithm to write a CRC calculation program that truly meets the requirements.

Now provide a simple function of CRC calculation for user reference (programming in C language):

```
unsigned int crc_cal_value(unsigned char *data_value, unsigned char
data_length)
{
```

```
int i;
unsigned int crc_value=0xffff;
while(data_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);
```

In the ladder logic, CKSM calculates the CRC value according to the



frame content, and uses the look-up table method to calculate. This method is simple and fast, but the ROM space used by the program is large. If there is a requirement for program space, please use it cautiously.

### 6.3 Communication address definition

This part is the address definition of the communication data, which is used to control the operation of the inverter, obtain the status information of the inverter and the related function parameter settings of the inverter.

The address of the function parameter has been described above, such as: FX.YZ parameter, which can be expressed as FX YZ (high position first, low position after), or 0X YZ. When the operation command is 06, the upper computer adopts the first address representation mode, and the written data is stored in the E2PROM. The second address representation mode is used to change only the data in the RAM, thereby reducing the number of operations of the E2PROM. Address description for other features.

Function	Address	Data associated description	R/W
Description	definition	Data meaning description	characteristic
	1000H	d-00	
	1001H	d-01	
Monitoring			
parameter			R
			K
	1015H	d-21	
		0000H: Downtime	
		0001H: Forward running	
Run command	2000H	0002H: Reverse run	W
Run command	200011	0003H: Fault reset	VV
		0001H: Forward running	
	3000H	0002H: Reverse run	



Operating status		0003H: Standby	R
		0004H: In failure	
		The percentage of the upper limit	
Frequency given	4000H	frequency, the upper limit frequency	W
		corresponds to 10000	
Inverter fault	5000H	Return the fault number (see Chapter 5)	R



# **Appendix 2 Function Description**

### 1. Basic operating parameters (F0 parameters)

F0-00 Model selection Predetermined area: 0, 1

### 0: G Model, Suitable for constant torque loads

### 1: P Model, Suitable for variable torque loads (fan, pump load)

The CM520 series inverter adopts the G/P unity mode, that is, the constant torque load (G type) adapter motor is smaller than the one used for the fan and pump type load (P type).

F0-01 Control way Predetermined area: 0~3

#### 0: V/F control

Applicable to most applications, it is suitable for the case where one inverter drives one motor, and it is also suitable for the case where one inverter drives multiple motors (multiple motors have the same working condition), especially for open loops beyond the fundamental frequency. Control the occasion.

# 1: Vectorization VF control

The vectorization processing of the ordinary VF control improves the stability of the control and the low-frequency torque, and is insensitive to the motor parameters.

### 2: Non-inductive vector control 1

Using a unique vector control idea, vector control is more versatile and has good steady-state performance, but the dynamic index is worse than vector control 2 and is not sensitive to motor parameters.

#### 3: Non-inductive vector control 2

F0-02 Operation command source selection setting range: 0 ~ 2

The rotor field oriented vector control has high control dynamic and static performance and is sensitive to motor parameters.



# 0: Run command is controlled by LED keyboard

# 1: Running command is controlled by terminal

F0-03 Main frequency setting source selection A setting range:  $0 \sim 11$ 

# 2: Operation command communication control

# 0: Keyboard potentiometer given

Set the operating frequency by the potentiometer on the operation panel

# 1: The keyboard rises and the down button determines the running frequency.

By operating the up and down buttons on the keyboard, you can change the frequency value in the F0-07 parameter and set the operating frequency.

# 2: Al1 (0-10V)

Set the operating frequency from the external analog voltage input terminal AI1 (0 to 10V)

# 3: Al2 ( 0- 10V/0~20mA)

Set the operating frequency from the external analog voltage input terminal Al2 (0 to 10V/0 to 20mA)

#### 4: Keep

### 5: PID Closed loop given frequency

The operating frequency is set by the output of the PID regulator.

#### 6: Multi-speed control

The external terminals X1 to X6 can be selected as the multi-speed terminal according to F5-16 to F5-21. Select the corresponding set frequency (F7-01~F7-16) by the status of the multi-speed terminal

# 7: PLC given

When the frequency source is a simple PLC, you need to set the F7 group "multi-speed and PLC" parameters to determine the given frequency of each phase of operation. For the PLC running settings, please refer to the F7 group function code description.

### 8: UP/DW Terminal given



The running frequency is set by the external control terminal UP/DW (UP and DW control terminals are selected by parameters F5-16 to F5-21). When UP-COM is closed, the running frequency increases, and when DW-COM is closed, the running frequency decreases. When the UP and DW are simultaneously closed or disconnected from the COM terminal, the operating frequency remains unchanged. The rising and falling of the set frequency is performed by the acceleration/deceleration time set by F4-17.

### 9: Communication control

The frequency command of the host computer is received through the RS485 interface. This mode should be selected when the host computer sets the frequency or the unit is set to the slave in the linkage control.

10: Keep

# 11: High speed pulse given

The running frequency is set by the external pulse signal, and the pulse input terminal is selected by parameter F5-21. (X6)

F0-04 Auxiliary frequency setting source selection B Setting range:  $0 \sim 5$ 

0: Keyboard potentiometer given

1: Al1 (0-10V)

2: Al2 (0-10V/0~20mA)

3: F0-07

4: High speed pulse given

5: Multi-speed

F0-05 Auxiliary frequency setting source selection B Setting range:  $0 \sim 1$ 

0: Frequency cap

### 1: Main frequency given A

The set value obtained by the auxiliary frequency setting source is 0 to 100.0%, and different reference values are selected, and the actual set frequency is also different.



F0-06 Auxiliary frequency setting source selection Setting

Setting range: 0~3

### 0: A frequency given

When the frequency is given as A, the frequency can be switched between A and B through the function of terminal No. 28; the frequency can be switched between A and A+B through the function of terminal No. 29;

# 1: B frequency given

When the frequency is given as B, the frequency reference can be switched from B to A+B by function No. 30.

2: A+B 3: MAX (A, B)

4: Min (A, B) 5: A-B

F0-07 Panel digital setting frequency

Setting range: 0 .00~Upper

In the status monitoring mode, press the up, down key or key on the operation panel to directly modify this parameter.

F0-08 Upper limit frequency Setting range: 5.00~650.00Hz F0-09Lower limit frequency Setting range: 0.00~F0-08

The upper limit frequency is the upper limit of the inverter output frequency, the external analog reference, multi-speed and PLC set frequency source, the percentage is given, and the reference value is the upper limit frequency.

F0-10 Lower limit frequency operation mode Setting range: 0~2

0: When the set frequency is lower than the lower limit frequency, press the limit frequency to run

1: when the set frequency is lower than the lower limit frequency,it will out of service After the stop, if the terminal switch control or RS485 control, the start command is often, you need to confirm the stop command, you can start again; if the keyboard control or terminal pulse control, only the start trigger signal will start again. If the terminal command mode, only the terminal



command is invalid, it can be used again if it is valid.

**2: Sleep standby** When the set frequency is lower than the lower limit frequency, the output is blocked, the running command is not canceled, and the setting is started when the set frequency is greater than the lower limit frequency.

When the inverter is in the sleep state, the sleep state will be exited only when the set frequency is greater than the time set by the lower limit frequency for F0.11.

F0-12 acceleration time	setting range: 0 .00~ 6000.0S
F0-13 deceleration time	setting range: 0 .00~ 6000.0S

The acceleration time refers to the time required for the output frequency to accelerate from 0 Hz to the rated frequency value. The deceleration time refers to the time required for the output frequency to decelerate from the rated set reference frequency value to 0 Hz.

F0-14 Carrier frequency	Setting range: 1 ~ 10KHz
F0-14 Carrier frequency	Setting range: 1 ~ 10KHz

The carrier frequency primarily affects the audible noise and thermal effects in operation. When the ambient temperature is high and the motor load is heavy, the carrier frequency should be appropriately reduced to improve the thermal characteristics of the inverter.

This parameter is used to change the current output phase sequence of the inverter, thus changing the running direction of the motor.

#### 0: Consistent with the set direction



#### 1: Contrary to the setting direction

Select this mode, the actual output phase sequence of the inverter is opposite to the setting.

**2: Reverse prevention** The drive will ignore the steering command and only operate in the forward direction.

F0-17 Parameter initialization Setting range: 0~9999

Change the parameters of the inverter to the factory values.

#### 0: No action

#### 11: Restore parameters to their initial values by model

#### 22: Clear fault record

Note: Please set the model (F0-00) according to the actual situation before initialization.

This parameter is a key parameter and cannot be changed by the user.

F0-18 Parameter protection Setting Range: 0, 1

#### 0: None protection

**1: Protection** All parameters cannot be changed. However, F0-07 can be changed by the up and down keys in the monitoring state.

#### 1. Start and stop parameters (F1)

F1-00 Startup mode

- **0: Start by start frequency** After receiving the running command, the inverter will run according to the set starting frequency (F1-01). After the starting frequency duration (F1-02), press the acceleration and deceleration time to the set frequency.
- **1: Brake and start again** The inverter first applies a certain DC braking current to the load motor (ie, the electromagnetic brake is defined in parameters F1-03 and F1-04), and then starts again. It is suitable for small



inertia with forward or reverse rotation in the stop state load.

**2: Speed tracking restart** The inverter first detects the speed of the motor, and then uses the detected speed as the starting point to run to the set frequency according to the acceleration and deceleration time.

```
F1-01 Starting frequency Setting range: 0.0 ~ 10.0Hz
F1-02 Start frequency duration Setting range: 0.0 ~ 20.0S
```

Properly set the starting frequency to improve the starting torque characteristics, but if the set value is too large, an overcurrent fault sometimes occurs.

The starting frequency duration refers to the duration of running at the starting frequency. If the set frequency is lower than the starting frequency, the operating frequency is first started. After the starting frequency duration is reached, the set deceleration time is decreased to the set frequency.

F1-03Start DC braking current	Setting Range: 0 ~ 150%
F1-04 Start DC braking duration	Setting Range: 0.0 ~ 30.0S

When the start mode is set to the brake restart mode, the DC brake function is enabled.

F1-03 is the DC braking current at start-up (% of rated current), F1-04 is the duration, DC braking output DC current. The DC braking mode is started as shown in Figure 1.

Figure 1 DC braking mode start

F1-05 Stop mode	Setting Range: 0,1

- **0: Deceleration mode** After receiving the stop signal, it will decelerate to stop according to the set deceleration time.
- 1: Free stop After receiving the stop signal, the output is blocked and the motor runs freely and stops.



F1-06 Stop DC braking start frequency Setting Range: 0.00 ~ 50.00Hz

F1-07 DC braking current at stop Setting Range: 0 ~ 150% Setting range: 0.0 ~ 60.0S

These three parameters are used to define the DC braking function of the inverter during shutdown. When the inverter is in the process of stopping, when the output frequency of the inverter is lower than the DC braking start frequency, the inverter will start the DC braking function.

The DC braking action time is the duration of DC braking. When this parameter is set to 0, the DC braking function at shutdown is turned off. When DC braking, the inverter outputs DC current. The DC braking function provides zero speed torque, which is usually used to improve the stopping accuracy, but it cannot be used for deceleration braking in normal operation.

F1-10 Speed tracking wait time Setting Range: 0.0~10.0s

F1-11Speed tracking search time Setting Range: 6.0  $\sim$  1000.0S

F1-12 speed tracking completion condition Setting range: 1.00~50.00%

Since there is residual magnetism inside the motor, when the motor just stops, the speed tracking is performed immediately. At the start, the inverter may over-current. Appropriately increasing F1-10 will effectively reduce the probability of overcurrent.

According to the current to determine the motor speed search time, the shorter the setting, the faster the search, but it is easy to report the flow, generally according to the factory value.

According to the current to determine the motor speed, the motor current is less than F1-12 as the completion condition. The larger the F1-12 is, the easier it is to search for the speed, but the speed deviation is also larger, generally according to the factory value.



F1-13Brake brake starting voltage Setting Range: 105.0~140.0%

F1-14Brake brake termination voltage Setting Range: 105.0~150.0%

When the DC bus voltage reaches the starting voltage, the brake PWM signal begins to output. As the bus voltage increases, the duty cycle gradually increases from 0% to 100% when the voltage is terminated. If the brake end voltage setting is less than the starting voltage, the PWM will not be output.

F1-15Power-on terminal running command detection

Setting Range: 0, 1

#### 0: Power-on running command is invalid

After the inverter is powered on, if the running command source selection is terminal reference, even if the terminal running command is valid, the inverter will not respond, preventing the inverter from starting suddenly and causing damage. For the system to work effectively, it is necessary to invalidate the terminal and then valid. Preventing a power-on, the inverter will run immediately and cause injury to personnel or equipment.

#### 1: Power-on running command is valid

After the inverter is powered on, the terminal running command is valid and the inverter runs.

F1-16Stop speed Setting Range: 0.00~100.00%

F1-17Stop speed detection mode Setting Range: 0, 1

When there is a stop command, the inverter output frequency (speed) is lower than the F1-16 setting, and the inverter blocks the output and is in the stop state.

#### **Stop speed detection mode:**

#### 0: Check out by speed setting



#### 1: Check by actual speed (for vector control)

#### 1. Motor parameters (F2 parameters)

F2-00 Motor type Setting Range: 0, 1

0: Asynchronous motor

1: Permanent magnet synchronous motor

F2-01 Motor rated voltage F2-02 Motor rated frequency F2-03 Rated current F2-04 Rated slip frequency	Predetermined area: 1~7000V Setting Range: 15.00~120.00Hz Setting Range: 0.1~1000.0 A Setting Range: 0.00~5.00Hz
F2-04 Rated slip frequency F2-05Number of pole pairs	Setting Range: 0.00~5.00Hz Setting Range: 1~50

Set according to the nameplate of the drive motor.

F2-06 No-load current	Setting Range: 10.0~ 70.0%
F2-07Stator resistance	Setting Range: 0.00~50.00%
F2-08 Rotor resistance	Setting Range: 0.00∼50.00%
F2-09Leakage resistance	Setting Range: 0.00~50.00%
F2-10Motor parameter self-tuning	Setting Range: 0,1,2

After the motor auto tuning is completed normally, the set values of F2-06~F2-9 are automatically updated. The motor parameters are relative to the set motor nominal parameters:

F2-06 No-load current, after dividing the actual no-load current of the motor by the rated current of the motor, multiply by 100%.

F2-07 stator resistance is the value obtained by multiplying the actual stator resistance by the rated stator current, dividing by the rated voltage of the motor, and multiplying by 1.732. F2-08 is the same.

F2-09 leakage inductance, leakage inductance as a percentage of mutual inductance.

If the motor cannot be tuned in the field, it can be manually entered with reference to the known parameters of the same type of motor.

Tip: Before tuning, you must set the correct motor rating parameters



(F2-01~ F2-05)

0: No operation, that is no tuning

**1: Static tuning** It is suitable for applications where the motor and load are not easily disconnected and cannot be rotated.

2: Rotation tuning

#### 2. Vector control and VF control parametersparameters) F3 parameters

F3-00 Vector control low speed ASR scale factor

Setting Range: 0.01 ~ 30.00

F3-01Vector control low speed ASR integral coefficient

Setting Range: 0.01 ~ 10.00

F3-02 Vector control ASR switching frequency 1

Setting Range: 1.00~7.50

F3-03 Vector control high speed ASR scale factor

Setting Range: 0.01 ~ 30.00

F3-04Vector control high speed ASR integral coefficient

Setting Range: 0.01 ~ 10.0

F3-05 Vector control ASR switching frequency 2

Setting Range: 8.00~50.00

The F3-00 and F3-01 parameters are the PI adjustment parameters when the operating frequency is less than the switching frequency 1 (F3-02). The F3-03 and F3-04 parameters are the PI adjustment parameters when the operating frequency is greater than the switching frequency 2 (F3-05). The PI adjustment parameter between the switching frequency 1 and the switching frequency 2 is a linear switching between the two sets of PI parameters.

The speed dynamic response characteristic of the vector control can be adjusted by setting the proportionality factor and the integration time of the speed regulator.

Increasing the proportional and integral coefficients can speed up the dynamic response of the speed loop. If the proportional coefficient and the integral coefficient are too large or the integration time is too small, the system can oscillate.



Suggested adjustment method:

If the factory parameters can not meet the requirements, then fine-tuning based on the factory value parameters: first increase the proportional gain to ensure that the system does not oscillate; then increase the integral coefficient, so that the system has faster response characteristics, and the overshoot is smaller.

F3-06Current loop proportional coefficient

Setting Range: 0.01~10.00

F3-07Current loop integral coefficient

Setting Range: 1~100

Note: If the PI parameter is set incorrectly, it may cause the speed overshoot to be too large. An overvoltage fault occurs even when the overshoot falls back.

By adjusting the coefficient of the current loop, the dynamic response capability of the current loop can be changed, and generally no adjustment is needed.

F3-08 Vector control slip compensation coefficient Setting Range 50 ~ 200%

F3-09 Speed loop filter time constant Setting Range 1 ~ 100mS

Generally, the speed information estimated by the speed sensorless vector control algorithm fluctuates somewhat. In order to improve the stability of the system, it is necessary to increase the filtering. It is generally not necessary to adjust this parameter.

F3-10 Torque limit Setting Range 1 ~200%

The set 100% corresponds to the rated output torque of the inverter matching motor.

F3-11Cross compensation coefficient Setting Range 0 ~0.50



In vector control, there is a coupling relationship between torque and magnetic field. Especially at high speed, this parameter can be adjusted to reduce coupling and improve control performance.

F3-12 Voltage closed loop proportional coefficient Setting Range 0 ~100.00 F3-13Voltage closed loop integral coefficient Setting Range 0 ~100.00

Vector control, high speed requires weak magnetic, otherwise the speed does not go up, the control output is the rated voltage during the field weakening process, adjusting these two parameters can improve the voltage control performance.

F3-14Magnetic field control proportional coefficient

Setting Range: 0.10~10.00

F3-15Magnetic field control integral coefficient

Setting Range: 1~500

F3-16 Current given filter coefficient Setting Range 0 ~100mS

F3-17 Whether torque control Setting Range: 0, 1 F3-18 Torque given Setting Range: 0 ~ 5

F3-19 Keyboard given torque Setting Range: 0~200.0

F3-20 Torque given direction Setting Range: 0, 1

F3-21Upper limit frequency setting source selection

Setting Range: 0 ~ 5

In the vector control mode, whether F3-17 is torque control, when set to 0, the system performs speed control; when set to 1, the system performs torque control.

F3-18 Torque given:

0: Keyboard setting torque

1: AI1

2: AI2

3: Multi-stage torque



- 4: RS485
- 5: High speed pulse

F3-20 Torque given direction: 0: Forward 1: Reverse

F3-21 Torque control upper limit frequency setting source:

0: Upper limit frequency set by the keyboard

- 1: AI1
- 2: AI2
- 3: Set the upper limit frequency in multiple segments.
- 4: RS485 Setting.
- 5: High-speed pulse

**0: Constant torque curve** The output voltage of the frequency converter is proportional to the output frequency, which is the case for most loads.

#### 1: Decreasing torque curve

The output voltage of the inverter and the output frequency are in a quadratic curve relationship, which is suitable for constant power loads such as fans and pumps.

#### 2. Custom curve

The relationship between the output voltage of the inverter and the output frequency is determined by the parameters of F3-23 to F3-28.

F3-23 Custom curve F1	Setting Range: 0.00 ~ 100.0%
F3-2 Custom curveV1	Setting Range: 0.00 ~ 100.0%
F3-25 Custom curve F2	Setting Range: 0.00 ~ 100.0%
F3-26 Custom curve V2	Setting Range: 0.00 ~ 100.0%
F3-27 Custom curve F3	Setting Range: 0.00 ~ 100.0%
F3-28 Custom curve V3	Setting Range: 0.00 ~ 100.0%

The inverter automatically sorts F1, F2, F3 and V1, V2, V3 from small to large, so that the minimum frequency Fmin corresponds to the minimum voltage Vmin, the intermediate frequency Fmid corresponds to the intermediate voltage Vmid, and the maximum frequency Fmax corresponds



to the maximum voltage Vmax. The V/F curve consists of five points: (0,0), (Fmin, Vmin), (Fmid, Vmid), (Fmax, Vmax), (rated frequency, rated voltage).

F3-29 V/F Torque boost Setting Range: 0.0~20.0%

Used to improve the low frequency torque characteristics of the frequency converter. When operating in the low frequency range, the output voltage of the inverter is boosted. This parameter has no effect when selecting a custom curve.

F3-30Low frequency oscillation suppression strength

Setting Range: 0 ~ 1000

F3-31High frequency oscillation suppression strength

Setting Range: 0 ~ 1000

F3-32 High and low frequency turning point

Setting Range: 5.00 ~ 50.00Hz

When the inverter drives the motor to no load or light load, the output current of the inverter sometimes oscillates, which may sometimes too large or too small, which may cause overcurrent and overvoltage faults of the inverter. Increasing the value of F3-30 and F3-31 can increase the suppression intensity of current oscillation, but has a slight influence on the accuracy of the output frequency. Generally, the two parameters should be as small as possible under the premise of satisfying the operation. Its factory value can generally meet user requirements.

F3-33 V/F Control slip compensation coefficient Setting Range: 0~200%

#### 3. Auxiliary operating parameters (F4 parameter)

F4-00 Positive reversal dead time Setting Range: 0.0 ~ 5.0S

The hold time at zero frequency output when the inverter changes the direction of operation. The positive and negative dead time is mainly set for a



large inertia load and a device that changes the mechanical dead zone when turning.

F4-01Jump frequency1 Setting Range: 0.00Hz ~

F4-02 Jump frequency1 Amplitude Setting Range: 0.00 ~ 5.00 Hz

F4-03 Jump frequency2

Setting Range: 0.00Hz ~Upper limit frequency

F4-04 Jump frequency2 Amplitude Setting Range: 0.00 ~ 5.00 Hz

F4-05 Jump frequency3

Setting Range: 0.00Hz ~Upper limit frequency

F4-06 Jump frequency3 Amplitude Setting Range: 0.00 ~ 5.00 Hz

When the load of the inverter is mechanically resonated at a certain frequency point, the resonance frequency can be avoided by the jump frequency.

There are 3 skip frequency points to choose from. If the skip frequency range is set to 0, the skip frequency is invalid.

F4-07 Jog frequency Setting Range: 0.00 ~Upper limit frequency
F4-08 Jog acceleration time Setting Range: 0.1 ~ 6000.0S
F4-09 Jog acceleration time Setting Range: 0.1 ~ 6000.0S

When jog command input, the inverter will run to the jog frequency according to the set jog acceleration and deceleration time.

F4-10 acceleration time2 Setting Range:  $0.1 \sim 6000.0S$  F4-11 deceleration time2 Setting Range:  $0.1 \sim 6000.0S$  Setting Ran

The 2nd, 3rd, and 4th acceleration and deceleration time setting values. The actual acceleration and deceleration time of the inverter running is selected by external terminal or simple PLC function parameters.

Acceleration/deceleration mode 0: Straight line Straight line acceleration



and deceleration are used for most loads; 1: S curve. The S-curve addition and deceleration are mainly provided for the load that needs to slow down noise and vibration and reduce the start-stop impact during acceleration and deceleration. as shown in picture 2.

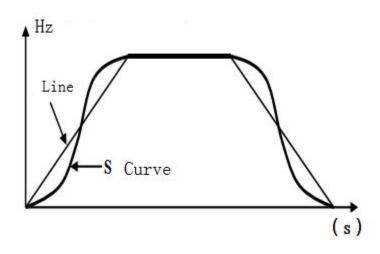


Figure 2 Acceleration and deceleration curves of the inverter

F4-17 UP/DWTerminal acceleration and deceleration rate Setting Range: 0.01~100.00Hz/S

F4-18 FDT1 (Frequency level) Set

Setting Range: 0.00 ~ Upper limit frequency

F4-19 FDT1 Detection frequency lag detection value

Setting Range: 0.0~100.0%

F4-20 FDT2 (Frequency level) Setting Setting Range: 0.00 ~Upper limit frequency

F4-21 FDT2Detection frequency lag detection value

Setting Range: 0.0~100.0%

These four parameters are used to set the two frequency detection levels. When the output frequency is higher than the FDT set value F4-18 (or F4-20), the selected output terminal (Y1, Y2 terminal or relay) outputs a valid signal. When the output frequency is lower than a certain value F4-18 - F4-18  $\times$  F4-19 (or F4-20 - F4-20  $\times$  F4-21), the selected output terminal (Y terminal or relay) outputs an invalid signal .



F4-22 Frequency arrival detection range Setting Range: 0.00 ~ 20.00Hz

This parameter is a supplementary definition of the frequency arrival signal function. When the output frequency of the inverter is within the positive and negative detection range of the set frequency, the selected output terminal (Y terminal or relay) outputs a valid signal.

F4-23 PWM Modulation Setting Range: 000 ~ 111

Single digit: Whether overmodulation

0: None Modulation

1: Modulation

Decimal: Modulation way

0: Low frequency three-phase modulation, high frequency two-phase modulation

1: Three-phase modulation

Hundred: Low frequency processing

0: Carrier frequency is greater than 3Khz, low frequency carrier is limited to 3Khz

1: Carrier frequency runs as set

F4-24Automatic voltage regulation (AVR) Setting Range: 0, 1, 2

0: None Action

1: Action

The function of the automatic voltage regulation function is to ensure that the output voltage of the inverter does not fluctuate with the fluctuation of the input voltage. When the fluctuation range of the grid voltage is large, and the motor has a relatively stable stator voltage and current, the function should be turned on.

2: Does not act only when decelerating



When decelerating to stop, select AVR does not work, the deceleration time is short, but the running current is relatively large; select AVR always action, the motor decelerates smoothly, the running current is relatively small, but the deceleration time will become longer.

F4-25 Droop control Setting Range: 0.0~10.00Hz

This function is applicable to the occasion where multiple inverters drive the same load. By setting this function, multiple inverters can achieve even power distribution when driving the same load. When the load of a certain inverter is heavy, the inverter will According to the parameters set by this function, the output frequency is automatically reduced appropriately to remove part of the load. This value can be gradually adjusted from small to large during debugging.

F4-26 Operation monitoring project selection1

Setting Range: 0 ~3939

F4-27 Operation monitoring project selection2

Setting Range: 0 ~ 3939

F4-28 Operation monitoring project selection3

Setting Range: 0 ~ 3939

The upper two bits and the lower two bits of each parameter respectively represent one d parameter, and three parameters can set a total of six d parameters. During the running of the inverter, press "Shift Key" in the monitoring state, the keyboard will display the six status parameter values set by F4-26, F4-27 and F4-28 in sequence.

F4-29Speed display factor Setting Range: 0.1~999.9%

When F4-29 is set to 100.0%, the output frequency of d-09 corresponds to the synchronous speed. Users can set different values according to the gear ratio to meet the user's display needs.



F4-30 Line speed display display factor Setting

Setting Range: 0.01~99.99

Based on the displayed value of d-09, multiply by F4-30 to meet the different display needs of the user.

F4-31Multi-function key MF.K function selection

Setting Range: 0, 1, 2, 3

0: Reverse

1: Forward turn

2: Reverse jog

3: Command channel switching

The current command mode is the keyboard mode. This button is invalid. For other modes, press this button to switch to the keyboard mode.

#### 4. External input and output terminal definition (F5 parameter)

F5-00 Al1 Minimum input

Predetermined area: 0.00~10.00V

F5-01 All Minimum input corresponding setting

Predetermined area: -100.0~100.0%

F5-02 Al1 Maximum input

Predetermined area: 0.00~10.00V

F5-03 Al1 Maximum input corresponding setting

Predetermined area: -100.0~100.0%

F5-04 Al1 filter time constant Setting range: 0.01~50.00S

By (F5-00, F5-01), (F5-02, F5-03) two points can be determined, input a straight line, get the analog input corresponding to the set frequency (when Al1 is given as PID or feedback, A percentage representing a certain actual variable can be obtained). When the set frequency is negative, the inverter output is inverted. In order to reduce the influence of the fluctuation of the



analog quantity on the control of the frequency converter, the analog quantity of the sampling is usually filtered, and is realized by setting F5-04.

F5-05 Al2 Minimum input

Predetermined area: 0.00~10.00V

F5-06 Al2 Al1 Minimum input corresponding setting

Predetermined area: -100.0~100.0%

F5-07 Al2 Maximum input

Predetermined area: 0.00~10.00V

F5-08 Al2 Maximum input corresponding setting

Predetermined area: -100.0~100.0%

F5-09 Al2 filter time constant Setting range: 0.01~50.00S

Through (F5-05, F5-06), (F5-07, F5-08) two points can be determined, input a straight line, get the analog input corresponding to the set frequency (when Al2 is given as PID or feedback, A percentage representing a certain actual variable can be obtained). When the set frequency is negative, the inverter output is inverted. In order to reduce the influence of the fluctuation of the analog quantity on the control of the inverter, the analog quantity of the sampling is usually filtered, and it is realized by setting F5-09.

Al1, Al2 support  $0\sim20\text{MA}$  in hardware circuit,  $0\sim20\text{MA}$  corresponds to  $0\sim10\text{V}$ .

F5-10 PLUSEMinimum input Predetermined area: 0.00~50.00KHz

F5-11 PLUSEMinimum input corresponding setting

Predetermined area: -100.0~100.0%

F5-12 PLUSEMaximum input Predetermined area: 0.00~50.00KHz

F5-13 PLUSEMaximum input corresponding setting

Predetermined area: -100.0~100.0%

F5-14 PLUSE filter time constant Setting range: 0.01~50.00S

By (F5-10, F5-11), (F5-12, F5-13) two points can be determined, input a straight line, get the high-speed pulse input corresponding to the set frequency (when the high-speed pulse input is given as PID or feedback At that time, a percentage representing an actual variable is obtained. When the



set frequency is negative, the inverter output is inverted. In order to reduce the influence of the detected high-speed pulse frequency fluctuation on the inverter control, it is usually filtered and implemented by setting F5-14.

F5-15 External operation command control method Predetermined area: 0, 1, 2, 3

# This parameter is used to set the external terminal command control mode:

FWD selects the forward rotation function for the external terminal, and this terminal is called FWD.

REV selects the reverse function for the external terminal, which is referred to as REV.

#### 0: Two-wire control mode 1

Instruction	Downtime	Run	Forward instruction	Reverse instruction	
Terminal status	FWD	FWD	REV	REV	

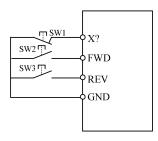
#### 1: Two-wire control mode 2

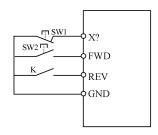
Instruction	Stop instruction	Forward instruction	Reverse instruction	
Terminal status	FWD REV GND	FWD REV GND	FWD REV GND	

#### 2: Three-wire control mode 1

A three-wire control terminal must be selected (see parameters F5-16 to F5-21 for instructions). The wiring diagram of the three-wire control mode is shown in Figure 3. X? For the three-wire operation control terminal, one of the input terminals X1 to X6 is selected by parameters F5-16 to F5-21. SW1 is the inverter stop trigger switch, SW2 is the forward rotation trigger switch, and SW3 is the reverse rotation trigger switch.







- a) Three-wire control mode 1 wiring diagram
- b) Three-wire control mode 2 wiring diagram

Image 3 Three-wire control mode wiring diagram

#### 3:Three-wire control mode 2

X? is the three-wire operation control terminal, one of the input terminals X1 to X6 is selected by parameters F5-16 to F5-21. SW1 is the inverter stop trigger switch, SW2 is the forward dictate trigger switch, and K is the reverse switch.

If X1 is selected, the wiring is as shown in Figure 4:

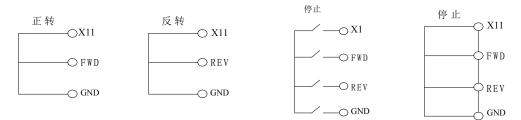


Figure 4 Description of the three-wire control command

F5-16 X1 Function selection	Predetermined area:	0~40
F5-17 X2 Function selection	Predetermined area:	0~40
F5-18 X3 Function selection	Predetermined area:	0~40
F5-19 X4 Function selection	Predetermined area:	0~40
F5-20 X5 Function selection	Predetermined area:	0~40

- 0: No functions
- 1: FWD Forward dictate
- 2: REV Reverse
- 3: External fault input (normally open)
- 4: DC brake at stop



- 5: Emergency stop input
- 6: Fault reset input
- 7: Multi-speed input 1
- 8: Multi-speed input 2
- 9: Multi-speed input 3
- 10: Multi-speed input 4
- 11: Three-wire control
- 12: Terminal UP
- 13: Terminal DOWN
- 14: Terminal clear
- 15: Acceleration/deceleration selector 1
- 16: Acceleration/deceleration selector 2
- 17: PLC Pause (stop at current frequency) in operation
- 18: PLC State reset (method 1, 2)
- 19: Forward jog
- 20: Reverse jog
- 21: Swing frequency pause (stop at current frequency) in operation
- 22: Swing frequency reset(reset to center frequency) in operation
- 23: PID Pause (stop at current frequency) in operation
- 24: Internal timer allows
- 25: Internal timer clear
- 26: Counter trigger input
- 27: Counter reset (reset to 0)
- 28: Frequency given A and B switching
- 29: Frequency given A and A+B switching
- 30: Frequency given B and A+B switching

When the frequency is given as A, the function of No. 28 can be used to switch A to function B and No.29 switch to A+B. When the frequency is given as B, it can be switched to A+B through the function of No. 30.



#### 31: Acceleration and deceleration stop

The running frequency of the inverter is not affected by the external frequency given signal, except for the stop command.

#### 32: Torque control prohibited

When torque control is selected, this function is active and switches to speed control.

- 33: Length counter input
- 34: Length counter clear
- 35: Command given source forced to LED keyboard
- 36: Command given source forced to terminal

#### 37: Command given source forced to communication control

If the functions of 35 to 37 are valid, the large function is preferred, and the function of the 35 is valid.

38: PID control parameter selection, when Fb-09=1, when there is a terminal to select this function, and the terminal is valid, the PID proportional, integral, and differential parameters select the second group; otherwise, the first group is selected.

#### 39: External fault normally closed input

The internal sampling of the faultless main control board is valid, and the fault is invalid.

#### 40: Pulse input (high speed, only valid for X6)

F5-27	Y Output setting	Predetermind area: 0 ~ 20
F5-28	TA-TB-TC1 Output setting	Predetermind area: 0 ~20
F5-29	TA -TB -TC2 Output setting	Predetermind are: 0 ~20

- 0: No function
- 1: Running status
- 2: Fault output
- 3: Frequency arrival
- 4: Detection frequency FDT1 arrives



- 5: Detection frequency FDT2 arrives
- 6: Zero speed operation
- 7: Lower limit frequency arrival
- 8: Upper limit frequency arrival
- 9: The specified value of the counter arrives (greater than the specified value, the output is ON)
- 10: The final value of the counter arrives (equal to the final value and outputs an ON signal for one count clock cycle)
- 11: Internal timer arrives (outputs a timing unit ON signal)
- 12: Running time reached (greater than set time outputs ON)
- 13: PLC phase operation completed (output 0.5S ON signal)
- 14: PLC running cycle is completed (output 0.5S ON signal)
- 15: Over torque warning
- 16: Inverter standby
- 17: Length reached
- 18: Sleeping
- 19: Al1 Overrun
- 20: Module temperature reached

F5-34 Analog output AO1 stands for variable setting

Predetermined area: 0 ~ 20

F5-35 AO1 Corresponding variable 0% Corresponding analog output

Predetermined area: 0 ~ 100.0%

F5-36 AO1 Corresponding variable 100% Corresponding analog output

Predetermined area: 0 ~ 100.0%

#### Analog AO1 represents variable selection:

- 0: Set frequency (100% corresponds to the upper limit frequency)
- 1: Ruuning frequency (100% corresponds to the upper limit frequency)
- 2: Output current (100% corresponds to 200% of rated current)
- 3: Bus voltage (100% corresponds to 150% of rated bus voltage)
- 4: Output voltage (100% corresponds to 100% of rated voltage)
- 5: Output power (100% corresponds to 200% of rated power)



- 6: Torque current (100% corresponds to 200% of rated current)
- 7: Al1
- 8: Al2
- 9: Extended AI3
- 10: High speed pulse input
- 11: RS485 setting
- 12: Length (100% corresponds to the length set by F9.06)
- 13: Count value (100% corresponds to the final count value set by F9.05)
- 14 ~ 20 Reserved

User terminal AO1, select  $0\sim10V$  jumper, F5-35, F5-36 100.0%, corresponding to 10.00V, select  $0\sim20\text{mA}$  jumper, F5-35, F5-36 100.0%, corresponding to 20mA.

F5-39 AO2 Output mode selection Predetermined area: 0, 1

F5-40 High speed pulse output upper limit Predetermined area: 0.10 ~ 50.00KHz

F5-41 AO2 Representative variable setting Predetermined area: 0 ~ 20

F5-42 AO2 corresponding variable 0% corresponds to analog output

Predetermined area: 0 ~ 100.0%

F5-43 AO2 corresponding variable 100% corresponds to analog output AO2

Predetermined area: 0 ~ 100.0%

#### AO2 output mode selection:

0: Analog output, 100.0% in F5-42 and F5-43, corresponding to 10.00V.

1: High-speed pulse output, the maximum frequency of output is determined by F5-40, 100.0% of F5-42 and F5-43, corresponding to F5-40.

#### 5. PID Parameter (F6 parameter)

F6-00 PIDSet channel selection Predetermined area: 0~7

This parameter is used to select the input channel of the PID instruction:

- 0: Keyboard potentiometer given
- 1: Reserved
- 2: F6.01 Given



- 3: AI1
- 4: Al2
- 5: RS485 Given
- 6: High speed pulse given
- 7: Multi-speed speed given

In the PID control mode, the set value 100.0 corresponds to the set maximum value (corresponding to the maximum feedback amount).

F6-02 PIDFeedback channel selection Predetermined area: 0 ~ 3

This parameter is used to select the PID feedback channel:

- 0: Al1 1: Al2
- 2: High speed pulse given 3: RS485

F6-03Adjustment characteristics Predetermined area: 0, 1

- **0: Positive characteristics.** Indicates that the given value is greater than the feedback and the PID output increases.
- **1: Negative characteristics.** Indicates that the given output is less than feedback and the PID output increases.

F6-04 Proportional gain Predetermined area:  $0.00 \sim 5.00$ F6-05 Integration time constant Predetermined area:  $0.1 \sim 100.0$ S F6-06 Differential gain Predetermined area:  $0.0 \sim 5.0$ 

The parameters of the built-in PID controller should be adjusted according to actual needs and system characteristics.

F6-08 Preset frequency Predetermined area:  $0 \sim 100.0\%$ F6-09 Preset frequency hold time Predetermined area:  $0 \sim 3000.0\%$ 

The inverter selects the PID output as the frequency timing. In order to achieve the user's desired PID control effect relatively quickly, it is sometimes necessary to run for a certain period of time according to a preset frequency



before the PID is started, and then transfer to the PID control. This pre-set frequency is determined by F6-08 and the duration is determined by F6-09.

F6-10 PID Feedback disconnection detection threshold

Predetermined area: 0.0 ~ 20%

F6-11 PIDWire break detection delay time

Predetermined area: 0.0 ~ 100.0S

When F6-10 is set to 0, the PID feedback disconnection detection does not work. When the setting is greater than 0, when the feedback signal is less than F6-10 and continues to exceed F6-11, the system reports that the PID disconnection is faulty.

F6-10 PIDNegative output limit Predetermined area: 0.0 ~100.0%

F6-11Maximum output deviation twice Predetermined area:0.00 ~ 100.00%

The maximum value of the PID output is 100%, which corresponds to the upper limit frequency. In some occasions, it is hoped that the PID output can control the motor to reverse direction and set F6-10 to a non-zero value. The inverter can automatically adjust the forward and reverse speed according to the given and feedback signal deviation.

In order to reduce the impact of rapid changes in PID output on the load system, the F6-11 can be adjusted to achieve perfect uniformity of speed and stability.

#### 6. Multi-speed and PLC parameters (F7 parameters)

F7-00PLC Operation mode and parameter selectio Predetermined area: 0~1112

This parameter determines the PLC operation mode, which is realized by configuring different units, tens, hundreds, and thousands.

Units:

0: Single run end shutdown



- 1: Keep the final value after a single run
- 2: Unlimited loops

After a running cycle, restart from the first speed running with the running time not 0, in order.

#### Tens:

- 0: Running time in seconds
- 1: Running time in minutes

Hundreds: reserved

Thousands: restart mode selection

0: Every start starts from the 0th paragraph

F7-01 Multi-speed frequency 0	Predetermined area: 0.00~100.0%
F7-02 Multi-speed frequency1	Predetermined area :0.00~100.0%
F7-03 Multi-speed frequency 2	Predetermined area:0.00~100.0%
F7-04 Multi-speed frequency 3	Predetermined area:0.00~100.0%
F7-05 Multi-speed frequency 4	Predetermined area:0.00~100.0%
F7-06 Multi-speed frequency 5	Predetermined area:0.00~100.0%
F7-07 Multi-speed frequency 6	Predetermined area:0.00~100.0%
F7-08 Multi-speed frequency 7	Predetermined area:0.00~100.0%
F7-09 Multi-speed frequency 8	Predetermined area:0.00~100.0%
F7-10 Multi-speed frequency 9	Predetermined area:0.00~100.0%
F7-11 Multi-speed frequency 10	Predetermined area:0.00~100.0%
F7-12 Multi-speed frequency 11	Predetermined area:0.00~100.0%
F7-13 Multi-speed frequency 12	Predetermined area:0.00~100.0%
F7-14 Multi-speed frequency 13	Predetermined area:0.00~100.0%
F7-15 Multi-speed frequency 14	Predetermined area:0.00~100.0%
F7-16 Multi-speed frequency 15	Predetermined area:0.00~100.0%

#### 1: Start every run from the interrupt frequency

These parameters are used to set the output frequency when the terminal controls multi-speed operation or programmable multi-speed (simple PLC) operation. The following table shows the multi-speed frequency corresponding to the multi-speed terminal combination. Among them, the corresponding 1 of the multi-speed control terminal is valid, and the corresponding 0 means invalid.



Contr ol termin al 1	Contr ol termin al 2	Contr ol termin al 3	Contr ol termin al 4	Corre spond ing to multi- speed	Contr ol termin al 1	Contr ol termin al 2	Contr ol termin al 3	Contr ol termin al 4	Corre spond ing to multi- speed
0	0	0	0	0	0	0	0	1	8
1	0	0	0	1	1	0	0	1	9
0	1	0	0	2	0	1	0	1	10
1	1	0	0	3	1	1	0	1	11
0	0	1	0	4	0	0	1	1	12
1	0	1	0	5	1	0	1	1	13
0	1	1	0	6	0	1	1	1	14
1	1	1	0	7	1	1	1	1	15

The multi-speed control terminal is selected by parameters F5-16~F5-21.

The PLC running time, running direction and running time are set by parameters F7-17~F7-48.



F7-17 Phase 0 running time Predetermined area: 0.0 ~ 3000.0 F7-18 Stage 0 running direction and acceleration/deceleration Predetermined area: 0~31 F7-19 Phase 1 running time Predetermined area: 0.0 ~ 3000.0 F7-10 Stage 1 running direction and acceleration/deceleration Predetermined area: 0~31 F7-21 Phase 2 running time Predetermined area : 0.0 ~ 3000.0 F7-22 Stage 2 running direction and acceleration/deceleration Predetermined area: 0~31 Predetermined area : 0.0 ~ 3000.0 F7-23 Phase 3 running time F7-24 Stage 3 running direction and acceleration/deceleration Predetermined area: 0~31 Predetermined area: 0.0 ~ 3000.0 F7-25 Phase 4 running time F7-26 Stage 4 running direction and acceleration/deceleration Predetermined area: 0~31 F7-27 Phase 5 running time Predetermined area : 0.0 ~ 3000.0 F7-28 Stage 5 running direction and acceleration/deceleration Predetermined area: 0~31 F7-29 Phase 6 running time Predetermined area: 0.0 ~ 3000.0 F7-30 Stage 6 running direction and acceleration/deceleration Predetermined area: 0~31 F7-31 Phase 7 running time Predetermined area: 0.0 ~ 3000.0 F7-32 Stage 7 running direction and acceleration/deceleration Predetermined area: 0~31 F7-33 Phase 8 running time Predetermined area : 0.0 ~ 3000.0 F7-34 Stage 8 running direction and acceleration/deceleration Predetermined area: 0~31 F7-35 Phase 9 running time Predetermined area: 0.0 ~ 3000.0 F7-36 Stage 9 running direction and acceleration/deceleration Predetermined area: 0~31 F7-37 Phase 10 running time Predetermined area : 0.0 ~ 3000.0 F7-38 Stage 10 running direction and acceleration/deceleration Predetermined area: 0~31 F7-39 Phase 11 running time Predetermined area: 0.0 ~ 3000.0 F7-40 Stage 11 running direction and acceleration/deceleration Predetermined area: 0~31 F7-41 Phase 12 running time Predetermined area: 0.0 ~ 3000.0 F7-42 Stage 12 running direction and acceleration/deceleration Predetermined area: 0~31 F7-43 Phase 13 running time Predetermined area: 0.0 ~ 3000.0 F7-44 Stage 13 running direction and acceleration/deceleration Predetermined area: 0~31

F7-41 Phase 12 running time Predetermined area : 0.0 ~ 3000.0

F7-42 Stage 12 running direction and acceleration/deceleration

Predetermined area: 0~31

F7-43 Phase 13 running time Predetermined area : 0.0 ~ 3000.0

F7-44 Stage 13 running direction and acceleration/deceleration

Predetermined area: 0~31

F7-45 Phase 14 running time Predetermined area : 0.0 ~ 3000.0

F7-46 Stage 14 running direction and acceleration/deceleration

Predetermined area: 0~31

F7-47 Phase 15 running time Predetermined area: 0.0 ~ 3000.0

F7-48 Stage 15 running direction and acceleration/deceleration

Predetermined area: 0~31

The running direction and acceleration/deceleration time of each stage are determined by setting different units and ten digits:

Units:

0: forward

1: reverse

Ten places:

0: Acceleration/deceleration time 1

1: acceleration and deceleration time 2

2: Acceleration and deceleration time 3

3: Acceleration and deceleration time 4

#### 7. Communication parameters (F8 parameters)

Used to specify the baud rate for RS485 communication, the communication parties must set the same baud rate.

- 0: 300 bps
- 1: 600 bps
- 2: 1200 bps
- 3: 2400 bps
- 4: 4800 bps
- 5: 9600 bps
- 6: 19200 bps
- 7: 38400 bps



F8-01 Data Format Predetermined area: 0 , 1, 2

Used to specify the data format for RS485 communication, the communication parties must use the same data format.

0: 1 start bit, 8 data bits, 1 stop bit, no parity.

1:1 start bit, 8 data bits, 1 stop bit, odd parity.

2: 1 start bit, 8 data bits, 1 stop bit, even parity.

F8-02 Local address Predetermined area: 0 ~247

This parameter is used to set the address of the inverter when RS485 communication. The inverter only receives the data of the host computer that matches the site of the station. The communication protocol uses the standard MODBUS RTU protocol, as detailed in Appendix 1. When this parameter is set to 0, no data is returned for the broadcast address.

F8-03 Local response delay Predetermined area: 0 ~ 100ms

The response delay refers to the delay between the inverter receiving the 485 command and the response to the return of the host computer.

F8-04 Timeout judgment time Predetermined area: 0.1 ~ 100.0S

When the 485 communication is unsuccessful, its duration exceeds the set time of this parameter, and the inverter determines the communication failure. When this parameter is set to 0.0, the timeout judgment function is invalid.

F8-05 Master and slave selection Predetermined area: 0 , 1

0: slave 1: master station

In the main station, the real-time broadcast transmits the running frequency and running status of the unit so that the slave can follow.

F8-06 RS485 Set frequency proportional coefficient Predetermined area: 0~999.9%



RS485 receives the signal from the host computer and multiplies it by F8-06 as the actual given frequency.

#### 8. Advanced parameters (F9 parameters)

F9-00 Swing frequency amplitude Predetermined area:  $0.0\sim50.0\%$  F9-01 Kick frequenc Predetermined area:  $0.0\sim50.0\%$  F9-02 Triangle wave rise time Predetermined area:  $0.1\sim3600.0S$  F9-03 Triangle wave fall time Predetermined area:  $0.1\sim3600.0S$  F9-04 Counter specified value Predetermined area:  $0\sim65535$  F9-05 Counter final value Predetermined area:  $0\sim65535$ 

The inverter receives the external pulse through the multi-function input terminal and counts it. When the count value reaches the value specified by the F9-04 counter, if the multi-function output terminal Y or the relay output function selects the function of the 9th (the counter specified value arrives), it will output Active level until the counter is cleared.

When the count value reaches the final value of the F9-05 counter, if the multi-function output terminal Y or the relay output function selects the function No. 10 (the counter final value arrives), a count cycle active level is output.

F9-06 Set length	Predetermined area: 0 ~ 65535m
F9-07 Pulse number per meter	Predetermined area: 0.1 ~ 6553.5

The two functions of setting the length and the number of pulses per meter are mainly used for fixed length control. The actual length is calculated by the pulse signal input from the digital input terminal:

Actual length = length count input pulse / number of pulses per meter.

F9-08 Internal timer timing unit	Predetermined area:	0.01~99.99S
F9-09 Internal timer period	Predetermined area:	1 ~ 65535

The internal timer is enabled through the multi-function input terminal. When the timer is timed to F9-08×F9-09, and the multi-function output terminal Y or the relay output function selects the 11th function (internal timer



arrives), a timing is output. The effective signal of the unit.

F9-10 Set run time Predetermined area: 1 ~ 65535

When the running time is greater than F9-10, and the multi-function output terminal Y or the relay output function selects the 12th function (running time arrives), a valid signal is output.

#### 9. Enhanced control parameters (FA parameters)

FA-00 Whether VF separation Predetermined area: 0~2

FA-01 Voltage source selection Predetermined area: 0~5

FA-02 Keyboard setting voltage given Predetermined area: 0.0~100.0%

FA-03 Voltage acceleration/deceleration time

Predetermined area: 0.1~3600.0S

#### When VF control is selected, FA-00 is the voltage separation parameter:

0: No separation, ie normal VF control

1: Semi-separated, the output voltage of the inverter has a linear relationship with the frequency, and the ratio of the two is controlled by the voltage source selected by FA-01.

2: Completely separated, the output voltage of the inverter has no relationship with the frequency, and is only controlled by the voltage source selected by FA-01.

#### FA-01 voltage source selection:

0: FA-02 Set value 1: Al1 2: Al2

3: Keyboard potentiometer 4: PID 5: AI1+PID

**FA-02** is the set voltage given 100.0% corresponds to the rated voltage of the motor

**FA-03 voltage acceleration and deceleration time** Refers to the time from zero to the rated voltage.

#### 10. Enhanced function parameters (FB parameters)



Fb-00 Remote pressure gauge range Predetermined area: 0.001~60.000MPA

Fb-01 Keyboard pressure setting

Predetermined area: 0.001~20.000MPA

Fb-02 Modify whether the keyboard settings are automatically saved

Predetermined area: 0~1 Fb-03 Sleep frequency

Predetermined area: 0.00~600.00Hz

Fb-04 Sleep delay time

Predetermined area: 0.0~3000.0S

Fb-05 Wake up pressure

Predetermined area: 0~100.0%

Fb-06 Wake delay time

Predetermined area: 0.0~60.0S Fb-07 Underload protection value Predetermined area: 0.0~100.0% Fb-08 allowed underload time Predetermined area: 5.0~600.0S

Fb-00 remote pressure gauge range refers to the actual pressure gauge range, and the pressure gauge outputs 10V or 20mA corresponding pressure value.

Fb-01 keyboard pressure setting, select PID given frequency and PID selection When selecting Fb-01, in the monitoring state, Fb-01 can be modified by keyboard up and down buttons regardless of running or stopping.

Fb-02 determines whether the modified set value is automatically stored, 0: no automatic storage, need to press SET to store; 1: automatic storage, automatically stored after 10S modification. This parameter also affects whether F0-07 and F6-01 parameters are automatically stored.

When the PID output frequency is lower than the Fb-03 setting and the duration exceeds Fb-04, the inverter enters the sleep state (output frequency is 0). When the feedback pressure is less than a certain value (Fb-05 multiplied by the set pressure), And when the duration exceeds Fb-06, the inverter will go out of sleep and work again.

When Fb-07 is 0.0, no underload protection is performed. When Fb-07



is non-zero, when the inverter output current (percentage of rated current) is less than Fb-07 setting and the duration exceeds Fb-08, E. UL fault is reported.

Fb-09 PID Parameter selection

Predetermined area: 0~3

Fb-10 Proportional gain 2

Predetermined area: 0.0~50.0

Fb-11 Integral time constant 2

Predetermined area: 0.1~100.0

Fb-12 Differential gain 2

Predetermined area: 0.0~5.0

Fb-13 PIDParameter switching deviation1

Predetermined area: 0.0~100.0%

Fb-14 PIDParameter switching deviation2

Predetermined area: 0.0~100.0%

Fb-15 PIDParameter switching deviation 1

Predetermined area: 0.0~100.0%

Fb-16 PIDParameter switching deviation2

Predetermined area: 0.0~100.0%

#### Fb-09 PID parameter selection:

0: PID proportional coefficient, integral time constant, differential gain select the first group (F6-04, F6-05, F6-06).

1: PID proportional coefficient, integral time constant, differential gain According to the terminal selection (function No. 38), when the function is invalid, the first group (F6-04, F6-05, F6-06) is selected. When the function is valid, select the second group (Fb-10, Fb-11, Fb-12).

2: The actual PID scale factor, integral time constant, differential gain, adjusted according to the deviation size, when the deviation is less than Fb-13, then run according to the first group (F6-04, F6-05, F6-06); greater than Fb-14, according to the second group (Fb-10, Fb-11, Fb-12); the deviation is greater than Fb-13, less than Fb-14, the actual parameters are obtained by linear interpolation.

3: The actual PID scale factor, integral time constant, differential gain, according to the output frequency size adjustment, when the output frequency is less than Fb-15, then run according to the first group (F6-04,



F6-05, F6-06); greater than Fb -16, then run according to the second group (Fb-10, Fb-11, Fb-12); if the output frequency is greater than Fb-15 and less than Fb-16, the actual parameters are obtained by linear interpolation.

#### 11. Protection parameter (Fd parameter)

Fd-00 Current limit value Predetermined area: 100.0~200.0%

Fd-01 Current too large frequency down time

Predetermined area: 1.0~200.0S

In order to suppress frequent occurrence of overcurrent faults, when the inverter current is too large, the inverter quickly reduces frequency to suppress excessive current.

Fd-02 Voltage limit value Predetermined area: 100.0~140.0% Fd-03 Voltage suppression gain Predetermined area: 0~10

During the deceleration process, the inverter's kinetic energy feedback on the busbar causes the busbar voltage height. In order to suppress the overvoltage fault, the inverter automatically lengthens the deceleration time when the bus voltage rises to a certain value.

Fd-02 is the percentage of the rated DC bus (for a 220V rated bus voltage of 311V, the 380V system rated bus voltage is 537V).

The larger the Fd-03 setting, the stronger the overvoltage suppression capability.

Fd-04 Phase loss protection function selection

Predetermined area: 00 ~ 11

Units: input phase loss, low power no input phase loss protection

0: no protection

1: protection

Ten digits: output phase loss

0: no protection1: protection



Fd-05 Motor overload protection factor Predetermined area: 50 ~ 100%

This parameter is used to set the sensitivity of the inverter to the thermal relay protection of the load motor. When the rated current value of the load motor does not match the rated current of the inverter, the correct thermal protection of the motor can be achieved by setting this value. The smaller the setting value, the easier it is to report motor overload protection.

Fd-06 Over torque warning value Predetermined area: 20.0~200.0% Fd-07 Over torque detection time Predetermined area: 0.0~60.0S

When the inverter current is greater than Fd-06 and the duration exceeds Fd-07, if the multi-function output terminal Y1 or the relay output function selects the 15th function (over-torque warning), the active level will be output.

Fd-08 Failure self-recovery Predetermined area: 0~5
Fd-09 Failure self-recovery interval Predetermined area: 0.1 ~ 600.0S

During the operation of the inverter, due to load fluctuations, accidents may occur and the output will be stopped. In this case, in order to stop the operation of the equipment, the fault self-recovery function of the inverter can be used. If the inverter fails to resume operation within the set number of times, the fault is protected and the output is stopped. When the number of failure self-recovery is set to zero, the self-recovery function is turned off.

The self-recovery function is not effective for fault protection caused by overload, overheating, etc.



Fd-14 First two fault numbers Predetermined area: 0~30 Fd-15 Previous trouble number Predetermined area: 0~30 Fd-15 Predetermined area: 0~30 Fd-15 Predetermined area: 0~30 Predetermined area: 0~30

Fd-17 Current fault frequency Setting range: 0~ upper limit frequency Fd-18 Current fault current Predetermined area: 0~3000.A

Fd-19 Current fault bus voltage Predetermined area: 0~800

#### The fault number is:

01: E.SC short circuit

02: Hardware overcurrent in E.OC1 acceleration

03: Hardware overcurrent in E.OC2 deceleration

04: E.OC3 hardware overcurrent in constant speed

05: E.OC4 software overcurrent

06: E.232. Two CPU downlink communication error

07: E.Gnd output ground protection

08: E.OU1 overpressure during acceleration

09: E.OU2 overvoltage during deceleration

10: E.OU3 over-speed in constant speed

12: Reserved

13: Reserved

14: E.UL underload protection

15: E.OL1 inverter overload

16: E.OL2 motor overload

17: E.Cur current detection circuit failure

18: E. LU undervoltage, low voltage during operation

19: E.EF1 external fault (terminal input normally open)

20: E.EF2 external fault (terminal input normally closed)

21: E. OH temperature is too high

22: E.SPI input phase loss

23: E.SPO output phase loss.

24: E.EEP memory error



25: E.End running time to

26: E.P1d PID feedback disconnection

27: E.485 485 disconnection

28: E.doG electromagnetic interference

29: E.232 Two CPU communication errors



## Appendix 3 Maintenance

Due to the influence of ambient temperature, humidity, dust, vibration and aging of the internal components of the inverter, some potential problems may occur during the operation of the inverter. In order to enable the inverter to operate for a long time and stably, it is necessary to carry out the inverter. Daily and regular maintenance.

#### 1. Daily inspection and maintenance

Check item	Check content	Criterion				
Operating environment	Temperature,     humidity	Turn on the inverter cover when the temperature > 40 °C     Humidity < 90%, no frost				
	2. Dust, gas	2. No odor, no flammable, explosive gas				
Cooling system	Installation     environment	The installation environment is well ventilated and the air duct is non-blocking.				
Cooling System	2. Inverter body fan	The main body fan runs normally without abnormal noise				
Frequency	Vibration, temperature rise	Smooth vibration, normal air outlet temperature				
converter body	2. Noise	2. No abnormal noise, no smell				
	3. Wires, terminals	3. The fastening screw is not loos				
Motor	Vibration, temperature rise	Smooth operation and normal temperature				
	2. Noise	2. No abnormalities, uneven noise				
Input and output	1.Input voltage	The input voltage is within the specified range				
parameters	2. Output current	2. The output current is below the rated value				



#### 2. Regular maintenance

Users are advised to perform a regular inspection of the inverter every 3 months or every 6 months depending on the usage.

#### 2.1 Check content

- 1. Whether the control circuit terminal block screws are loose, if loose, please use a screwdriver to tighten.
- 2. If the main circuit terminal block screws are loose, if it is loose, please reinforce. Whether there is any trace of overheating at the copper bar joint.
- 3. Main circuit cable, control circuit cable for damage, especially the skin that is in contact with the metal surface is cut. Is the insulation of the main circuit power cable good?
- 4. Thoroughly clean the air duct, body fan, and dust on the circuit board; in a dusty environment, clean it frequently.

#### 3. Inspection and replacement of consumable parts

The internal consumable parts of the inverter mainly include a cooling fan and an electrolytic capacitor for filtering. Its service life is closely related to the use environment and maintenance conditions. The general life expectancy is:

Device name	Lifetime
cooling fan	30,000to 40,000 hours
Electrolytic capacitor	40,000to 50,000 hours

The user can determine the replacement period based on the running time.

#### 3.1 cooling fan

Possible causes of damage: cracks in the bearing wear, blade aging, etc.

Judgment standard: The sound is abnormal when starting up. Please check the fan carefully. When it is determined that the fan is faulty, replace the fan in time.

#### 3.2 Filter capacitor

Possible causes of damage: high ambient temperature; frequent load changes cause excessive pulsating current; electrolyte aging.



Judging criteria: whether there is liquid leakage; whether the safety valve protrudes; the measurement of electrostatic capacitance; the determination of insulation resistance

#### 4. Storage and warranty

#### 4.1 Storage

If the inverter is not used or stored for a long time after purchase, the following items should be noted:

- (1) Avoid storing the inverter in a place with high temperature, humidity or vibration or metal dust to ensure good ventilation.
- (2) If the inverter is not used for a long time, it should be powered once every two years to restore the characteristics of the filter capacitor and check the function of the inverter. When power is on, the voltage should be gradually increased by an autotransformer, and the power-on time is not less than 5 hours.

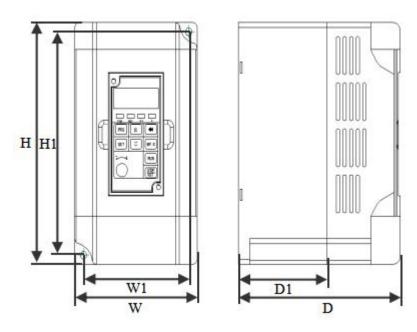
#### 4.2 Warranty

The warranty period of this inverter is 18 months (from the date of purchase). Domestic market: Due to the quality of the product itself, it will be repaired within 18 months from the date of shipment; foreign market: repair within 6 months. The warranty covers only the drive body. Even if the warranty period is exceeded, the company also provides lifetime paid repair services. See warranty agreement and warranty card.



# Appendix 4 Inverter size

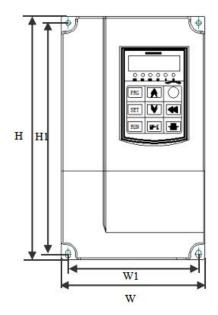
1. Single-phase inverter and three-phase mini inverter size (dimensions in mm)

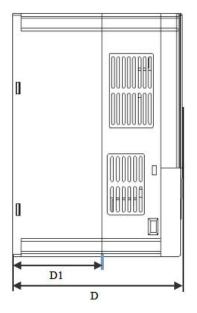


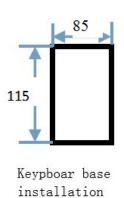
power	Н	H1	W	W1	D	D1	Mounting aperture
0.75~1.5K W	143	132	86	74	114	62.5	4.5



### 2. Three-phase inverter (dimension unit is mm)







power	Н	H1	W	W1	D	D1	Mounting aperture
0.75~2.2K W	185	175	118	105	157	80	4.5
4~11KW	247	235	160	147	178	101	5