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OWNER'S MANUAL

Variable Speed (VS) Controls
for STK VS Hoists & SMT VS Trolleys

Quick Parameter Setting

1. Usage: Start/stop controlled by external terminal, speed adjusted by potentiometer on control panel

P0.01=0; P0.03=1

2. Usage: Start/stop controlled by external terminal, speed adjusted by external potentiometer

P0.01=5; P0.03=1

3. Usage: Start/stop controlled by external terminal, speed adjusted by 0~5V input voltage signal

P0.01=5; P0.03=1; P1.04=5.00

4. Usage: Start/stop controlled by external terminal, speed adjusted by 0~10V input voltage signal

P0.01=5; P0.03=1; P1.04=10.00

5. Usage: Start/stop controlled by external terminal, speed adjusted by 4~20mA input current signal

P0.01=6; P0.03=1; P1.07=1.00; P1.09=5.00

6. Usage: Start/stop controlled by external terminal, speed adjusted by 0~20mA input current signal

P0.01=6; P0.03=1; P1.07=0.00; P1.09=5.00

7. Usage: Start/stop controlled by control panel, speed adjusted by external potentiometer

P0.01=5; P0.03=0

8. Usage: Start/stop controlled by control panel, speed adjusted by 0~5V input voltage signal

P0.01=5; P0.03=0; P1.04=5.00

9. Usage: Start/stop controlled by control panel, speed adjusted by 0~10V input voltage signal

P0.01=5; P0.03=0; P1.04=10.00

10. Usage: Start/stop controlled by control panel, speed adjusted by 4~20mA input current signal

P0.01=6; P0.03=0; P1.07=1.00; P1.09=5.00

11. Usage: Start/stop controlled by control panel, speed adjusted by 0~20mA input current signal

P0.01=6; P0.03=0; P1.07=0.00; P1.09=5.00

Note: Parameter factory default reset:P3.01=10

Contents

Chapter 1 Introduction

1.1 Unpacking Inspection

Upon unpacking, please confirmthe following:

· Any damage occurred duringtransportation;

· Check whether the model and specifications on the nameplate of inverter are in accordance with your order.

If there is anyerror, please contactus or distributors.

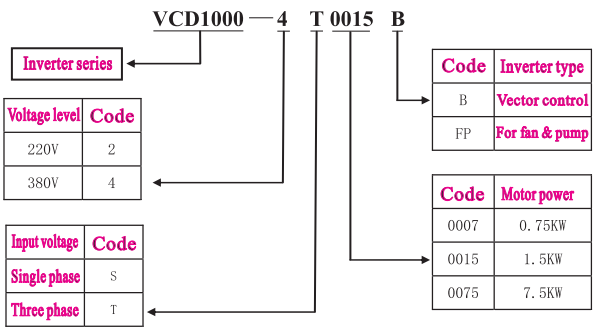


Fig. 1-1 Model Description

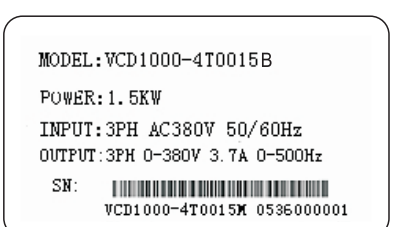


Fig. 1-2 Inverternameplate

1.2 Safety Rules

- **Inspection**

Attention

1. Please do notinstall the damagedinverter, otherwise there is adanger of injury.

- **Installation**

Attention

1. Please install the inverter on metal or other nonflammable materials, otherwise there is a danger of fire.
2. Please install cooling fans when two inverters are installed in a same cabinet, keep the air intake temperature under 40℃, otherwise, there is a danger of fire.

- **Cable connection and distribution**

Danger

1. Wire-connection job canonly be done when the mains are cut off, otherwise, there is adanger of shock or fire.
2. Only qualified personnel can perform wire-connection job, otherwise, there is a danger of shock or fire.

3. The earth terminal of frequency inverter must be connected to earth reliably, otherwise, there is a danger of shock or fire.
(Please use the 3rd grounding method specially for 380V)

4. After connects emergency stop terminal, please make sure it is effective, otherwise, there is a danger of injury.
(The user is responsible for the connection)

5. Please don't touch the output terminals, don't connect the output terminals with the shell, don't short connect the output terminals, otherwise, there is a danger of shock or short circuit.

Attention

1. Please confirm the mains supply is in accordance with rated voltage of inverter, otherwise, there is a danger of injury or fire.
2. Please don't make voltage withstanding test to the inverter. It may damage the semiconductor and other components.
3. Please connect the braking unit or resistance according to the wiring diagram, otherwise, there is a danger of fire.
4. Please use screw drivers with appointed moment of force to tighten the terminals, otherwise, there is a danger of fire.
5. Please don't connect input mains cable with output terminals of U, V, W. It may damage the inverter.
6. Please don't connect shifting capacitor or LC/RC noise filter with output loop. It may damage the inverter.
7. Please don't connect solenoid switch or solenoid contactor with output loop. When inverter is running with load, the action of such swith and contactor will cause surge current. It may trigger over current protection of inverter.
8. Please just disassemble the terminals cover when wiring, don't disassemble the front cover of inverter.

It may damage the inverter.

- Maintenance and inspection

Danger

1. Please do not touch the control terminals when it is live, otherwise there is a danger of shock.
2. Please make sure the termnials cover is assembled before power up. Before diassembling the termnials cover, please make sure the power is cut off, otherwise, there is a danger of shock.
3. Only qualified personnel can perform the maintenance and inspection job, otherwise, there is a danger of shock.

Attention

1. The keyboard, control circuit board, and driver circuit board were integrated with CMOS circuit. Please be careful when using. Please don not touch these circuit boards by fingers.
2. Please don't change the cable connection when power on.

1.3 Notes on Usage

1. Constant torque low speed running

When the inverter outputs to a common motor at low speed for a long term, the output rated torque should be derated due to the worsening radiating effect. If low speed constant torque long term running is required, then a special variable frequency motor is needed.

2. Confirm motor's insulation

Before using VCD1000 series inverter, please confirm the motor is insulated, otherwise, the equipment may be damaged. Please confirm motor's insulation termly when motor is working under bad condition.

3. Negative torque load

To some application situation such as lifting load, negative torque load may occur. Braking unit and resistor should be connected with inverter, or over current or over voltage fault may happen.

4. The mechanical resonance point of load

The inverter may encounter the mechanical resonance point of load within certain output frequency range. Jump frequencies have to be set to avoid it.

5. Capacitor and varistor

Because the inverter outputs PWM pulse wave, capacitor and varistor should not be connected with the output terminals of the inverter, or the inverter may trip or components may be damaged, as shown in Fig.1-3.

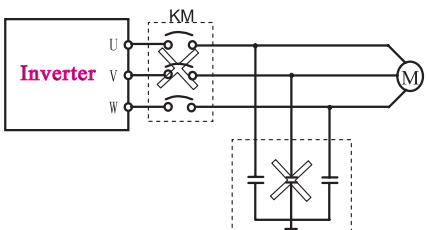


Fig. 1-3 Capacitor connection with inverter output prohibited

6、 Motor derating

When basic frequency is set to be lower than rated frequency, motor derating is necessary in order to avoid motor overheating.

7、 Running at frequency above 50Hz

If running at frequency above 50Hz, besides the increment of vibration and noise, the ranges of running speed of motor shaft and mechanical device have to be guaranteed. Be sure to make an enquiry first.

8、 The electro-thermal protective value of motor

If the applicable motor is selected as per requirements, the inverter can perform the thermal protection to the motor. If the ratings of applied motor are not in compliance with the inverter, be sure to adjust the protective value to guarantee the safe running of motor.

9、 Altitude and derating

When the altitude is higher than 1000m, the cooling effect of inverter is deteriorated because of the rareness of air, derating must be considered. Fig.1-4 indicates the relationship between the altitude and rated current of frequency inverter.

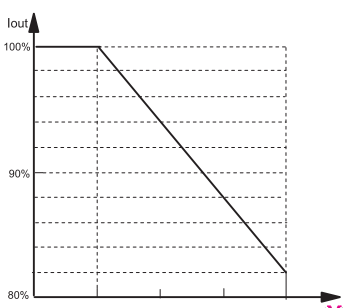


Fig.1-4 Altitude vs. inverter rated current

1.4 Notes Regarding Disposal

When you dispose frequency inverter, pay attention to:
The capacitors in the main circuits may explode when they are burned.
Poisonous gas may be generated when front panel is burned.
Please dispose the inverter as industrial rubbish.

Chapter 2 Models and Specifications

2.1 Models

VCD1000 series inverter have 2 kinds of voltage levels, 220V and 380V. The range of applicable motor is from 0.4KW to 315KW. Models of VCD1000 series are shown in Table 2-1.

Table 2-1. Models description

Voltage level	Models		Rated capacity (KVA)	Rated output current(A)	Applicable motor (KW)
220V Single phase	VCD1000-2S0004B		1.1	3.0	0.4
	VCD1000-2S0007B		1.5	4.7	0.75
	VCD1000-2S0015B		2.8	7.5	1.5
	VCD1000-2S0022B		3.8	10.0	2.2
220V three phase	VCD1000-2T0015B		3.0	7.0	1.5
	VCD1000-2T0022B		4.0	10.0	2.2
380V three phase	VCD1000-4T0007B		1.5	2.5	0.75
	VCD1000-4T0015B		2.5	4.0	1.5
	VCD1000-4T0022B	VCD1000-4T0022P	3.0	6.0	2.2
	VCD1000-4T0030B	VCD1000-4T0030P	4.0	7.5	3.0
	VCD1000-4T0040B	VCD1000-4T0040P	5.0	9.5	4.0
	VCD1000-4T0055B	VCD1000-4T0055P	7.5	14.0	5.5
	VCD1000-4T0075B	VCD1000-4T0075P	10	17.0	7.5
	VCD1000-4T0110B	VCD1000-4T0110P	17	25	11
	VCD1000-4T0150B	VCD1000-4T0150P	21.7	32	15
	VCD1000-4T0185B	VCD1000-4T0185P	25.7	39	18.5
	VCD1000-4T0220B	VCD1000-4T0220P	29.6	45	22
	VCD1000-4T0300B	VCD1000-4T0300P	39.5	60	30
	VCD1000-4T0370B	VCD1000-4T0370P	49.4	75	37
	VCD1000-4T0450B	VCD1000-4T0450P	60	91	45
	VCD1000-4T0550B	VCD1000-4T0550P	73.7	112	55
	VCD1000-4T0750B	VCD1000-4T0750P	99	150	75
	VCD1000-4T0900B	VCD1000-4T0900P	116	176	90

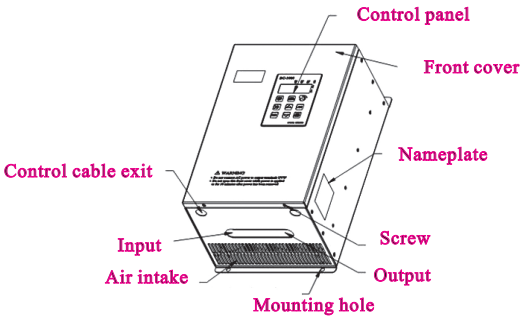
	VCD1000-4T1100B	VCD1000-4T1100P	138	210	110
	VCD1000-4T1320B	VCD1000-4T1320P	167	253	132
	VCD1000-4T1600B	VCD1000-4T1600P	200	304	160
	VCD1000-4T2000B	VCD1000-4T2000P	280	426	220
	VCD1000-4T2500B	VCD1000-4T2500P	318	474	250
	VCD1000-4T2800B	VCD1000-4T2800P	342	520	280
	VCD1000-4T3150B	VCD1000-4T3150P	390	600	315

2.2 Specifications

Items		Specifications
Input	Rated voltage/Frequency	Single phase 220V, three phase 200V, three phase 380V; 50Hz/60Hz
	Range	Voltage:±20%，voltage unbalance rate:<3%; frequency:±25%
Output	Rated voltage	0～200V/220V/380V
	Frequency range	0Hz～500Hz
	Frequency r esolution	0. 01Hz
	Overload ability	150% rated current for 1minute, 180% rated current for 3 seconds
Control function	Modulation modes	Optimized space voltage vector SVPWM modulation
	Control mode	Sensorless vector control (with optimal low frequency dead time compensation)
	Frequency precision	Digital setting: The highest frequency×±0.01%; Analog setting:The highest frequency×±0.2%
	Frequency resolution	Digital setting: 0.01Hz; Analog setting:The highest frequency×0.1%
	Start frequency	0. 40Hz～20. 00Hz
	Torque boost	Auto torque boost, manualtorque boost 0.1%~30.0%
	V/F curve	Five ways: constant torque V/F curve, 1 kind of user defined V/F curve , 3 kinds of down torque curve (2.0/1.7/1.2 times the power)
	Acc./Dec. curve	Two ways: linear Acc./Dec., S-curve Acc./Dec.; 7 kinds of Acc./Dec. time, time unit(minute/second) optional, max. Time: 6000 minutes.
	DC braking	DC braking start frequency:0~15.00Hz braking time: 0~60.0s braking current: 0~80%
	Energy consuming braking	Energy consuming braking unit built-in, external braking resistor can be
	Jog running	Jog frequency range: 0.1Hz~50.00Hz, JOG Acc./Dec. time: 0.1~60.0s
	PI built-in	Easily constitute a close loop control system
	Multi-stage speed running	Multi-stage speed running available through built-in PLC or control terminals

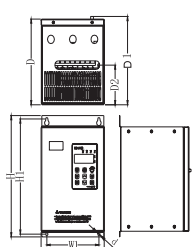
	Textile swing frequency	Swing frequency available with preset and centre frequency adjustable
	Auto voltage regulation	When the grid voltage changes, to maintain constant output voltage
	Auto energy saving running	Saving energy by auto optimizing V/F curve according to the load
	Auto current limitting	Auto current limitting toprevent frequent overcurrent faulttrip
	Fixed-length control	Inverter stops when reaches the pæset length
	Communication	RS 485 standard communication port available, support MODBUS communication protocol of ASCII and RTU, master-slave multi-machine interaction function available
Running function	Running command channel	Control panel : control terminal : serial port : 3 channels switchable
	Frequency setting channel	Control panel potentiometer : ▼、▲ control panel keys: function code digital : serial port : terminal up/down: analog voltage: analog current : pulse : combination setting: all channels switchable
	Switch input channel	FWD/REV command: 8 channels programmable switch inputs, 35 kinds of function can be set separately
	Analog input channel	4~20mA: 0-10V:2 optional analog inputs
	Analog output channel	4~20mA or 0~10Voptional, setting frequency andoutput frequency ,etc. can beoutput
	Switch / pulse output channel	Programmable open collector output: relay output : 0~20KHz pulse output:
Control panel	LED digital display	Display setting frequency, output voltage, output current, etc.
	External meter display	Display output frequency,output current, output voltage,etc.
	Key lock	All the keys canbe locked
	Parameter copy	Function code parameters are able to be copyed between inverters when use remote control panel
Protection function		Overcurrent protection: overvoltage protection: undervoltage protection: overheating protection: overload protection,etc.
Optional parts		Braking unit: remote control panel: cable: panel mounting feet, etc.
Environment	Environment	Indoors, free from direct sunlight, dust, corrosive gas, oil mist, steam, water drop or salt, etc.
	Altitude	Lower than 1000m (derating is necessary above 1000m)
	Ambient temperature	－10℃~+40℃
	Humidity	<90%RH, no condensation
	Vibration	Lower than 5.9m/s² （0.6g）
	Storage temperature	－20℃~+60℃
Structure	Protection level	IP 20
	Cooling	Forced air cooling
Installation		Wall mounted

2.3 Parts of Inverter

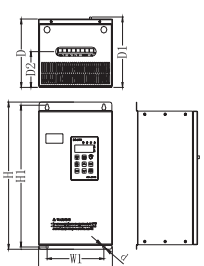


Note: The actual item is the standard.

2.4 Dimensions



a. Inverters below 2.2 Kw



b. Inverters from 4.0 Kw to 7.5 Kw

Table 2-2 Dimensions (mm)

Model	W	W1	H	H1		D	D1	D2	d
VCD1000-2S0004	125	115	170	160		140	143	80	4
VCD1000-2S0007									
VCD1000-2S0015									
VCD1000-2T0015									
VCD1000-4T0007									
VCD1000-4T0015									
VCD1000-2S0022	145	133	200	188		148	150	80	5
VCD1000-4T0015									
VCD1000-4T0030									
VCD1000-4T0040									
VCD1000-4T0055	200	180	300	280		193	195	110	6
VCD1000-4T0075									
VCD1000-4T0110	200	180	300	280		193	195	110	6
VCD1000-4T0150									
VCD1000-4T0185	275	205	510	490		240	250	190	8
VCD1000-4T0220									
VCD1000-4T0300									
VCD1000-4T0370	280	205	625	600		240	250	190	8
VCD1000-4T0450									
VCD1000-4T0550	380	300	740	725		310	320	240	10
VCD1000-4T0750									
VCD1000-4T0930									

2.5 Optional Parts

2.5.1 Remote control panel

RS 485 communication is applied between remote control panel and inverter which are connected by a 4-core cable via RJ45 network port.
The maximum connection distance is 500 M.
The inverter supports local control panel and remote control panel used at the same time, no priority, both can control the inverter.
HotPlugIn for remote control panel is available.

The following functions are available by using remote control panel:

(1) Control slave inverter to run, stop, jog run, fault reset, chang setting frequency, change function parameters and running direction.
(2) Monitor slave inverter's running frequency, setting frequency, output voltage, output current, busbar voltage, etc.

2.5.2 Communication cable for remote control panel

Type: VCD1000-LAN0020(2.0m)
Standard options: 1m, 2m, 5m, 10m, 20m
More than 20m can be customized.

2.5.3 Fieldbus Adaptor

The inverter can be connected into MODBUS fieldbus network via adaptor as a slave station in the network.
The function as follow:
(1) To send command to inverter such as start, stop, jog running, etc.
(2) To send speed or frequency signal to inverter.
(3) To read status from inverter.
(4) To fault reset for the inverter.

Please refer to Chapter 9 for communication protocol.

2.5.4 Braking Resistors

VCD1000 series inverters have built-in braking units.

If energy consuming braking is needed. Please choose braking resistors according to Table2-3. The wire connection of braking resistors are shown in Fig. 2-2.

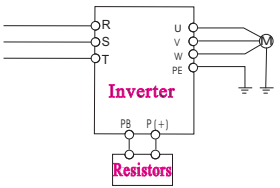


Fig.2-2 The wire connection of braking resistors

Table 2-3 Braking resistors selection table

Model	Applicable motor (KW)	Resistance (Ω)	Resistance power (W)
VCD1000-2S0004B	0.4	200	100
VCD1000-2S0007B	0.75	150	200
VCD1000-2S0015B	1.5	100	400
VCD1000-2S0022B	2.2	70	500
VCD1000-4T0007B	0.75	300	400
VCD1000-4T0015B	1.5	300	400
VCD1000-4T0022B	2.2	200	500
VCD1000-4T0030B	3.0	200	500
VCD1000-4T0040B	4.0	200	500
VCD1000-4T0055B	5.5	30	1000
VCD1000-4T0075B	7.5	30	1000

Chapter 3 Installation and Wire Connection

3.1 Installation

3.1.1 Environment Requirements

(1) Please mount inside a well-ventilated location. The ambient temperature is required to be within the range of -10℃~40℃. If the temperature is higher than 40℃, the inverter should be derated, at the same time the ventilation and heat dissipation should be enhanced.

(2) Be away from the location full of dust or metal powder, and mount in the location free of direct sunlight.

(3) Mount in the location free of corrosive gas or combustible gas.

(4) Humidity should be lower than 90% with no dew condensation.

(5) Mount in the location where vibration is less than 5.9m/s² (0.6G).

(6) Please try to keep the inverter away from EMI source and other electronic devices which are sensitive to EMI.

3.1.2 Mounting Space and Direction

(1) Generally in vertical way.

(2) For the requirements on mounting space and distance, refer to Fig.3-1.

(3) When several inverters are installed in one cabinet, they should be mounted in parallel with special incoming and outcoming ventilation and special fans. When two inverters are mounted up and down, an air flow diverting plate should be fixed as shown in Fig.3-2 to ensure good heat dissipation.

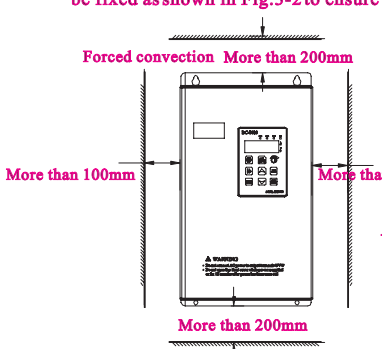


Fig.3-1 Mounting space and distance

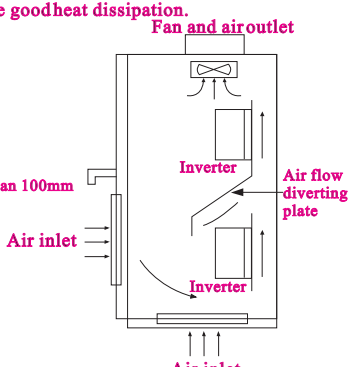


Fig.3-2 Mounting of multiple inverters

3.2 Removing and Mounting Front Cover of Inverter

Removing: remove 4 screws on the cover and take the cover out.

Mounting: Align the mounting holes and screw them.

3.3 Wire Connection

Attention

(1) Before wiring, please ensure the power has been removed and wait for at least 10 minutes.

(2) Please do not connect AC power to output terminals UVW.

(3) To ensure the safety, the inverter and motor should be safety grounding. It is necessary to use copper wire above 3.5mm² as ground wire, grounding resistance less than 10Ω.

(4) The inverter has gone through voltage withstand test in factory, please do not make it again.

(5) Solenoid switch or cr absorbing devices, such as ICEL, is prohibited to connect inverter output.

(6) To provide input overcurrent protection and for convenience in maintenance, the inverter should be connected to AC power through circuit breaker.

(7) Please use twisted wire or shielded wire above 0.75mm² for the wiring of relay input/output loop (X1~X6, FWD, REV, OC, DO). One end of shielding layer suspended, and the other side connected to PE grounding terminal of inverter, wiring length less than 50m.

Danger

(1) The cover can be removed only when the power is switched off, all the LEDs on the panel are off and waiting at least for 10 minutes.

(2) Wiring work can be performed only when the DC voltage between P+ and P- terminals is lower than 36V.

(3) Wiring work can only be done by trained or professional personnel.

(4) Before usage, check whether the mains voltage meets the requirement of inverter input voltage.

3.4 Main Circuit Wiring

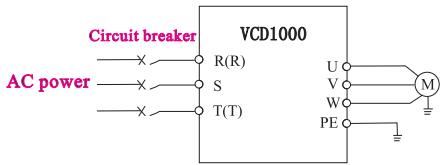


Fig. 3-3 Main circuit wiring

3.5 Basic Wiring Diagram

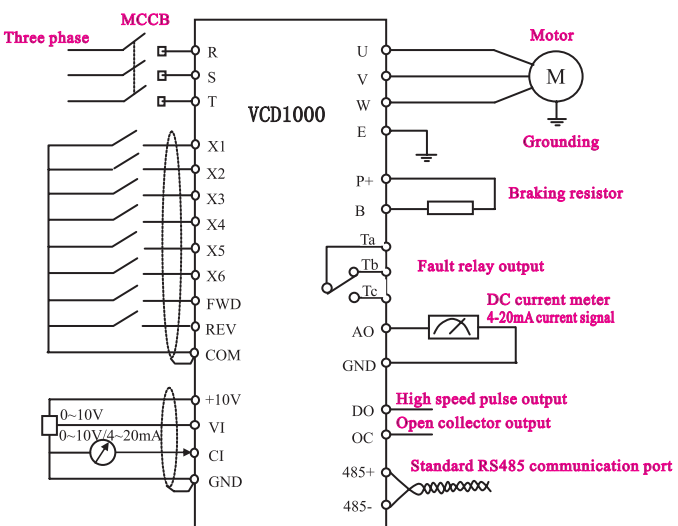


Fig. 3-5 Basic Wiring Diagram

3.5.2 Main Circuit Wiring

Table 3-1 Description of Main Circuit input/output terminals

	Main Circuit Terminals	Voltage	Terminals	Function
	R T B P+ U V W	1-phase 220V	R、T	Input terminals
			U、V、W	Output terminals
			P+、B	Braking resistor wiring terminals
	R S T B P+ U V W	3-phase 380V/ 220V	R、S、T	Input terminals
			U、V、W	Output terminals
			P+、B	Braking resistor wiring terminals

3.6 Control Circuit Terminal Wiring

3.6.1 Position and Function of Terminals and Jumpers on Control Circuit

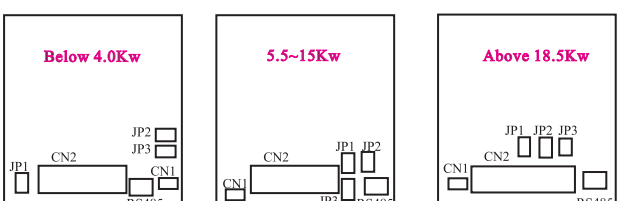


Fig. 3-6 Position of terminals and jumpers on control circuit

Before using the inverter, Please make correct terminals wiring and jumpers setting. It is suggested to use above 1mm^2 wire as terminal connection wire.

Table 3-2 Jumper switch function

Number	Function	Setting	Factory default
JP1	Pulse output terminal DO power selection	1-2 connected : external power 2-3 connected: internal 24V power of inverter	external power
JP2	Analog output terminal AO current/voltage output selection	1-2 : 4~20mA: AO1 output current signal 2-3 : 0~10V: AO1 output voltage signal	0~10V
JP3	Terminal CI current/voltage input selection	1-2 : V side, 0~10 V voltage signal 2-3 : I side, 4~20 mA current signal	4~20mA

3.6.2 Description of Terminals on Control Circuit

(1) Function of CN 1 terminal shown as Table 3-3

Table 3-3 CN 1 terminal function

Sort	Terminal	Name	Function Description	Specification
Relay output terminal	TA	Multifunctional relay output terminal	Can be defined as multifunctional relay output terminal by programming, refer to Chapter 6.5 P4.11	TA-TC: NC, TA-TB: Normally open contact capacity AC250V/2A (COSΦ=1) AC250V/1A (COSΦ=0.4) DC30V/1A
	TB			
	TC			

(2) Control Circuit CN2 terminal shown as Fig.3-7

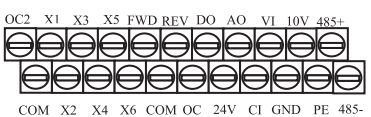


Fig.3-7 CN2 terminal order

(2) Function of CN 2 terminal shown as Table 3-4

Table 3-4 CN 2 terminal function

Sort	Terminal	Name	Function Description	Specification
Communi-cation	485+	RS485 communication port	RS485 differential signal positive terminal	Twisted or shielded wire needed
	485-		RS485 differential signal negative terminal	

Multifunctional output terminal	OC1	Open collector output terminal 1, 2	Can be defined as multifunctional on-off output terminal by programming, refer to Chapter 6.5 P4.10 (Common port: COM)	Opto isolated output Working voltage: 9~30V Max. output current: 50mA
	OC2			
Pulse output terminal	DO	Open collector pulse output terminal	Can be defined as multifunctional pulse output terminal by programming, refer to Chapter 6.5 P4.19/P4.20 (Common port: COM)	Max. output frequency :20KHz output freq range defined by P4.20
Analog input	VI	Analog input VI	Analog voltage input (Grounding: GND)	Input voltage range:0~10V (input resistance:47KΩ) Resolution: 1/1000
	CI	Analog input CI	Analog voltage/current input, choose voltage or current input by setting JP3 jumper. Factory default: voltage input (Grounding: GND)	Input voltage range:0~10V (input resistance:47KΩ) Input current range:0~20mA (input resistance:500Ω) Resolution: 1/1000
Analog output	AO	Analog output AO1	Analog voltage/current output, indicating 7quantities, choose voltage or current output by setting JP2 jumper. Factory default:voltage output (Grounding: GND)	Current output range: 4~20mA Voltage output range: 0~10V
Running control terminal	FWD	Forward running	Refer to chapter 6.5 P4.08	Opto isolated input Input resistance:2KΩ Max. input frequency: 200Hz Input voltage range:9~30V
	REV	Reverse running		
Multifunctional input terminal	X1	Multifunctional input terminal1	Can be defined as multifunctional on-off input terminal by programming, refer to Chapter 6.5 P4. (Common port: COM)	X1~X4 / FWD、REV / COM — Effective when closure
	X2	Multifunctional input terminal2		
	X3	Multifunctional input terminal3		
	X4	Multifunctional input terminal4		
	X5	Multifunctional input terminal5		
	X6	Multifunctional input terminal6		
Power source	P24	+24V power source	Supply +24V power (negative terminal:COM)	
	10V	+10V power source	Supply +10V power (negative terminal:GND)	Max. output current: 50mA
	GND	+10V common port	Grounding of analog signal and +10V power source	Terminal COM and GND are isolated inside
	COM	+24V common port	Digital signal input, output common port	

3.6.3 Analog Input/Output Terminal Wiring

(1) Analog voltage signal input through VI terminal as follow wiring.

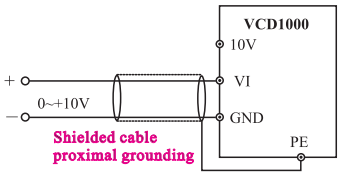


Fig. 3-7 VI terminal wiring

(2) Analog signal input through CI termianl, jumper selection for input voltage (0~10V) or input current (4~20mA) as follow wiring.

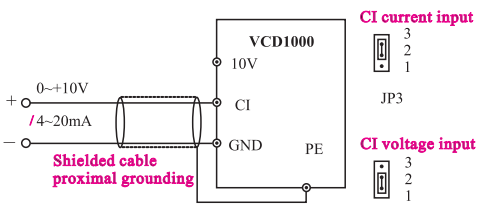


Fig. 3-8 CI terminal wiring

(3) Analog output terminal AO wiring

Analog output terminal can be connected with external analog meter indicating various physical quantity, jumper selection for output voltage (0~10V) or output current (4~20mA) as follow wiring.

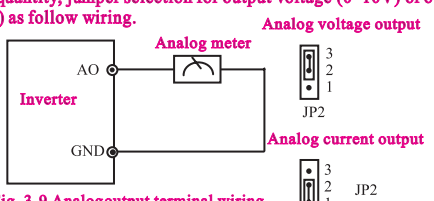


Fig. 3-9 Analog output terminal wiring

Notes:

(1) Filter capacitor or common-mode inductor can be installed beween VI and GND terminal or CI and GND terminal when using analog input mode.

(2) Please use shielded cable and do well grounding , keep the wire as short as possible in order to prevent external interference when using analog input/output mode.

3.6.4 Communication Terminal Wiring

The inverter supplies standard RS 485 communication port.

It can constitute a single host-single slave control system or a single host-multi slaves system. The upper computer(PC/PLC)can real time monitor the inverter in the control system and achieve complicated control function such as remote control and supermatic, etc.

(1) Remote control panel can be connected with inverter via RS 485 port by pluging in the remote control panel into RS 485 port without any parameter setting.
The local control panel of inverter and remote control panel can work at the same time.

(2) Inverter RS 485 port and upper computer wiring as follow.

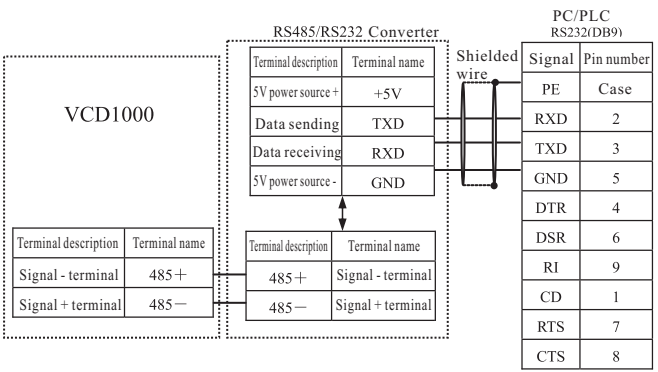


Fig. 3-10 RS485-(RS485/232)-RS232 communication wiring

(3) Multi inverters can be connected together via RS 485, controled by PC/PLC as a host shown as Fig.3-12. It also can be controled by one of inverters as a host shown as Fig. 3-13.

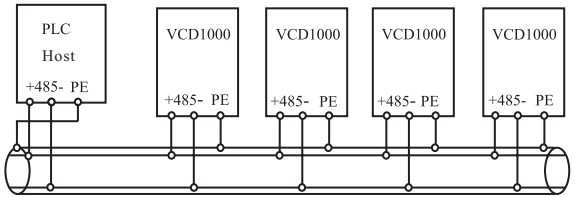


Fig. 3-12 PLC communicationwith multi inverters

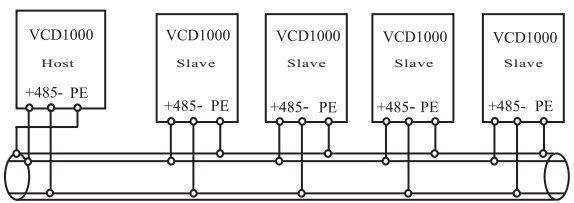


Fig. 3-13 Multi inverterscommunication

The more inverters connected, the more serious the communication interference becomes. Please make wiring as above and do well grounding for inverters and motors, or adopt the following measures to prevent interference as even above wiring can't work.

(1) Separately power supply to PC/PLC or isolated the power of PC/PLC.
(2) Use EMIFIL to the wire or reduce carrier frequency properly.

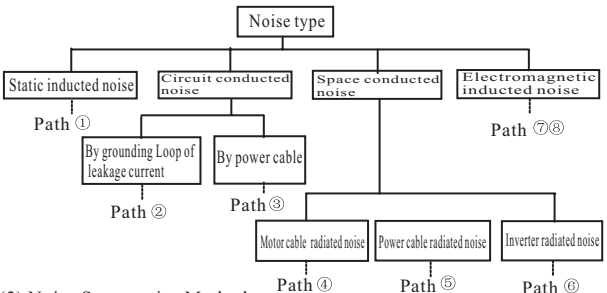
3.7 EMC Installation Instruction

Inverter outputs PWM wave, it will produce electromagnetic noise. To reduce the interference, EMC installation will be introduced in this section from noise suppression, wire connection, grounding, leakage current and filter of power supply.

3.7.1 Noise Suppression

(1) Noise Type

Noise is unavoidable during inverter operation. Its influence over peripheral equipment is related to the noise type, transmission means, as well as the design, installation, wiring and grounding of the driving system.



(2) Noise Suppression Methods

Table 2-5 Noise suppression methods

Path	Noise suppression methods
②	**If a closed loop is formed between the peripheral equipment and the inverter wiring, the grounding leakage of the inverter will misoperate the equipment. Solution: Remove the grounding of the peripheral equipment.**
③	**When peripheral equipment share the same power source with the inverter, the noise transmitted through the power line may misoperate the peripheral equipment. Solution: Mount a noise filter at inverter input side, or isolate the peripheral equipment with an isolated transformer or power filter.**
④⑤⑥	**Electronic equipment such as computers, measuring meters, sensors and radio equipment , when in the same cabinet with inverter, with their wiring close to the inverter, may misoperate due to radio interference. Solution: (1) The susceptible equipment and its signal lines should be kept away from the inverter. Use shielded cable for the signal line. Ground the shielding coat. Protect the signal cable with a metal pipe and keep it off the inverter input/output cable. When crossing of the signal line and the inverter input/output cables is inevitable, make sure it is orthogonal. (2) Mount radio noise filter or linear noise filter (choke coil) to the input/ output side of the inverter to suppress the radio noise. (3) The shielding coat for the cable connecting inverter and the motor should be thick. The wiring can be arranged through thick pipe (2mm or thicker) or cement trench. The cable should be through a metal pipe, and has its shilding coat grounded. You may use the 4-core cable as the motor power cable. Ground one core at inverter side, with the other end of it connected to the motor case.**
①⑦⑧	**When the signal cables are parallel to , or bound together with the power cables, the static and electromagnetic induction will cause the noise transmit through the signal cable, misoperating the related equipment. Solution: (1) Avoid laying the signal cables parallel to the power cable, or bind them together. (2) Keep the susceptible peripheral equipment away from the inverter. (3) Keep the susceptible signal babies away from the input/output cables of inverter. Shielded cables should be used as the signal or power cable. Lead them through metal pipes respectively would achieve better effect. The metal pipes should be at least 20cm away from each other.**

3.7.2 Wiring Connection and Grounding

(1) Please try not to wire motor cable (from inverter to motor) in parallel with power cable and keep at least 30cm from each other.

(2) Please try to arrange the motor cable through metal pipe or in metal wiring groove.

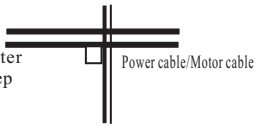


Fig. 3-16 Orthogonal wiring

(3) Please use shielded cabel as control signal cable, and connect the shielding coat to PE terminal of inverter with proximal grounding to inverter.

(4) PE grouding cable shouldbe directly connected to theearth plate.

(5) The control signal cable should not be in parallel with strong electricity cable (power cable/motor cable). They should not be bent together and should be kept away as least 20cm from each other. If cable crossing is inevitable, please make sure it is orthogonal as Fig.3-16.

(6) Please ground the control signal cable separately with power cable /motor cable.

(7) Please don't connect other devices to inverter power input terminals(R,S,T/R,T).

Chapter 4 Running of Inverter

4.1 Running of Inverter

4.1.1 Running Command Channels

There are three channels for inverter receiving commands like START,STOP, JOG and others.

Control panel

Use RUN 、STOP RESET 、JOG REV Keys on the panel to control the inverter. (Factory default)

Control terminal

Use terminal FWD, REV, COM to constitute a 2-wire control mode, or use one of terminals among X1~X6 and FWD, REV to constitute a 3-wire control mode.

Serial port

Use upper computer (PC/PLC) or host inverter to control slave inverter to start or stop via serial port.

The command channels can be selected by setting Function Code P0.03, or by multifunctional input terminal (function code P4.00-P4.07).

Note: These three channels are all switchable. Please make debugging before switch so as to avoid equipment damage and personal injury.

4.1.2 Frequency setting channel

There are 8 kinds of frequency setting channels as follow.
0: by control panel potentiometer
1: by ▼、▲ control panel keys
2: digital setting by function code via control panel
3: via terminal UP/DOWN
4: by upper computer via serial port
5: analog setting via VI terminal
6: analog setting via CI terminal
7: via pulse terminal
8: combination setting

4.1.3 Inverter Running States

There are two inverter running states which are stopping state and running state.

Stopping state: The inverter is in stopping state before running control command is accepted after the power is on or deceleration to stop.

Running state: After running control command is accepted, the inverter enters running state.

4.1.4 The Running Modes of Inverter

There are five running modes according to priority which are JOG running, close loop running, PLC running, multi-stage speed running, normal running as shown in Fig.4-1.

0: JOG running
In stopping state, after receiving JOG running command, the inverter will run according to JOG frequency, for example, by pressing control panel JOG/REV key to give JOG command (refer to function code P3.06~P3.08).

1: Close loop running
By setting close loop running control parameter effective (P7.00=1), the inverter will enter close loop running, that is PI regulation (refer to function code P7). To make close loop running invalid, please set multifunctional input terminal (function 27) and switch to lower level running mode.

2: PLC running
By setting PLC function parameter effective (P8.00 units≠0), the inverter will enter PLC running mode and go to run according to preset running mode (refer to function code P8). To make PLC running invalid, please set multifunctional input terminal (function 29) and switch to lower level running mode.

3: Multi-stage speed running
By setting non-zero combination of multifunctional input termianl (function 1,2,3) and selecting multi-frequency 1-7, the inverter will enter multi-stage speed running mode (refer to function code P3.26~P3.32).

4: Normal running
Simple open loop running mode of inverter.

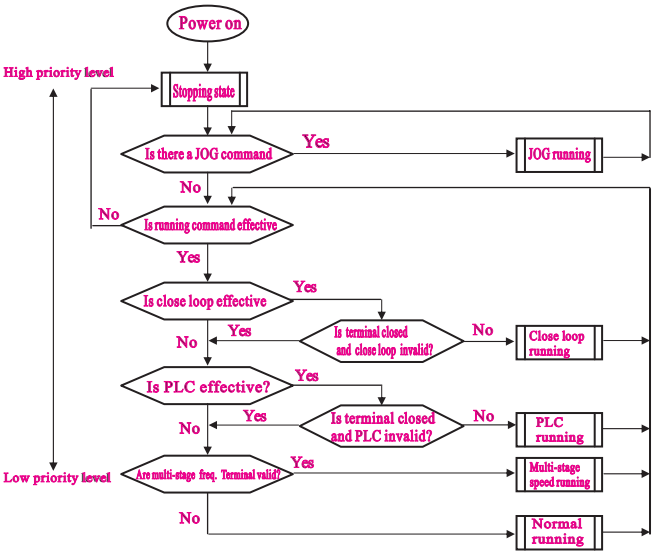


Fig.4-1 Running mode logicdiagram

The above 5 kinds of running modes can be running in multiple frequency setting channel except JOG running. PLC running, multi-stage speed running and normal running can carry out swing frequency conditioning.

4.2 Operation and Using of the Control Panel

4.2.1 Control Panel Layout

User can perform inverters' start, speed modulation, stop, braking, setup the running parameters and control peripheral equipment through control panel and control terminal.

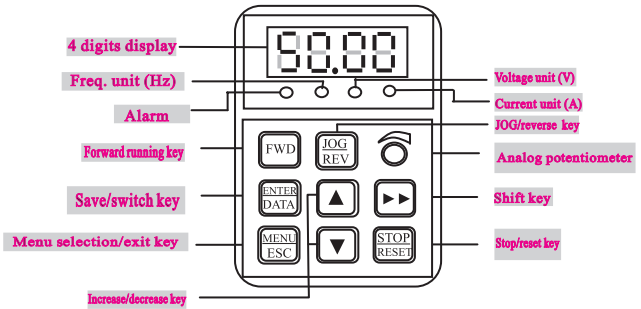


Fig. 4-2 Control panel diagram

4.2.2 Control Panel Function

There are 8 keys and 1 analog potentiometer on the inverter's panel. The function are shown as follow.

Key	Name	Function
FWD	Forward running key	Press this key to forward run.
STOP RESET	Stop/reset key	In the panel control mode, press this key to stop inverter running, and reset in fault state.
MENU ESC	Menu selection/exit key	Enter or exit programming state
JOG REV	JOG/reverse key	In the panel control mode, press this key for JOG running or reverse running. P3.45=0, press this key for JOG running. P3.45=1, press this key for reverse running.
▲	Increase key	Increase of data or code
▼	Decrease key	Decrease of data or code
▶▶	Shift key	In the programming state, press this key to change the data's revising bit. In the other state, press this key to display monitoring parameters.
ENTER DATA	Save/switch key	In the programming state, press this key to enter the next menu or save the function code data.

	Analog potentiometer	In potentiometer control mode (P0.01=0), the output frequency can be controlled by regulating this potentiometer.

4.2.3 LED Display and Indictor Description

There are a 4 digits LED display,3 unit indicators and 3 state indicators. These 3 unit indicators have 6 kinds of combinations corresponding to 6 kinds of unit indicating as Fig.4-3.

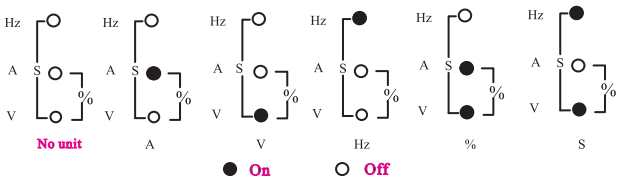


Fig. 4-3 Indicator state and unit indicating

There are 3 state indicators under LED display. From left to right they are FWD indicator, REV indicator, and ALM indicator.

Table 4-2 State indicator description

Item			Function Description	
Display function	LED digital display		Display inverter's running state parameters and setting parameters.	
	State indicator	FWD	When the motor is running forward, this indicator is on.	When the inverter is in DC braking state, the FWD and REV indictor are on at the same time.
		REV	When the motor is running reverse, this indicator is on.	
		ALM	When there is a fault alarm, this indicator is on.	

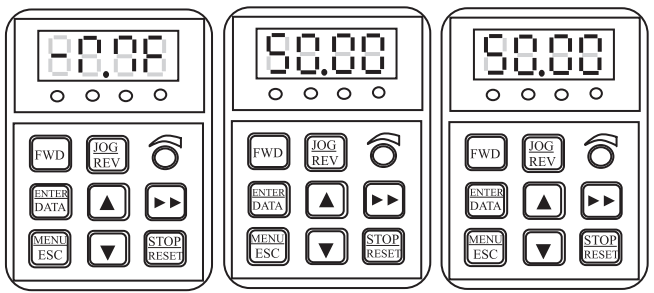
4.2.4 Control Panel Display State

The control panel display state includes parameter displaying in stopping state, function code parameter displaying in programming state, fault displaying in alarm state, and parameter displaying in running state.

A. Parameter displaying in stopping state

When inverter is in stopping state, panel displays stopping state monitoring parameter which usually is set frequency (b-01 monitoring parameter) shown as Fig.4-4 B.

Press ▶▶ key to display the other monitoring parameter (The inverter default displays the first 7 monitorting paratmeters of b group. The other parameters can be defined by function code P3.41 and P3.42. Please refer to Chapter 5.3). When in parameter displaying, press ENTER DATA key for switching to default display parameter b-01, that is setting frequency, or it will always be displaying the monitoring parameter displayed last time.



A. Initializing after power on B. Display and flashing in stopping state C. Display without flashing in running state

Fig.4-4 Parameter display ininitialization, stopping and runningstate.

B. Parameter displaying in running state

The inverter enters running state after receiving effective running command, and the panel displays running state monitoring parameter. It default displays output frequency (b-00 monitoring parameter) shown as Fig.4-4 C.

Press ▶▶ key to display the other monitoring parameter (defined by function code P3.41 and 3.42). When in parameter displaing, press ENTER DATA key for switching to default display parameter b-00, that is output frequency, or it will always be displaying the parameter displayed last time.

C. Fault displaying in alarm state

The Inverter enters fault alarm display state after fault signal is detected. The displayed fault code will be flashing.

Press ▶▶ key to check fault related parameter. When checking fault retated parameter, press ENTER DATA key for switching to fault code display.

Press MENU ESC key to enter programming state to check P6 group parameter of fault information.

After troubleshooting, press STOP RESET key to reset the inverter (or via control terminal/serial port) If the fault still exists, it will keep displaying the fault code.

Note:
To some serious fault such as IGBT protection, over current, over voltage, etc. Don't reset the inverter before clearing the fault for sure, otherwise there is a danger of damage.

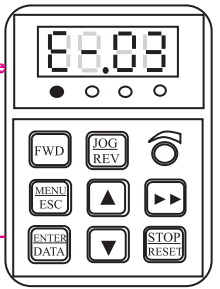


Fig. 4-5 Fault alarm display state

D. Function code programming state

In the state of stopping, running, and fault alarm, press MENU ESC key to enter programming state (A password is required, If it has been set. Please refer to P0.00 discription and Fig.4-10). The programming state includes three display menus shown as Fig.4-6 which in order are function code group→ function code number →function code parameter. Press ENTER DATA key to enter each menus. When in function code parameter display menu, press ENTER DATA key to save parameter, press MENU ESC key to go back to previous menu without parameter saving.

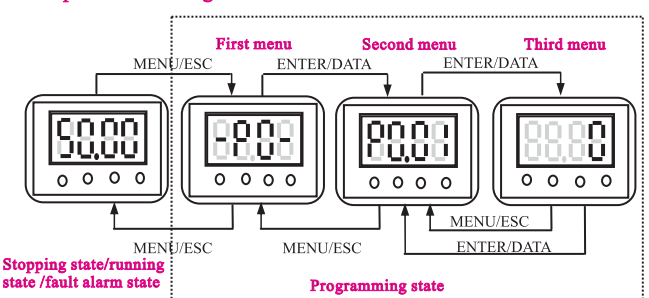


Fig. 4-6 Control panelprogramming state

4.2.5 Control Panel Operation

A. Switching display of state monitoring parameter

Press ▶▶ key to display b group state monitoring parameter. It first displays the order of monitoring parameter, after 1 second, it switches automatically to display the value of this monitoring parameter shown as Fig.4-7.

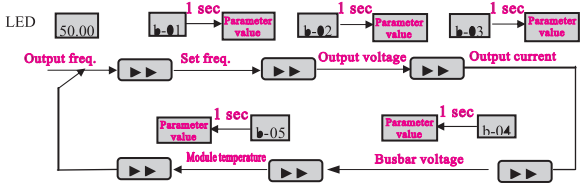


Fig. 4-7 Operation to display monitoring parameter

(1) Only 7 parameters (b-00~b-06) are displayed in factory default setting. User can view the other monitoring parameter by revising function code P3.41 and P3.42.

(2) When viewing monitoring parameter, press MENU ESC key for switching to default monitoring parameter display state. Default monitoring parameter is setting frequency in stopping state, and default monitoring parameter in running state is output frequency.

B. Function code parameter setting

For example, to set parameter code P3.06 from 5.00Hz to 8.50Hz.

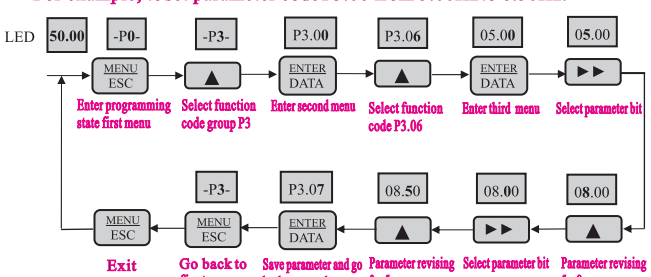


Fig. 4-8 Example of function code parameter setting

Note: In third menu, if the parameter displayed is not in flashing, it means that this function code is unable to be revised. Probably the reasons are:

(1) This function code parameter is unmodifiable, such as actual detected state parameter, record running parameter, etc.

(2) This function code parameter can not be revised in running state. It just can be revised in stopping state.

(3) The parameter is under protection. When function code P3.01 unit's place is 1 or 2, all function code parameter can not be revised. This is parameter protection to avoid fault operation. Set P3.01 unit's place as 0 to make modification available.

C. JOG running operation

Following is an example. Suppose it is in panel control mode and in stopping state, JOG running frequency is 5Hz.

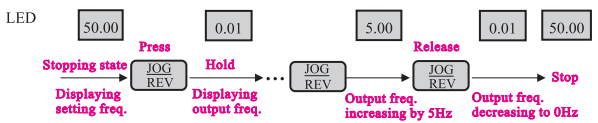


Fig.4-9 JOG running operation

D. Password authentication operation

Suppose P9.14 password parameter has been set as "2345". The authentication operation is shown as Fig. 4-10. The bold figure represents the flashing bit.

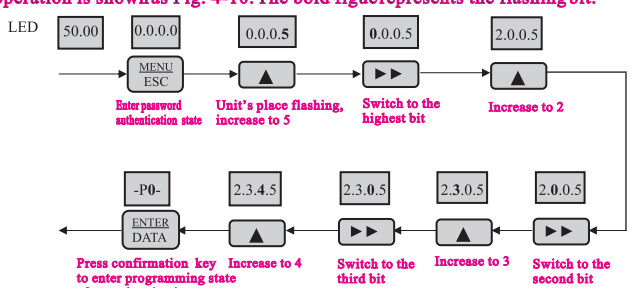


Fig. 4-10 Example of password authentication operation

E. Inquiring fault related parameter

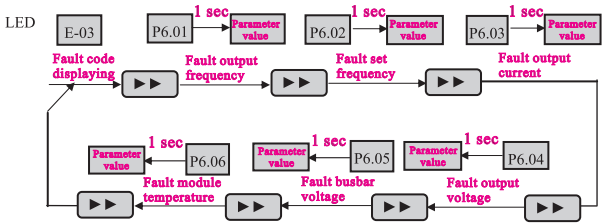


Fig. 4-11 Example of inquiring fault related parameter

Note:

(1) In fault code display state, press ►► key to inquire P6 group function code parameter. The range is from P6.01 to P6.06. After pressing ►► key, LED first displays function code, and 1 second later it displays automatically the value of this function code parameter.

(2) When inquiring fault paramter, press MENU ESC key to switch back to fault code display state.

F. Frequency defined operation by control panel ▲、▼ keys

Suppose it is in stopping state and P0.01=1, the operation is as follow.

(1) Frequency integral adjustment.

(2) As press ▲ key and hold it, LED begins to increase from unit's place to ten's place, and then to hundred's place. If release ▲ key and then press ▲ key again, LED will increase from unit's place again.

(3) As press ▼ key and hold it, LED begins to decrease from unit's place to ten's place , and then to hundred's place. If release ▼ key and then press ▼ key again, LED will decrease from unit's place again.

G. Control panel key lock operation

Press MENU ESC key for 5 seconds to lock control panel key. It displays 'LOCC', as panel locked.

H. Control panel key unlock operation

Press MENU ESC key for 5 seconds to unlock control panel key.

4.3 Power Applied for Inverter

4.3.1 Inspection Before Power Applied

Please perform cable connection according to the requirements in manual.

4.3.2 First Power Applied Operation

After inspecting canble connection and power source for sure, switch on inverter input AC power switch. The inverter's LED on control panel will display dynamic start menu. When it displays set frequency, it means initialization has been completed.

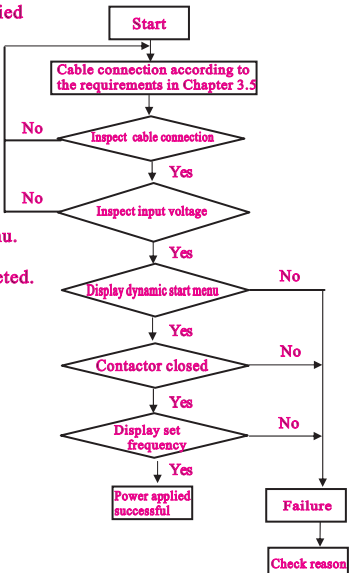


Fig. 4-12 Inverter first power applied operation process

Chapter5 Function Parameter Table

5.1 Symbol Description

"○": means that the parameter can be revised during running state.

"×": means that the parameter can not be revised during running state.

"*": means read-only parameter which can not be revised.

5.2 Function Code Table

P0 Group: Basic running function parameter					
Func. Code	Name	Range	Min. Unit	Factory Default	Change
P0.00	Control mode selection	0: V/F Control 1: Sensorless vector control	1	0	○
P0.01	Freq.control channel selection	0: Analog potentiometer on control panel 1: ▲、▼ key on control panel 2: Digital setting 1, control panel given 3: Digital setting 2, UP/DOWN terminal given 4: Digital setting 3, serial port given 5: VI analog given (VI-GND) 6: CI analog given (CI-GND) 7: Pulse terminal given 8: Combination given (refer to P3.00)	1	0	○
P0.02	Initial digital set freq.	P0.19 lower limit freq.~P0.20 upper limit freq.	0.01HZ	50.00HZ	○
P0.03	Running command mode seleciton	0: Control panel mode 1: Terminal control mode 2: Serial port control mode	1	0	○
P0.04	Running direction setting	Unit's place: 0: Forward 1:Reverse Ten's place: 0:REV allowed REV 1:REV prohibited	1	10	○
P0.05	FWD/REV dead time	0.0~120.0s	0.1s	0.1s	○
P0.06	Max output freq.	50.00Hz~500.00Hz	0.01Hz	50.00Hz	×
P0.07	Basic running freq.	1.00Hz~500.00Hz	0.01Hz	50.00Hz	×
P0.08	Max output voltage	1~480V	1V	Inverter rated voltage	×
P0.09	Torque boost	0.0%~30.0%	0.1%	2.0%	×
P0.10	Torque boost cut-off freq.	0.00Hz~Basic running freq.P0.07	0.00	25.00Hz	○
P0.11	Torque boost mode	0:Manual 1:Auto	1	0	○
P0.12	Carrier freq.	1.0K~14.0K	0.1K	8.0K	×
P0.13	Acc/Dec mode selection	0: Linear Acc/Dec 1: Curve Acc/Dec	1	0	×

P0 Group: Basic running parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P0.14	Time of Scurve start stage	10.0%~50.0% (Acc/Dec time) P0.14+P0.15 ≤ 90%	0.1%	20.0%	○
P0.15	Time of Scurve ascent stage	10.0%~80.0% (Acc/Dec time) P0.14+P0.15 ≤ 90%	0.1%	60.0%	○
P0.16	Acc/Dec time unit	0: Second 1: Minute	0	0	×
P0.17	Acc time 1	0.1~6000.0	0.1	20.0	○
P0.18	Dec time 1	0.1~6000.0	0.1	20.0	○
P0.19	Upper limit freq.	Lower limit freq.~Max output freq.P0.06	0.01Hz	50.00Hz	×
P0.20	Lower limit freq.	0.00Hz~Upper limit freq.	0.01Hz	0.00Hz	×
P0.21	Lower limit freq. Running mode	0: Running at lower limit freq. 1: Stopping	1	0	×
P0.22	V/F curve setting	0: Constant torque curve 1: Reduced torque curve 1 (1.2 times the power) 2: Reduced torque curve 2 (1.7 times the power) 3: Reduced torque curve 3 (2.0 times the power) 4: Customized V/F curve	1	0	×
P0.23	V/F Freq.valueP3	P0.25 ~ P0.07 Basic running freq.	0.01Hz	0.00Hz	×
P0.24	V/F Volt.valueV3	P0.26 ~ 100.0%	0.1%	0.0%	×
P0.25	V/F Freq.valueP2	P0.27 ~ P0.23	0.01Hz	0.00Hz	×
P0.26	V/F Volt.valueV2	P0.28 ~ P0.24	0.1%	0.0%	×
P0.27	V/F Freq.valueP1	0.00~P0.25	0.01Hz	0.00Hz	×
P0.28	V/F Volt.valueV1	0~ P0.26	0.1%	0.0%	×

P1 Group: Frequency setting function parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P1.00	Analog filtering time constant	0.01~30.00s	0.01s	0.20s	○
P1.01	VI channel gains	0.01~9.99	0.01	1.00	○
P1.02	VI min given	0.00~P1.04	0.01Hz	0.00V	○
P1.03	Corresponding freq.to VI min given	0.00~ Upper limit freq.	0.01Hz	0.00Hz	○
P1.04	VI max given	P1.04~10.00V	0.01V	10.00V	○
P1.05	Corresponding freq.to VI max given	0.00~ Upper limit freq.	0.01Hz	50.00Hz	○

P1 Group: Frequency setting function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P1.06	CI channel gains	0.01～ 9.99	0.01	1.00	○
P1.07	CI min given	0.00～ P1.09	0.01V	0.00V	○
P1.08	Corresponding freq.to CI min given	0.00～ Upper limti freq.	0.01Hz	0.00Hz	○
P1.09	CI max given	P1.07 ～10.00V	0.01V	10.00V	○
P1.10	Corresponding freq.to CI max given	0.00～ Upper limti freq.	0.01Hz	50.00Hz	○
P1.11	Max input pulse freq.	0.1～20.0K	0.1K	10.0K	○
P1.12	Pulse min given	0.0～P2.14 (Pulse max given)	0.1K	0.0K	○
P1.13	Corresponding freq.to pulse min given	0.00～ Upper limit freq.	0.01Hz	0.00Hz	○
P1.14	Pulse max given	P1.12 (Pulse min given) ～P1.11 (Max input pulse freq.)	0.1K	10.0K	○
P1.15	Corresponding freq.to pulse max given	0.00～ Upper limti freq.	0.01Hz	50.00Hz	○

P2 Group: Start/Brake function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P2.00	Start running mode	0: Start from start freq. 1: Brake first, then start from start freq. 2: Track speed, then start.	1	0	×
P2.01	Start freq.	0.40～20.00Hz	0.01Hz	0.50Hz	○
P2.02	Start freq.running duration	0.0～30.0s	0.1s	0.0s	○
P2.03	DC brake current as start	0.0～80.0%	0.1%	0%	○
P2.04	DC brake time asstart	0.0～60.0s	0.1s	0.0s	○
P2.05	Stop mode	0: Dec 1: Free stop 2: Dec+DC brake	1	0	×
P2.06	Start freq.of DC brake as stop	0.0～15.00Hz	0.0Hz	3.00Hz	○
P2.07	DC brake time asstop	0.0～60.0s	0.1s	0.0s	○
P2.08	DC brake current as stop	0.0～80.0%	0.1%	0.0%	○

P3 Group: Auxiliary running parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P3.00	Freq.control channel combination	0: VI+CI 1: VI-CI 2: External pulse given +VI+control panel ▲、▼ key given 3: External pulse given -VI- control panel ▲、▼ key given 4: External pulse given +CI 5: External pulse given -CI 6: RS485 given +VI+ control panel ▲、▼ key given 7: RS485 given -VI- control panel ▲、▼ key given 8: RS485 given +CI+ control panel ▲、▼ key given 9: RS485 given -CI- control panel ▲、▼ key given 10: RS485 given +CI+ External pulse given 11: RS485 given -CI- External pulse given 12: RS485 given +VI+ External pulse given 13: RS485 given -VI- External pulse given 14: VI+CI+ control panel ▲、▼ key given + digital given (P0.02) 15: VI+CI- control panel ▲、▼ key given + digital given (P0.02) 16: MAX (VI, CI) 17: MIN (VI, CI) 18: MAX (VI, CI, PULSE) 19: MIN (VI, CI, PULSE) 20: VI, CI (Availability except 0,VI prior)	1	0	×
P3.01	Parameter initialization setting	LED unit's place: 0: All parameters are allowed to be revised. 1: All parameters are not allowed to be revised except this parameter itself. 2: All parameters are not allowed to be revised except P0.02 parameter and this parameter itself. LED ten's place: 0: Inaction 1: Factory default reset 2: Clear history fault record	1	0	×

P3 Group: Auxiliary running parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P3.02	Parameter copy	0:Inaction 1:Parameter upload 2:Parameter download Note: only valid in remote control mode	1	0	×
P3.03	Auto energy save running	0: Inaction 1: Action	1	0	×
P3.04	AVR function	0: Inaction 1: Always action 2: Inaction only in Dec	1	0	×
P3.05	Slip freq.compensation	0～150%	1%	0%	×
P3.06	JOG running freq.	0.10～50.00Hz	0.01Hz	5.00Hz	○
P3.07	JOG Acc time	0.1～60.0s	0.1s	20.0s	○
P3.08	JOG Dec time	0.1～60.0s	0.1s	20.0s	○
P3.09	Communication configuration	LED unit's place:baud rate selection 0: 1200BPS 1: 2400BPS 2: 4800BPS 3: 9600BPS 4: 19200BPS 5: 38400BPS LED ten's place:dataformat 0: 1－7－2 Format, without check 1: 1－7－1 Format, odd parity check 2: 1－7－1 Format, even parity check 3: 1－8－2 Format, without check 4: 1－8－1 Format, odd parity check 5: 1－8－1 Format, even parity check 6: 1－8－1 Format, without check LED hundred's place: communication mode 0: MODBUS, ASCII Mode 1: MODBUS, RTU Mode	1	005	×
P3.10	Local address	0～248 0:Broadcast address 248:Host address	1	1	×

P3 Group: Auxiliary running parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P3.11	Communication overtime detection time	0.0～1000.0s 0.0: Function invalid	0.1s	0.0s	×
P3.12	Local response delay	0～1000ms	1	5ms	×
P3.13	Multi-running running proportion	0.01～1.00	0.01	1.00	×
P3.14	Acc time2	0.1～6000.0	0.1	20.0	○
P3.15	Dec time2	0.1～6000.0	0.1	20.0	○
P3.16	Acc time3	0.1～6000.0	0.1	20.0	○
P3.17	Dec time3	0.1～6000.0	0.1	20.0	○
P3.18	Acc time4	0.1～6000.0	0.1	20.0	○
P3.19	Dec time4	0.1～6000.0	0.1	20.0	○
P3.20	Acc time5	0.1～6000.0	0.1	20.0	○
P3.21	Dec time5	0.1～6000.0	0.1	20.0	○
P3.22	Acc time6	0.1～6000.0	0.1	20.0	○
P3.23	Dec time6	0.1～6000.0	0.1	20.0	○
P3.24	Acc time7	0.1～6000.0	0.1	20.0	○
P3.25	Dec time7	0.1～6000.0	0.1	20.0	○
P3.26	Multi-stage freq.1	Lower limit freq.~Upper limit freq.	0.01Hz	5.00Hz	○
P3.27	Multi-stage freq.2	Lower limit freq.~Upper limit freq.	0.01Hz	10.00Hz	○
P3.28	Multi-stage freq.3	Lower limit freq.~Upper limit freq.	0.01Hz	20.00Hz	○
P3.29	Multi-stage freq.4	Lower limit freq.~Upper limit freq.	0.01Hz	30.00Hz	○
P3.30	Multi-stage freq.5	Lower limit freq.~Upper limit freq.	0.01Hz	40.00Hz	○
P3.31	Multi-stage freq.6	Lower limit freq.~Upper limit freq.	0.01Hz	45.00Hz	○
P3.32	Multi-stage freq.7	Lower limit freq.~Upper limit freq.	0.01Hz	50.00Hz	○
P3.33	Jump freq.1	0.00～500.00Hz	0.01Hz	0.00Hz	×
P3.34	Jump freq.1range	0.00～30.00Hz	0.01Hz	0.00Hz	×
P3.35	Jump freq.2	0.00～500.00Hz	0.01Hz	0.00Hz	×
P3.36	Jump freq.2range	0.00～30.00Hz	0.01Hz	0.00Hz	×
P3.37	Jump freq.3	0.00～500.00Hz	0.01Hz	0.00Hz	×
P3.38	Jump freq.3range	0.00～30.00Hz	0.01Hz	0.00Hz	×
P3.39	Set running time	0～65.535K(Hour)	0.001K	0.000K	○
P3.40	Total running time	0～65.535K(Hour)	0.001K	0.000K	*

P3 Group: Auxiliary running parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P3.41	Display parameter selection 1	0000～1111 Unit's place: runningtime 0: No display 1: Display Ten's place:input/output terminal state 0: No display 1: Display Hundred's place:analog input VI 0: No display 1: Display Thousand's place:analog input CI 0: No display 1: Display	1	0000	○
P3.42	Display parameter selection 2	0000～1111 Unit's place: external pulse input 0: No display 1: Display Ten's place:external counts value 0: No display 1: Display Hundred's place: actuallength 0: No display 1: Display	1	0000	○
P3.43	Display parameter selection 3	00～13	1	00	○
P3.44	No unit displayed coefficient	0.1～60.0	0.1	1.0	○
P3.45	JOG/REVcontrol	0:JOG running 1:Reverse running	1	0	×

P4 Group:Terminal control function parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P4.00	Input terminal X1 function selection	0: Idle terminal 1: Multi-stage speed control terminal 1 2: Multi-stage speed control terminal 2 3: Multi-stage speed control terminal 3 4: External FWD JOG control input 5: External REV JOG control input 6: Acc/Dec time terminal1 7: Acc/Dec time terminal 2 8: Acc/Dec time terminal 3 9: 3-wire control 10: Free stop input (FRS) 11: External stop command 12: Stopping DC brake input command DB 13: Inverter running prohibited 14: Freq.increase command(UP) 15: Freq.decrease command(DOWN) 16: Acc/Dec prohibited command 17: External reset input (clear fault) 18: Peripheral equipment fault input (normally open) 19: Freq. control channel selection 1 20: Freq. control channel selection 2 21: Freq. control channel selection 3 22: Command switched to terminal 23: Running command control mode selection 1 24: Running command control mode selection 2 25: Swing frequency selection 26: Swing frequency running reset 27: Close loop invalid 28: Simple PLC pause running command 29: PLC invalid 30: PLC Reset in stopping state 31: Freq.switch to CI 32: Counter trig signal input 33: Counter clear input	1	0	×

		34: External interrupt input 35: Pulse freq.input (only valid for X4) 36: Actual length clear input			
P4.01	Input terminal X2 function selection	Ditto	1	0	×
P4.02	Input terminal X3 function selection	Ditto	1	0	×
P4.03	Input terminal X4 function selection	Ditto	1	0	×
P4.04	Input terminal X5 function selection	Ditto	1	0	×
P4.05	Input terminal X6 function selection	Ditto	1	0	×
P4.06	Input terminal X7 function selection	Ditto	1	0	
P4.07	Input terminal X8 function selection	Ditto	1	0	
P4.08	FWD/REV running mode selection	0: 2-wire control mode 1 1: 2-wire control mode 2 2: 3-wire control mode 1 3: 3-wire control mode 2	1	0	×
P4.09	UP/DN Rate	0.01—99.99Hz/s	0.01	1.00Hz/s	○
P4.10	2-way open collector output terminal OC1 output selection	0: Inverter in running(RUN) 1: Freq.arrival signal(FAR) 2: Freq.level detected signal(FDT1) 3: Freq.level detected signal(FDT2) 4: Overload pre-alarm signal(OL) 5: Undervoltage locking(LU) 6: External fault stopping (EXT) 7: Output freq.upper limit(FH) 8: Output freq.lower limit(FL) 9: Inverter in zero speed running 10: Simple PLC stage running finish 11: A PLC running cycle finish 12: Set counts arrival	1	0	×

		13: Specified counts arrival 14: Inverter ready for running(RDY) 15: Inverter fault 16: Start freq.running time 17: DC brake time whenstart 18: DC brake time whenstop 19: Swing freq. upper/lower limit 20: Set running time arrival			
P4.11	Relay output selection	Ditto	1	0	×
P4.12	Freq.arrival detection range	0.00～50.00Hz	0.01Hz	5.00Hz	○
P4.13	FDT1(freq.level)	0.00～Upper limit freq.	0.01Hz	10.00Hz	○
P4.14	FDT1 lag	0.00～50.00Hz	0.01Hz	1.00Hz	○
P4.15	FDT2(freq.level)	0.00～Upper limit freq.	0.01Hz	10.00Hz	○
P4.16	FDT2 lag	0.00～50.00Hz	0.01Hz	1.00Hz	○
P4.17	Analog output (AO) selection	0: Output freq.(0~upper limit freq.) 1:Output current(0~2 times motor rated current) 2:Output voltage(0~1.2 times inverter rated voltage) 3: Busbar voltage (0～800V) 4: PID given 5: PID feedback 6: VI (0～10V) 7: CI(0～10V/4～20mA)	1	0	○
P4.18	Analog output (AO) gain	0.50～2.00	0.01	1.00	○
P4.19	DO output terminal function selection	0: Output freq.(0~upper limit freq.) 1:Output current(0~2 times motor rated current) 2:Output voltage(0~1.2 times inverter rated voltage) 3: Busbar voltage (0～800V)	1	0	○

		4: PID given 5: PID feedback 6: VI (0～10V) 7: CI(0～10V/4～20mA)			
P4.20	DO max pulse output freq.	0.1K～20.0K (Max 20KHz)	0.1KHz	10.0KHz	○
P4.21	Set counts given	F4.20～9999	1	0	○
P4.22	Specified counts given	0～F4.19	1	0	○
P4.23	Overload pre-alarm detection level	20%～200%	1	130%	○
P4.24	Overload pre-alarm delay time	0.0～20.0s	0.1s	5.0s	○
P4.25	2-way open collector output terminal OC2 output selection	Same as P4.10	1	0	×

P5 Group: Protection function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P5.00	Motor overload protection mode selection	0: Stop outputting 1: Inaction	1	0	×
P5.01	Motor overload protection coefficient	20～120%	1	100%	×
P5.02	Overvoltage stall selection	0: Prohibited 1: Allowed	1	1	×
P5.03	Overvoltage stall point	380V: 120～150% 220V: 110～130%	1%	140% 120%	○
P5.04	Auto current limit level	110%～200%	1%	150%	×
P5.05	Freq.drop rate during current limit	0.00～99.99Hz/s	0.01Hz/s	10.00Hz/s	○
P5.06	Auto current limit mode selection	0: Constant speed invalid 1: Constant speed valid Note: Acc/Dec valid	1	1	×
P5.07	Restart setting after power failure	0: Inaction 1: Action	1	0	×

P5.08	Restart waiting time after power failure	0.0～10.0s	0.1s	0.5s	×
P5.09	Fault self-recovery times	0～10 0: Self-recovery invalid Note: Self-recovery invalid in overload or overheat	1	0	×
P5.10	Self-recovery interval time	0.5～20.0s	0.1s	5.0s	×
P5.11	Output missing phase protection	0. Inaction 1. Action	1	1	×

P6 Group: Fault record function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P6.00	Last fault record	Last fault record	1	0	*
P6.01	Output freq.in last fault	Output freq.in last fault	0.01Hz	0	*
P6.02	Set freq.in last fault	Set freq.in last fault	0.01Hz	0	*
P6.03	Output current in last fault	Output current in last fault	0.1A	0	*
P6.04	Output voltage in last fault	Output voltage in last fault	1V	0	*
P6.05	DC busbar voltage in last fault	DC busbar voltage in last fault	1V	0	*
P6.06	Module temperature in last fault	Module temperature in last fault	1℃	0	*
P6.07	Last 2 fault record	Last 2 fault record	1	0	*
P6.08	Last 3 fault record	Last 3 fault record	1	0	*
P6.09	Last 4 fault record	Last 4 fault record	1	0	*
P6.10	Last 5 fault record	Last 5 fault record	1	0	*
P6.11	Last 6 fault record	Last 6 fault record	1	0	*

P7 Group: Close loop running control function parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P7.00	Close loop running control selection	0: Invalid 1: Valid	1	0	×
P7.01	Close loop given channel selection	0: Digital given 1: VI analog 0~10V voltage given 2: CI analog given	1	1	○
P7.02	Feedback channel selection	0: VI analog 0~10V input voltage 1: CI analog input 2: VI+CI 3: VI-CI 4: Min {VI, CI} 5: Max {VI, CI}	1	1	○
P7.03	Given channel filtering time constant	0.01~50.00s	0.01s	0.50s	○
P7.04	Feedback channel filtering time constant	0.01~50.00s	0.01s	0.50s	○
P7.05	Given value digital setting	0.00~10.00V	0.01V	0.00V	○
P7.06	Min given value	0.0~ Max given value P7.08	0.1%	0.0%	○
P7.07	Feedback value to min given value	0.0~100.0%	0.1%	0.0%	○
P7.08	Max given value	Min given value P7.06~100.0%	0.1%	100.0%	○
P7.09	Feedback value to max given value	0.0~100.0%	0.1%	100.0%	○
P7.10	Proportional gain(KP)	0.000~9.999	0.001	0.050	○
P7.11	Integral gain(KI)	0.001~9.999	0.001	0.050	○
P7.12	Sampling period(T)	0.01~10.00S	0.01	1.00	○
P7.13	Deviation limit	0.0~20.0%	1%	2.0%	○
P7.14	Close loop adjustment characteristics	0: Positive effect 1: Negative effect	1	0	×
P7.15	Integral adjustment selection	0: Freq.upper/lower limit arrival, integral adjustmen stops. 1: Freq.upper/lower limit arrival, integral adjustmen continues.	1	0	×
P7.16	Close loop preset freq.	0~ Upper limit freq.	0.01Hz	0.00Hz	○
P7.17	Close loop preset freq.hold time	0.0~250.0s	0.1s	0.1s	×

P7.18	Awakening threshold	0.00~500.00Hz	0.01Hz	0.01Hz	×
P7.19	Awakening hysteresis	0.00~500.00Hz	0.01Hz	0.01Hz	×
P8 Group: PLC running parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
P8.00	PLC running mode selection	0000~1113 LED unit's place: mode selection 0: Inaction 1: Stop after single cycle 2: Running at final freq after single cycle 3: Continuous cycle LED ten's place: restart mode selection 0: Restart from the firststage 1: Restart from the freq.of break stage LED hundred's place:parameter save mode selection 0: No save 1: Save LED thousand's place:running time unit 0: Second 1: Minute	1	0000	×
P8.01	Stage 1 setting	000~621 LED unit's place: freq setting 0: Multi-stage freq i (i=1~7) 1: Freq.defined by P0.01 function code LED ten's place: direction selection 0: Forward 1: Reverse 2: Controlled by running command LED hundred's place:Acc/Dec time selection 0: Acc/Dec time 1 1: Acc/Dec time 2 2: Acc/Dec time 3	1	000	○

		3：Acc/Dec time 4 4：Acc/Dec time 5 5：Acc/Dec time 6 6：Acc/Dec time 7			

P8 Group: PLC running parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P8. 02	Stage 1 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 03	Stage 2 setting	000～621	1	000	○
P8. 04	Stage 2 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 05	Stage 3 setting	000～621	1	000	○
P8. 06	Stage 3 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 07	Stage 4 setting	000～621	1	000	○
P8. 08	Stage 4 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 09	Stage 5 setting	000～621	1	000	○
P8. 10	Stage 5 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 11	Stage 6 setting	000～621	1	000	○
P8. 12	Stage 6 running time	0. 1～6000. 0	0. 1	10. 0	○
P8. 13	Stage 7 setting	000～621	1	000	○
P8. 14	Stage 7 running time	0. 1～6000. 0	0. 1	10. 0	○

P9 Group: Swing frequency function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P9. 00	Swing freq.selection	0：Inaction 1：Action	1	0	×
P9. 01	Swing freq.running mode	0000～11 LED unit's place:start mode 0：Auto start 1：Manual start by terminal LED ten's place:swing amplitude control 0:Variable swing amplitude 1:Fixed swing amplitude	1	00	×
P9. 02	Preset swing freq.	0. 00～500. 00Hz	0. 01Hz	0. 00Hz	○
P9. 03	Preset swing freq.waiting time	0. 0～3600. 0s	0. 1s	0. 0s	○

P9. 04	Swing amplitude	0. 0～50. 0%	0. 1%	0. 0%	○
P9. 05	Kick freq.	0. 0～50. 0%	0. 1%	0. 0%	○
P9. 06	Swing freq.cycle	0. 1～999. 9s	0. 1s	10. 0s	○
P9. 07	delta wave ascent time	0. 0～98. 0%	0. 1%	50. 0%	○
P9 08	Set length	0 000 ～ 65 535(km)	0. 001km	0 000km	○

P9 Group: Swing frequency function parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
P9. 09	Actual length	0. 0～65. 535km (Auto save when power failure)	0. 001km	0. 000km	○
P9. 10	Length magnification	0. 001～30. 000	0. 001	1. 000	○
P9. 11	Length correction coefficient	0. 001～1. 000	0. 001	1. 000	○
P9. 12	Measurement axis circumference	0. 01～100. 00cm	0. 01cm	10. 00cm	○
P9. 13	Axis pulse	1～9999	1	1	○
P9. 14	User password	1～9999	1	0	○

PA Group: Vector control parameter

Func. Code	Name	Range	Min. Unit	Factory default	Change
PA. 00	Motor parameter self-learning function	0：Inaction 1：Resting self-learning	1	0	×
PA. 01	Motor rated voltage	0～400V	1	Depends on model type	×
PA. 02	Motor rated current	0. 01～500. 00A	0. 01A	Depends on model type	×
PA. 03	Motor rated frequency	1～500Hz	1Hz	Depends on model type	×
PA. 04	Motor rated rotating speed	1～9999 r/min	1r/min	Depends on model type	×
PA. 05	Motor poles number	2～16	1	Depends on model type	×
PA. 06	Motor stator inductance	0. 1～5000. 0mH	0. 1mH	Depends on model type	×
PA. 07	Motor rotor inductance	0. 1～5000. 0mH	0. 1mH	Depends on model type	×
PA. 08	Motor stator and rotor mutual inductance	0. 1～5000. 0mH	0. 1mH	Depends on model type	×
PA. 09	Motor stator resistance	0. 001～50. 000Ω	0. 001Ω	Depends on model type	×
PA. 10	Motor rotor resistance	0. 001～50. 000Ω	0. 001Ω	Depends on model type	×
PA. 11	Overcurrent protection coefficient of torque current	0～15	1	15	×
PA. 12	Proportion adjustment coefficient of speed deviation	50～120	1	85	×
PA. 13	Integral adjustment coefficient of speed deviation	100～500	1	360	×

PA. 14	Vector torque boost	100～150	1	100	×
PA. 15	Reserved	0	0	0	×
PA. 16	Reserved	1～5	1	4	×
PA. 17	Reserved	100～150	1	150	×
PA. 18	Reserved	150	1	150	×
PA. 19	Reserved	0～2	1	0	

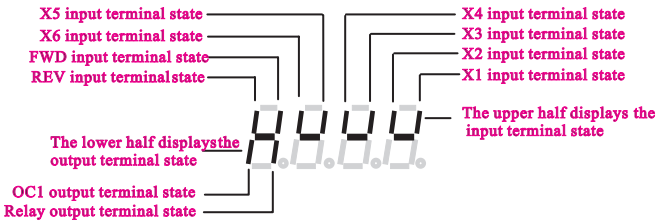
PF Group: Factory function parameter					
Func. Code	Name	Range	Min. Unit	Factory default	Change
PF. 00～PF. 10	Reserved	—	—	—	—

5.3 State Monitoring Parameter Table

B-Monitoring function parameter					
Func. Code	Name	Discription	Min. Unit	Factory default	Change
b-00	Output freq.	Present output freq.	0. 01Hz		*
b-01	Set freq.	Present set freq.	0. 01Hz		*
b-02	Output voltage	Effective value of present output voltage	1V		*
b-03	Output current	Effective value of present output current	0. 1A		*
b-04	Busbar voltage	Present DC busbar voltage	1V		*
b-05	Module temperature	IGBT heat sink temperature	1°C		*
b-06	Motor speed	Present motor speed	1r/min		*
b-07	Running time	One continuous running time	1 H		*
b-08	Input/output terminal state	Input/output terminal state	——		*
b-09	Analog input VI	Analog input VI value	0. 01V		*
b-10	Analog input CI	Analog input CI value	0. 01V		*
b-11	External pulse input	External pulse width input value	1 Ms		*
b-12	Inverter rated current	Inverter rated current	0. 1A		*
b-13	Inverter rated voltage	Inverter rated voltage	1V		*
b-14	No unit display	No unit display	1		
b-15	Inverter model type	Inverter model type	1		

5.4 Terminal Monitoring State

Note: Monitoring parameter input/output terminal state displayed as follow:



Note: | Means invalidity (LED OFF) / Means validity (LED ON)

Chapter 6 Function Code Description

6.1 Basic running function parameter (P0 Group)

P0.00	Control mode selection	Range: 0/1	1

0: V/F Control

1:Sensorless vector control

P0.01	Freq. control channel selection	Range: 0~8	0

0: Analog potentiometer given on control panel

1: Control panel ▲、▼ key given. Use ▲、▼ key to set running frequency.

2: Control panel frequency digital setting. Use control panel to amend P0.02 parameter (initial set freq.) to change set freq.

3: Terminal UP/DOWN digital setting. Use terminal UP/DOWN to amend P0.02 parameter (initial set freq.)to change set freq.

4: Serial port digital setting.(remote control mode) Set P0.02 parameter (initial set freq.)via serial port.

5: VI analog given (VI-GND). Set freq. controlled by VI terminal analog input voltage. The voltage range is DC 0~10V. The corresponding relationship between set freq. and VI input voltage defined by function code P1.00~P1.05.

6: CI analog given (CI-GND). Set freq. controlled by CI terminal analog input voltage/current. The input voltage range is DC 0~10V(JP3 jumper→V), and the current range is DC 4~20mA (JP3 jumper→A). The corrensponding relationship between set freq. and CI input defined by function code P.1.06-P1.10

7: Pulse terminal given. Set freq. controlled by terminal pulse (The pulse signal only can be input through X4 terminal.). The corrensponding relationship between set freq. and input pulse defined by function code P1.11-P1.15.

8: Combination given (refer to function parameter P3.00).

P0.02	Initial digital set freq.	Range: Lower limit freq. ~ Upper limit freq.	50.00Hz

In freq.digital setting (P0.01=1,2,3,4),P0.02 parameter defines the initial digital set frequency.

P0.03	Running command mode selection	Range: 0,1,2	0

0: Control panel mode. Use control panel RUN、STOP/RESET、JOG key to operate the inverter.

1: Terminal control mode. Use control terminal FWD, REV, X1~X6, etc. to operate the inverter.

2: Serial port control mode. Operate the inverter via serial port RS485 in remote control mode.

Note:

Running command mode can be switched by changing P0.03 parameter in stopping or running state. Please use this function in caution.

P0.04	Running direction setting	Range: 00~11	0

This function is effective in panel control mode, terminal control mode, and serial port control mode.

LED unit's place :

0: Running forward

1: Running reverse

LED ten's place:

0: Reverse allowed

1: Reverse prohibited

P0.05	FWD/REV dead time	Range: 0.0~120.0s	0. 0s

In switching process between forward and reverse running, the transition time as Fig.6-1 t1 is defined as FWD/REV dead time. The inverter outputs 0 freq. during transition time.

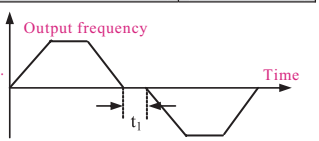


Fig.6-1 FWD/REV dead time

P0.06	Max. output freq.	Range: 50.00Hz~500.0Hz	50. 00Hz
P0.07	Basic running freq.	Range: 1.00Hz~500.0Hz	50. 00Hz
P0.08	Max. output voltage	Range: 1~480V	Rated voltage

Max. output freq. is the highest output frequency allowed shown as Fig. 6-2 Fmax. Basic running freq. is the lowest output frequency as inverter outputs the highest voltage. Generally it is motor rated frequency shown as Fig.6-2 FB. Max. output voltage is the output voltage as inverter outputs basic running frequency. Generally it is motor rated voltage shown as Fig.6-2 Vmax.

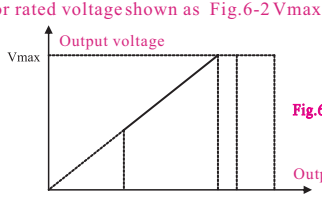
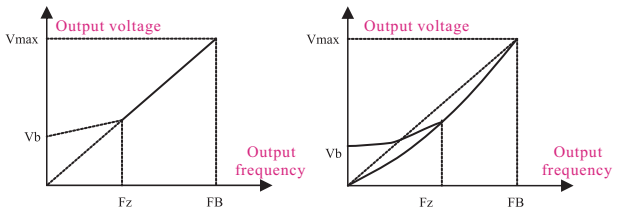


Fig.6-2 Fmax/FB/Vmax

FH,FL are the upper limit frequency and lower limit frequency respectively, defined by P0.19,P0.20 function parameter.

P0.09	Torque boost	Range: 0.0%~30.0%	2.0%

In order to compensate the low frequency torque, boost the output voltage in the low frequency zone shown as Fig.6-3.



Vb: manual torque boost voltage
Fz: torque boost cutoff frequency

(A) Constant torque curve torque boost

Vmax: highest output voltage
FB: basic running frequency

(B) Square torque curve torque boost

Fig.6-3 Torque boost

P0.10	Torque boost cutoff freq.	Range: 0.00Hz~basic running freq.	25.00Hz

This function defines the cutoff freq. in manual torque boost.

P0.11	Torque boost mode	Range: 0,1	0

0: Manual boost. In manual boost mode, torque boost voltage is defined by P0.09 parameter, which is fixed. But the motor is easy to reach magnetic saturation when light-load.

1: Auto. boost. In this mode, torque boost voltage is changed according to the change of motor stator current. The higher of stator current, the bigger of boost voltage.

$$\text{Boost voltage} = \frac{\text{P0.09}}{100} \times \text{Motor rated voltage} \times \frac{\text{Inverter output current}}{2 \times \text{Inverter rated current}}$$

P0.12	Carrier freq.	Range: 1.0K~14.0K	8.0K

The carrier freq. mainly affects the noise of motor and heat loss. The relationship between carrier freq. and motor noise, leakage current, and interference shown as follow.

Carrier freq.	Decrease	Increase
Noise	↑	↓
Leakage current	↓	↑
Interference	↓	↑

Note:

(1) In order to get better control characteristic, the ratio of carrier frequency to inverter highest running frequency is suggested beyond 36.

(2) Error occurs in current value display when carrier freq. is lower.

P0.13	Acc/Dec mode selection	Range: 0,1	0

0:Linear Acc/Dec. Output frequency increases or decreases as constant slope shown as Fig.6-4.

1:S curve Acc/Dec. Output frequency increases or decreases as s curve shown as Fig.6-5.

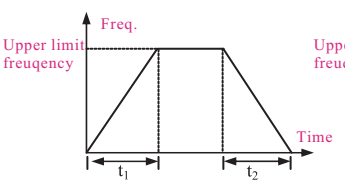


Fig.6-4 Linear Acc/Dec

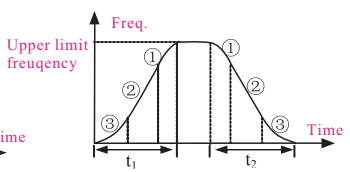


Fig.6-5 S curve Acc/Dec

P0.14	Time of s curve start stage	Range:10.0%~50.0%(Acc/Dec time), P0.14+P0.15<90%	20.0%
P0.15	Time of s curve ascent stage	Range:10.0%~80.0%(Acc/Dec time), P0.14+P0.15<90%	60.0%

P0.14,P0.15 is effective only in s curve Acc/Dec mode(P0.13=1).

S curve start stage time shown as Fig.6-5 ③. The curve slope is increasing from 0.
S curve ascent stage time shown as Fig.6-5 ② . The curve slope keeps constant.
S curve end stage time shown as Fig.6-5 ①. The curve slope is decreasing to 0.

Note:
S curve **Acc/Dec mode is suitable for the start and stop process of conveying load such as elevator, and belt conveyor, etc.**

P0.16	Acc/Dec time unit	Range: 0,1	0

0:Second

1:Minute

Note:

(1) This function is effective for all Acc/Dec process except for JOG running mode.
(2) Please try to select second as time unit.

P0.17	Acc time 1	Range: 0.1~6000.0	20. 0
P0.18	Dec time 1	Range: 0.1~6000.0	20. 0

Acc time is the time of inverter output frequency increasing from 0 to upper limit freq. shown as in Fig.6-6 t1.
Dec time is the time of inverter output frequency decreasing from upper limit freq. to 0 shown as Fig.6-6 t2.

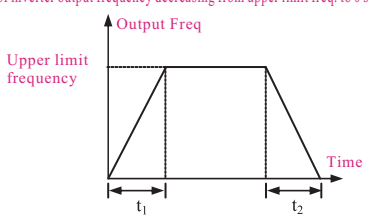


Fig.6-6 Acc/Dec time

Note:
(1)The inverter has 7 Acc/Dec time. Herein just 1 Acc/Dec is defined.
The other 2~7 Acc/Dec time are defined by P3.14~P3.25 function parameter.
(2) It can select time unit by P0.09 for all 1~7 Acc/Dec time. The factory default setting unit is second.

P0.19	Upper limit freq.	Range: Lower limit freq. ~ highest output freq.	50. 00Hz
P0.20	Lower limit freq.	Range: 0.00Hz ~ Upper limit freq.	0. 00HZ
P0.21	Lower limit freq. running mode	Range: 0: running at lower limit freq. 1: stopping	0

P0.19,P0.20 parameter defines the upper and lower limit of output frequency. FH,FL is upper limit frequency and lower limit frequency respectively shown as Fig.6-2.

When actual setting frequency is lower than lower limit freq., the inverter output frequency will decrease in Dec time which has been set. As it reaches the lower limit frequency, if P0.21=0 , the inverter will run at lower limit frequency. If P0.21=1, the inverter will keep decreasing the output frequency to 0.

P0.22	V/F Curve setting	Range: 0~4	0
P0.23	V/F Freq. value F3	Range: P0.25~P0.07 basic running Freq.	0. 00Hz
P0.24	V/F Volt. value V3	Range: P0.26~100%	0. 0%
P0.25	V/F Freq. value F2	Range: P0.27~P0.23	0. 00Hz
P0.26	V/F Volt. value V2	Range: P0.28~P0.24	0. 0%
P0.27	V/F Freq. value F1	Range: 0.00~P0.25	0. 00Hz
P0.28	V/F Volt. value V1	Range: 0~P0.26	0. 0%

These function parameter defines flexible V/F setting mode of inverter. User can select 4 fixed curves and 1 customized curve through P0.22 parameter so as to meet different load requirements.

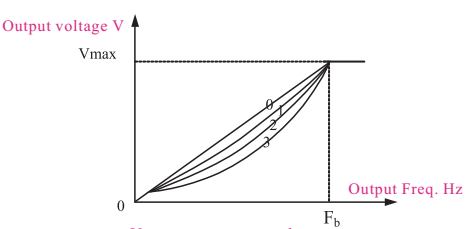
P0.22=0, Constant torque V/F curve shown as Fig.6-7 curve 0

P0.22=1, 1.2 times the power reduced torque V/F curve shown as Fig.6-7 curve 1

P0.22=2, 1.7 times the power reduced torque V/F curve shown as Fig.6-7 curve 2

P0.22=3, 2.0 times the power reduced torque V/F curve shown as Fig.6-7 curve 3

When inverter drives reduced torque load such as fans, and pumps, user can select 1/2/3 V/F curve running mode according to load characteristic so as to save energy.



Vmax: max. output voltage
Fb: basic running frequency

Fig.6-7 V/F curve

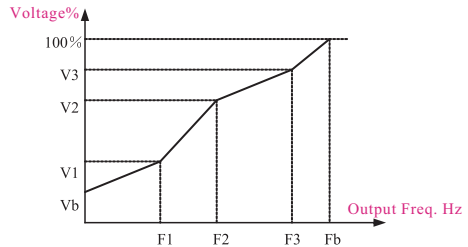


Fig.6-8 Customized curve

P0.22=4, Customized V/F curve shown as Fig. 6-8.
User can define V/F curve through revising (V1,F1),(V2,F2),(V3,F3) so as to meet special load requirements. Torque boost is available for customized curve.

Vb=Torque boost(P0.09) X V1

6.2 Frequency Setting Function Parameter (P1 Group)

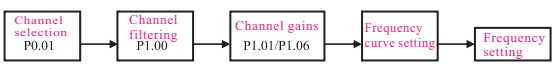
P1.00	Analog filtering time constant	Range:0.01~30.00s	0.20s

When adopts frequency external analog channel setting mode, the time constant for inverter filtering sampling value called as analog filtering time constant. When longer wiring or serious interference cause setting frequency unstable, increase this time constant to make improvement. The longer filtering time it has, the stronger anti-interference ability, but slower response. The shorter filtering time it has, the quicker response, but weaker anti-interference ability.

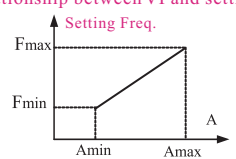
P1.01	VI channel gains	Range:0.01~9.99	1.00
P1.02	VI min.given	Range:0.00~P1.04	0.00V
P1.03	Corresponding freq to VI min.given	Range:0.00~upper limit freq	0.00Hz
P1.04	VI max.given	Range:P1.04~10.00V	10.00V
P1.05	Corresponding freq to VI max.given	Range:0.00~upper limit freq	50.00Hz
P1.06	CI channel gains	Range:0.01~9.99	1.00
P1.07	CI min.given	Range:0.00~P1.09	0.00V
P1.08	Corresponding freq to CI min.given	Range:0.00~upper limit freq	0.00Hz

P1.09	CI max.given	Range:P1.07~10.00V	10.00V
P1.10	Corresponding freq to CI max.given	Range:0.00~upper limit freq.	50.00Hz
P1.11	Max.input pulse freq.	Range:0.1~20K	10.0K
P1.12	Pulse min.given	Range:0.0~P1.14	0.0K
P1.13	Corresponding freq to pulse min.given	Range:0.00~upper limit freq.	0.00Hz
P1.14	Pulse max.given	Range:P1.12~P1.11	10.0K
P1.15	Corresponding freq to pulse max.given	Range:0.00~upper limit freq.	50.00Hz

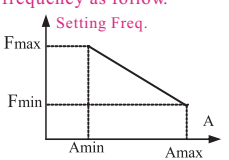
When selects VI, CI or pulse frequency input as open loop frequency setting channel, the relationship between frequency given and setting frequency as follow.



The relationship between VI and setting frequency as follow.



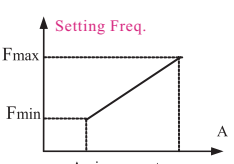
(1) Positive effect



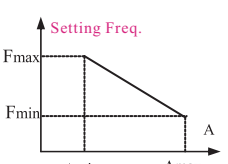
(2) Negative effect

A: VI given Amin: Min given Amax: Max given Fmin: corresponding Freq to Min given Fmax: corresponding Freq to Max given

The relationship between CI and setting frequency as follow.



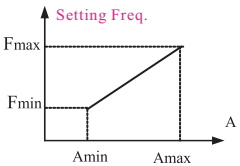
(1) Positive effect



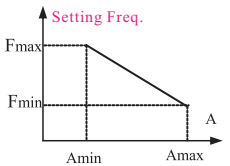
(2) Negative effect

A: CI given Amin: Min given Amax: Max given Fmin: corresponding Freq to Min given Fmax: corresponding Freq to Max given

The relationship between input pulse frequency and setting frequency as follow.



(1) Positive effect



(2) Negative effect

A: PULSE given Amin: Min given Amax: Max given

Fmin: corresponding Freq to Min given
Fmax: corresponding Freq to Max given

6.3 Start/Brake Function Parameter (P2 Group)

P2.00	Start running mode	Range: 0,1,2	0

0: The inverter starts from start freq.(P2.01) and keeps running at start freq. for a duration defined as start freq. running duration (P2.02).

1: The inverter brakes first by DC brake current (P2.03) and brake time (P2.04), and then starts from start frequency.

2: The inverter restarts again after speed tracking, which is available for power restored after momentary power failure and restart after fault reset.

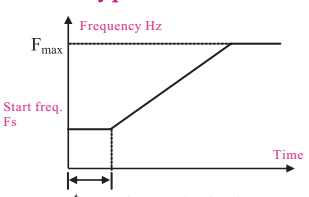


Fig.6-9 Start freq. and start freq. running duration

Note:

(1) Start running mode 0: It is suggested to use mode 0 in general applications and when to drive synchronous motor.

(2) Start running mode 1: It is suitable to small inertia loads which have FWD or REV running when there is no motor driven. But not suitable to big inertia loads.

(3) Start running mode 2: It is suitable to restart after momentary power failure and restart during motor free stopping.

P2.01	Start freq.	Range: 0.20~10.00Hz	0.50 Hz
P2.02	Start freq. running duration	Range: 0.0~30.00s	0.0S

Start freq. is the initial frequency when inverter starts shown as Fig.6-9 Fs.
Start freq. running duration is the duration time for inverter keeping running at start frequency shown as Fig.6-9 t1.

Note:
Start frequency is not restricted by lower limit freq.

P2.03	DC brake current as start	Range: 0~80(%)	0(%)
P2.04	DC brake time as start	Range: 0.0~60.0s	0.0S

DC brake current is a percentage relative to the inverter rated current.
There is no DC brake as DC brake time is 0.0s.

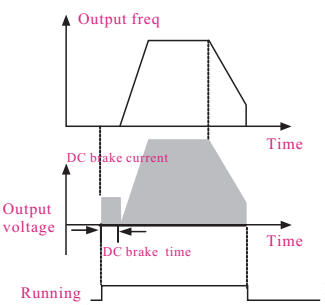


Fig.6-10 Start mode 1

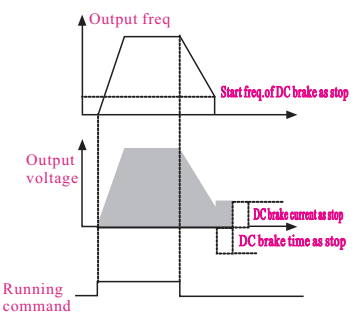


Fig.6-11 Dec to stop+ DC brake

P2.05	Stop mode	Range: 0,1,2	0

0: After receiving stop command, the inverter decreases the output frequency to 0 in set Dec time.

1: After receiving stop command, the inverter stops output immediately, and the load goes to stop by mechanical inertia. This is called as free stop.
2: After receiving stop command, the inverter decreases the output frequency in Dec time, when it reaches the start frequency of DC brake, the inverter begins to DC brake.

P2.06	Start freq. of DC brake as stop	Range: 0.0~15.00Hz	3.00Hz
P2.07	DC brake time as stop	Range: 0.0~60.0s	0.0S
P2.08	DC brake current as stop	Range: 0.0~80(%)	0(%)

DC brake current as stop is a percentage relative to the inverter rated current. There is no DC brake as DC brake time as stop is 0.0s.

6.4 Auxiliary Running Parameter (P3 Group)

P3.00	Freq. control channel combination	Range: 0~20	0

As P0.01 (frequency control channel selection)=8, It can set frequency control channel combination through the above parameter (P3.00)

0: VI+CI
1: VI−CI
2: External pulse given +VI+control panel ▲、▼ key given
3: External pulse given −VI− control panel ▲、▼ key given
4: External pulse given +CI
5: External pulse given −CI
6: RS485 given +VI+ control panel ▲、▼ key given
7: RS485 given −VI− control panel ▲、▼ key given
8: RS485 given +CI+ control panel ▲、▼ key given
9: RS485 given −CI− control panel ▲、▼ key given
10: RS485 given +CI+ External pulse given

11: RS485 given −CI− External pulse given
12: RS485 given +VI+ External pulse given
13: RS485 given −VI− External pulse given
14: VI+CI+ control panel ▲、▼ key given + digital given (P0.02)
15: VI+CI− control panel ▲、▼ key given + digital given (P0.02)
16: MAX (VI, CI)
17: MIN (VI, CI)
18: MAX (VI, CI, PULSE)
19: MIN (VI, CI, PULSE)
20: VI, CI (Availability except 0, VI prior)

P3.01	Parameter initialization setting	Range: LED unit's place 0~2 LED ten's place 0~2	00

LED unit's place:
0: All parameters are allowed to be revised.
1: All parameters are not allowed to be revised except this parameter itself.
2: All parameters are not allowed to be revised except P0.02 parameter and this parameter itself.

LED ten's place:
0: Inaction
1: Factory default reset
2: Clear history fault record

Note:
(1) The factory default setting of this function code parameter is 0, that is all the function code parameter are allowed to be revised.

(2) After factory default reset, each place of this function code recovers to 0 automatically.

P3.02	Parameter copy	Range:0,1,2	0

0:Inaction
1:Parameter upload: upload function code parameter to remote control.
2:Parameters download: download function code parameter from remote control.

P3.03	Auto energy saving running	Range: 0,1	0

0: **Inaction**

1: **Action**

When motor is running with light load or no-load, the inverter will detect the load current and adjust output voltage appropriately so as to save energy. This function is mainly used in application with stable load and running speed.

P3.04	AVR function	Range: 0,1,2	0

This is auto. voltage regulation function. When inverter input voltage is fluctuating, use this function to keep inverter output voltage stable.
When inverter is decelerating to stop, if AVR function is invalid, the Dec. Time is going to be shorter, but with a higher running current. If AVR is effective, the motor will be decelerating stably with lower running current, but the Dec. Time becomes longer.

0: **Inaction**

1: **Always action**

2: **Inactin only in deceleration**

P3.05	Slip freq.compensation	Range: 0~150(%)	0(%)

This function can regulate the output frequency appropriately according to the load, which can dynamically compensate the slip frequency of asynchronous motor so as to control the speed at a stable value. If use this function in conjunction with auto.torque boost function, It can achieve better low speed torque characteristic, which is shown as Fig.6-12

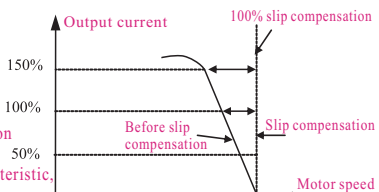


Fig.6-12 Slip freq.compensation

P3.06	JOG running freq.	Range: 0.10~50.00Hz	5.00Hz
P3.07	JOG Acc time	Range: 0.1~60.0s	20.0S
P3.08	JOG Dec time	Range: 0.1~60.0s	20.0S

JOG frequency has the highest priority. In any stage, as long as there is a JOG command input, the inverter will switch to JOG frequency running by JOG Acc/Dec time immediately, which is shown as Fig.6-13.
JOG Acc time is the time for inverter accelerating from 0 to upper limit freq.
JOG Dec time is the time for inverter decelerating from upper limit freq. to 0.

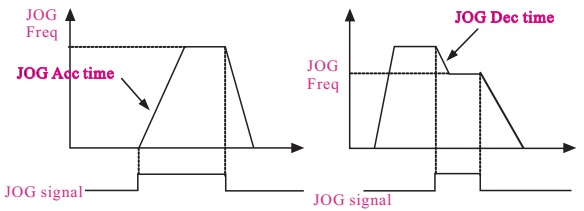


Fig.6-13 JOG running

Note:
(1) JOG running is available in panel control mode, terminal and serial port control mode.
(2) After JOG running command is canceled, the inverter will decelerate by Dec time.

P3.09	Communication configuration	Range: 000~155	0

User can configure the baud rate, data format and communication mode by setting P3.09.

LED unit's place (baud rate):

0: 1200BPS

1: 2400BPS

2: 4800BPS

3: 9600BPS

4: 19200BPS

5: 38400BPS

LED ten's place (data format):

0: 1-7-2 **Format, without check; 1-initial place, 7-data place, 2-stop place, without check**

1: 1-7-1 **Format, odd parity check; 1-initial place, 7-data place, 1-stop place, odd parity check**

2: 1-7-1 **Format, even parity check; 1-initial place, 7-data place, 1-stop place, even parity check**

3：1－8－2 **Format, without check; 1-initial place, 8-data place, 2-stop place, without check**

4：1－8－1 **Format, odd parity check; 1-initial place, 8-data place, 1-stop place, odd parity check**

5：1－8－1 **Format, even parity check; 1-initial place, 8-data place, 1-stop place, even parity check**

6：1－8－1 **Format, even parity check; 1-initial place, 8-data place, 1-stop place, without check**

LED hundred's place (communication mode):

0：MODBUS，ASCII **Mode: MODBUS communication protocol,ASCII data transmission**

1：MODBUS，RTU **Mode: MODBUS communication protocol,RTU data transmission**

Note:
When ASCII mode is selected , please select data format as 0~2, that data place is 7.
When RTU mode is selected , please select data format as 3~5, that data place is 8.

P3.10	Local address	Range: 0~248	1

This function is used to mark the address of inverter itself in serial port communication mode.

0: Broadcast address . When the inverter works as a slave, if it receives address command as 0, it means the inverter is receiving broadcast command and unnecessary to respond the host.

248: Host address. When the inverter works as a host, set P3.10=248, the host inverter is able to send broadcast command to other slave inverters so as to achieve multi-machine interaction.

P3.11	Communication overtime detection time	Range: 0.0~1000.0s	0.0S

When serial port communication is failed, if the duration exceeds the set value of this function, the inverter will conclude that there is a communication failure. As set value is 0, the inverter will not detecte the serial port communication signal, that this function is invalid.

P3.12	Local response delay	Range: 0~1000ms	5ms

Local response delay is the time from serial port recieving the command from the upper computer and executing the command to responding the upper computer.

P3.13	Multi-running running proportion	Range: 0.01~1.00	1. 00

This function code is used to set the scale factor of inverter received frequency set command through serial port. The actual inverter running frequency is equal to this scale factor multiplied by received frequency set command through serial port.
In multi-machine interaction running mode, it can use this parameter to set the scale of multi-inverter running frequency, that is defferent running freq.

P3.14	Acc time2	Range: 0.1~6000.0	20. 0
P3.15	Dec time2	Range: 0.1~6000.0	20. 0
P3.16	Acc time3	Range: 0.1~6000.0	20. 0
P3.17	Dec time3	Range: 0.1~6000.0	20. 0
P3.18	Acc time4	Range: 0.1~6000.0	20. 0
P3.19	Dec time4	Range: 0.1~6000.0	20. 0
P3.20	Acc time5	Range: 0.1~6000.0	20. 0
P3.21	Dec time5	Range: 0.1~6000.0	20. 0
P3.22	Acc time6	Range: 0.1~6000.0	20. 0
P3.23	Dec time6	Range: 0.1~6000.0	20. 0
P3.24	Acc time7	Range: 0.1~6000.0	20. 0
P3.25	Dec time7	Range: 0.1~6000.0	20. 0

This function can define seven kinds of Acc/Dec time. It can select 1~7 kind of Acc/Dec time during running process by different combination of control terminal (Please refer to P4.00~P4.05).

P3.26	Multi-stage freq.1	Range: Lower limit freq.~Upper limit freq.	5. 00Hz
P3.27	Multi-stage freq.2	Range: Lower limit freq.~Upper limit freq.	10. 00Hz
P3.28	Multi-stage freq.3	Range: Lower limit freq.~Upper limit freq.	20. 00Hz
P3.29	Multi-stage freq.4	Range: Lower limit freq.~Upper limit freq.	30. 00Hz
P3.30	Multi-stage freq.5	Range: Lower limit freq.~Upper limit freq.	40. 00Hz
P3.31	Multi-stage freq.6	Range: Lower limit freq.~Upper limit freq.	45. 00Hz
P3.32	Multi-stage freq.7	Range: Lower limit freq.~Upper limit freq.	50. 00Hz

These setting frequency can be used in multi-stage speed running mode and PLC simple running mode (please refer to P.00~P4.05 and P8 group).

P3.33	Jump freq.1	Range: 0.00~500.00Hz	0. 00Hz
P3.34	Jump freq.1 range	Range: 0.00~30.00Hz	0. 00Hz

P3.35	Jump freq.2	Range: 0.00~500.00Hz	0. 00Hz
P3.36	Jump freq.2 range	Range: 0.00~30.00Hz	0. 00Hz
P3.37	Jump freq.3	Range: 0.00~500.00Hz	0. 00Hz
P3.38	Jump freq.3 range	Range: 0.00~30.00Hz	0. 00Hz

This function is used for the inverter to avoid the resonance frequency of mechanical load.

The inverter setting frequency is able to do jump running near some frequency point shown as Fig.6-14. It can set 3 jump ranges at most.

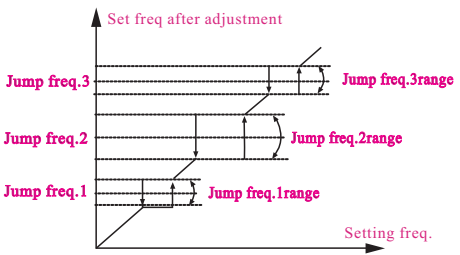


Fig.6-14 Jump frequency andrange

P3.39	Set running time	Range:0~65.535Kh	0. 000K
P3.40	Total running time	Range:0~65.535Kh	*

As total running time reaches set running time, the inverter will output index signal (refer to P4.08~P4.09).

P3.40 function code defines the total running time of inverter from factory delivery to present.

P3.41	Displayed parameter selection 1	Range:0000~1111	1111

This function uses 4 digits of P3.41parameter to set monitoring parameter b-09~b-12 whether displayed in the parameter group. 0: not displayed, 1: displayed.

The relationship between the 4 digits setting and parameter displayed shown as Fig. 6-15.

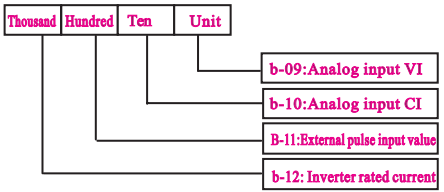


Fig.6-15 Displayed parameter selection1

P3.42	Displayed parameter selection 2	Range:000~111	000

This function uses 3 digits of P3.42parameter to set monitoring parameter b-13~b-15 whether displayed in the parameter group. 0: not displayed, 1: displayed.

The relationship between the 3 digits setting and parameter displayed shown as Fig. 6-16.

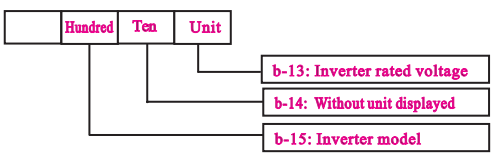


Fig.6-16 Displayed parameter selection2

P3.43	Displayed parameter selection 3	Range:00~12	00

This function is to set LED default displayed monitoring parameter in inverter running mode, including 0-12 which are corresponding to monitoring parameter b-01 to b-13 respectively. For example, set P3.43=03, in inverter running mode, the output current will be always displayed. It also can press ▶▶ key to view other monitoring parameter.

P3.44	Without unit displayed coefficient	Range:0.1~60.0	1. 0

Displayed value of monitoring parameter b-14 = inverter output frequency ×P3.44

P3.45	JOG/REV control	Range:0,1	0

0:**JOG running**

1:**Reverse running**

6.5 Terminal Control Function Parameter (P4 Group)

P4.00	Input terminal X1 function selection	Range:0~30	0
P4.01	Input terminal X2 function selection	Range:0~30	0
P4.02	Input terminal X3 function selection	Range:0~30	0
P4.03	Input terminal X4 function selection	Range:0~30	0
P4.04	Input terminal X5 function selection	Range:0~30	0
P4.05	Input terminal X6 function selection	Range:0~30	0
P4.06	Input terminal X7 function selection	Range:0~30	0
P4.07	Input terminal X8 function selection	Range:0~30	0

The multifunctional input terminal X1~X8 provide various function. It can set the value of P4.00~P4.07 to define the function of terminal X1~X8 shown as Table 6-1. Terminal X7 -FWD terminal, X8 -REV terminal.

Table 6-1 Multifunctional input selcetion

Content	Function	Content	Function
0	Idle terminal	19	Freq. control channel selection 1
1	Multi-stage speed control terminal 1	20	Freq. control channel selection 2
2	Multi-stage speed control terminal 2	21	Freq. control channel selection 3
3	Multi-stage speed control terminal 3	22	Command switched to terminal
4	External FWD JOG control input	23	Running command control mode selection 1
5	External REV JOG control input	24	Running command control mode selection 2
6	Acc/Dec time terminal1	25	Swing frequency start mode selection
7	Acc/Dec time terminal 2	26	Swing frequency running reset
8	Acc/Dec time terminal 3	27	Close loop invalid
9	3-wire control	28	Simple PLC running pause command
10	Free stop input (FRS)	29	PLC invalid
11	External stop command	30	PLC reset in stopping state

12	Stopping DC brake input command DB	31	Freq.switched to CI
13	Inverter running prohibited	32	Counter trigger signal input
14	Freq.increase command(UP)	33	Counter clear input
15	Freq.decrease command(DOWN)	34	External interrupt input
16	Acc/Dec prohibited command	35	Pulse freq.input (only valid for X4)
17	External reset input (clear fault)	36	Actual length clear input
18	Peripheral equipment fault input (normally open)	37	

Decription of function listed in Table 6-1:

1~3: Multi-stage speed control terminal

It can set 7-stage speed running frequency at most by selecting ON/OFF combination of these 3 control terminals and selecting Acc/Dec time at the same time shown as Table 6-2.

Table 6-2 Multi-stage speed running selection

K_3	K_2	K_1	Freq.setting	Acc/Dec time
OFF	OFF	OFF	Normal running Freq.	Acc/Dec time1
OFF	OFF	ON	Multi-stage freq.1	Acc/Dec time1
OFF	ON	OFF	Multi-stage freq.2	Acc/Dec time2
OFF	ON	ON	Multi-stage freq.3	Acc/Dec time3
ON	OFF	OFF	Multi-stage freq.4	Acc/Dec time4
ON	OFF	ON	Multi-stage freq.5	Acc/Dec time5
ON	ON	OFF	Multi-stage freq.6	Acc/Dec time6
ON	ON	ON	Multi-stage freq.7	Acc/Dec time7

The above multi-stage frequency can be used in multi-stage speed running mode and simple PLC running mode. Herein take multi-stage speed running for example as follow.

Define control terminal X1,X2,X3 as follow.

P4.00=1, P4.01=2, P4.03=3, that X1,X2,X3 are used to achieve multi-stage speed running shown as Fig.6-17.

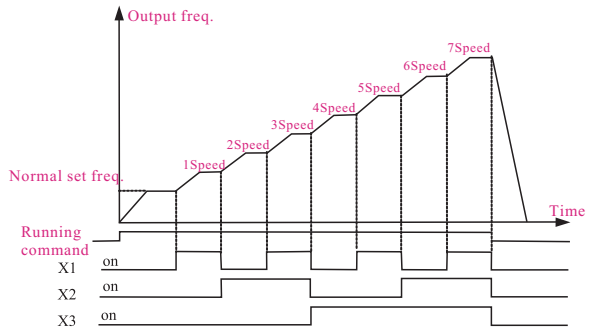


Fig.6-17 Multi-stage speed running

Take terminal control mode for example as Fig.6-18, that K7,K8 can control forward or reverse running.

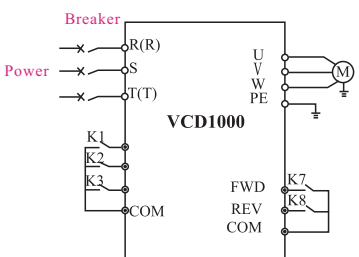


Fig.6-18 Wiring diagram of multi-stage speed running

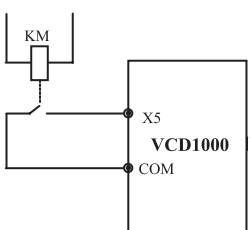


Fig.6-19 Peripheral equipment

4~5:**External JOG control input JOGP/JOGR.**
In terminal control mode(P0.03=1), JOGP is JOG forward running, JOGR is JOG reverse running. JOG running frequency and JOG running Acc/Dec time is defined by P3.06~P3.08.

6~8: Acc/Dec time terminal selection

Table 6-3 Acc/Dec time terminal selection logical mode

Terminal 3	Terminal 2	Terminal 1	Acc/Dec time selection
OFF	OFF	OFF	Acc time 1/Dec time1
OFF	OFF	ON	Acc time 2/Dec time2
OFF	ON	OFF	Acc time 3/Dec time3
OFF	ON	ON	Acc time 4/Dec time4
ON	OFF	OFF	Acc time 5/Dec time5
ON	OFF	ON	Acc time 6/Dec time6
ON	ON	OFF	Acc time 7/Dec time7

By ON/OFF combination of Acc/Dec time terminal the Acc/Dec time 1~7 can be selected accordingly.

9: 3-wire **control. Please refer to P4.08.**

10:Free **stop input (FRS). This function is same as free stop defined by P2.05. But this is controlled by terminal which is convenient for remote control.**

11: **External stop command. This command is effective in all running command control mode.**

12: **Stopping DC brake input command DB. Use control terminal to execute DC brake to the motor during stop process in order to achieve motor emergency stop and accurate positioning. Brake start frequency, brake current, and brake time are defined by P2.06~P2.08.**

13: **Inverter running prohibited. When this terminal is effective, the inverter in running state will go to stop, and the inverter in stopping state will be prohibited to start. This function is mainly used in application requiring safety linkage.**

14~15: **Freq.increase command(UP), Freq.decrease command(DOWN). The frequency increase or decrease is controlled by control terminal. It can take the place of control panel in remote control mode.**

16: **Acc/Dec prohibited command. To maintain the motor free from influence of any input command except stopping command, and keep running at the present speed.**

17: **External reset input(clear fault). When there is a fault alarm, it can reset the inverter by this terminal. This function is same as RESET key in control panel.**

18: **Peripheral equipment fault input(normally open). The peripheral equipment fault can be input by this terminal for the convenience of inverter to monitor the**

peripheral equipment. The inverter will display 'E-13', that is peripheral equipment fault alarm, after receiving peripheral equipment fault signal.

19~21: **Freq.control channel selection.**

The freq.control channel can be switchable by the ON/OFF combination of these 3 control terminals shown as Table 6-4. For this function and P0.01 defined function, the later set one is prior to previous one.

Table6-4 Freq.control channel selection logical mode

Freq. control channel selection terminal 3	Freq. control channel selection terminal 2	Freq. control channel selection terminal 1	frequency control channel selection
OFF	OFF	OFF	Maintaining set Freq.
OFF	OFF	ON	Function code digital given
OFF	ON	OFF	Terminal UP/DOWN given
OFF	ON	ON	Serial port given
ON	OFF	OFF	VI
ON	OFF	ON	CI
ON	ON	OFF	PULSE
ON	ON	ON	Combination given (refer to P3.01)

22: **Command switched to terminal. As this function is effective, the running control mode will be switched to terminal control mode.**

23~24: **Running control mode selection.**

The running control mode can be switchable by the ON/OFF combination of these 2 control terminals shown as Table 6-5. For this function and P0.03 defined function, the later set one is prior to previous one.

Table 6-5 running control mode selection logical mode

Running control mode selection 2	Running control mode selection 1	Running control mode
OFF	OFF	Maintaining running control mode
OFF	ON	Control panel control mode
ON	OFF	Terminal control mode
ON	ON	Serial port control mode

25: Swing freq.start mode selection.

In swing frequency manual start mode, the swing frequency running will be effective as this terminal is effective (refer to P9 Group).

26: Swing freq.running reset

In swing frequency running mode, no matter it is in manual or automatically start mode, by closing this terminal it will clear the recorded data of swing frequency running. The swing frequency running will restart by disconnecting this terminal. (refer to P9 Group).

27: Close loop invalid

In close loop running state, this function can invalidate the close loop running, and the inverter will switch to lower priority running mode.

28: Simple PLC running pause command

In simple PLC running state, as this function is effective, the PLC running will pause, and the inverter will run at 0 frequency. As this function is invalid, the inverter will automatically execute running speed tracking start and continue PLC running (refer to P8 Group).

29: PLC invalid

In PLC running state, this function can invalidate the PLC running, and the inverter will switch to lower priority running mode.

30: PLC reset in stopping state

In the stopping state of PLC running mode, as this terminal is effective, the inverter will clear the data recorded in stopping state, such as PLC running stage, running time, and running frequency, etc. (refer to P8 Group).

31: Freq.switched to CI

When this function is effective, the frequency control channel will be switched to CI given.

32: Counter trigger signal input

There is a built-in counter in inverter, the max input pulse frequency to pulse input port is 200Hz. It can store memory the present counted data when power failure (refer to P4.21,P4.22).

33: Counter clear input

Clear the built-in counter to 0.

34: External interrupt input

In the running state, when inverter receives external interrupt signal, it will stop output, and run at zero frequency. After the interrupt signal is cancelled,the inverter will execute automatically the running speed tracking start mode, and continue to run again.

35: Pulse freq.input

Only valid for X4 terminal. This terminal receives pulse signal as frequency given command (refer to P1.11~P1.15).

36: Actual length clear input

When this function is effective, it will clear the value of function code P9.09 to 0.

P4.08	FWD/REV running mode selection	Range: 0~4	0

0:2-wire control mode1

K2	K1	Running command
0	0	Stop
0	1	FWD
1	0	REV
1	1	Stop

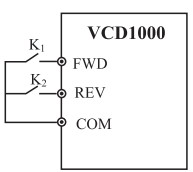


Fig.6-20 2-wire control mode1

1:2-wire control mode2

K2	K1	Running command
0	0	Stop
1	0	Stop
0	1	FWD
1	1	REV

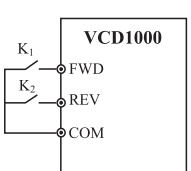


Fig.6-21 2-wire control mode2

2:3-wire control mode1

SB1： Stop button

SB2： FWD button

SB3： REV button

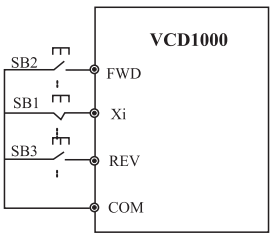


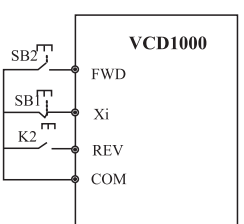
Fig.6-22 3-wire control mode1

Xi is one of multifunctional input terminal X1~X6 which should be defined to function 9, that is 3-wire control mode.

3:3-wire control mode2

SB1： Stop button

SB2： Run button



K2	Running direction selection
0	FWD
1	REV

Fig.6-23 3-wire control mode2

Xi is one of multifunctional input terminal X1~X6 which should be defined to function 9, that is 3-wire control mode.

Note: In alarm stopping mode, if the running control mode is selected as terminal control mode and FWD/REV terminal is effective, the inverter will start at once after fault reset.

P4.09	UP/DOWN Rate	Range: 0.01~99.99Hz/s	1.00 Hz/s

This function code defines the rate of change of set frequency given by UP/DOWN terminal.

P4.10	2-way open collector output terminal OC 1	Range: 0~20	0
P4.11	Relay output selection	Range: 0~20	0

Table6-6 Outputterminal function selection

Content	Function	Content	Function
0	Inverter in running(RUN)	11	A PLC running cycle finish
1	Freq.arrival signal(FAR)	12	Set counts arrival
2	Freq.level detected signal(FDT1)	13	Specified counts arrival
3	Freq.level detected signal(FDT2)	14	Inverter ready for running(RDY)
4	Overload pre-alarm signal(OL)	15	Inverter fault
5	Undervoltage locking(LU)	16	Start freq.running time
6	External fault stopping (EXT)	17	DC brake time whenstart
7	Output freq.upper limit(FH)	18	DC brake time whenstop
8	Output freq.lower limit(FL)	19	Swing freq. upper/lower limit
9	Inverter in zero speed running	20	Set running time arrival
10	Simple PLC stage running finish		

The decription offunction listed in Table 6-6as follow.

0: Inverter in running(RUN). In the running state, it outputs index signal.
1: Freq.arrival signal(FAR). Please refer to P4.12.
2: Freq.level detected signal(FDT1). Refer to P4.11~P4.12.
3: Freq.level detected signal(FDT2). Refer to P4.13~P4.14.
4: Overload pre-alarm signal(OL). As inverter output current exceeds P5.02 defined overload detected level and the time is longer than P5.03 defined overload detected time. It outputs index signal.
5: Undervoltage locking(LU). In the running state, when DC busbar voltage is lower than limited level, the inverter will display 'E-11' and outputs index signal.
6: External fault stopping(EXT). When external fault alarm occurs (E-13), it outputs index signal.
7: Output freq.upper limit(FH). When set freq ≥ upper limit freq, and running frequency reaches upper limit freq, it outputs index signal.

8: Output freq.lower limit(FL). When setting freq ≤ lower limit freq,and running frequency reaches lowerlimit frequency , it outputs index signal.
9: Inverter inzero speed running. When the inverteroutputs 0 frequency, but still in running state, it outputs indexsignal.
10:Simple PLC stagerunning finish. Whenpresent simple PLCstage finishes, it outputs index signal.(singlepulse signal, widthis 500ms).
11: APLC running cyclefinish. When asimple PLC runningcycle finishes,it outputs index signal.(singlepulse signal, widthis 500ms).
12: Set countsarrival.
13: Specified countsarrival.
(refer to P4.21~P4.22)
14: Inverter ready for running(RDY). Whenthis signal outputs, it means the inverter busbar voltageis normal, andthe inverter runningprohibited terminal is invalid, thatinverter can start.
15: Inverter fault. When fault occurs in the runningstate, it outputsindex signal.
16: Start freq.runningtime .
17: DC brake time when start.
18: DC brake time when stop.
19: Swing freq.upper/lowerlimit. In swingfrequency running mode, if the fluctuation range ofswing frequency calculatedaccording to center freq. exceeds upper limitfreq.P0.19 or belowlower limit freq.P0.20, it outputs index signal.

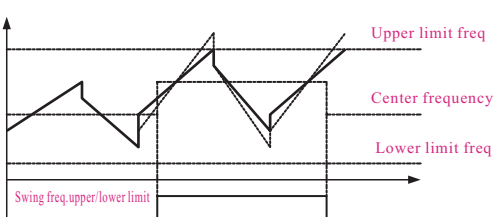


Fig.6-24 Swing freq.upper/lower limit

20: Set running time arrival. When inverter total running time (P3.40) reaches set running time (P3.39), it outputs index signal.

P4.12	Freq.arrival detection range(FAR)	Range:0.00~50.00Hz	5.00Hz

This function is a complement to function 1 listed in Table6-6. When inverter output frequency is in the "+-" detection range of set frequency, it outputs pulse signal shown as Fig.6-25.

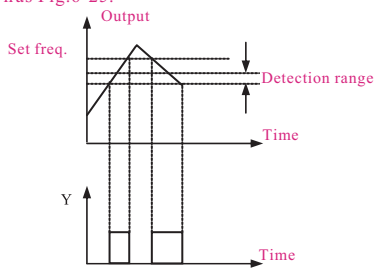


Fig.6-25 Frequency arrival detection range

P4.13	FDT1(freq.level)	Range: 0.00~upper limit freq.	10.00Hz
P4.14	FDT1 lag	Range: 0.00~50.00Hz	1.00Hz
P4.15	FDT2(freq.level)	Range: 0.00~upper limit freq.	10.00Hz
P4.16	FDT2 lag	Range: 0.00~50.00Hz	1.00Hz

P4.13~P4.14 are the complement to function 2 listed in Table 6-6. P4.15~P4.16 are the complement to function 3 listed in Table 6-6. Both are same in usage. For example, when output frequency exceeds a certain set frequency (FDT1), it outputs index signal until output frequency decreasing to a certain frequency lower than FDT1 (FDT1-FDT1 lag) shown as Fig.6-26.

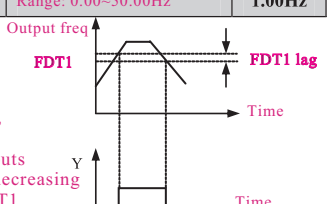


Fig.6-26 Frequency level detection

P4.17	Analog output (AO) selection	Range: 0~7	0

P4.18	Analog output (AO)gain	Range: 0.50~2.00	1.00

Table 6-7 Output terminal indication

Content	Function	Indication Range
0	Output freq.	0~upper limit freq.
1	Output current	0~2 * rated current
2	Output voltage	0~1.2 * motor rated voltage
3	Busbar voltage	0—800V
4	PID given	0~10V
5	PID feedback	0~10V
6	VI	0~10V
7	CI	0~10V/4~20mA

As to AO analog output, if user wants to change measuring range or adjust meter tolerance, it can be achieved by regulating the output gain.

P4.19	DO output terminal function selection	Range: 0~7	0

Please refer to Table 6-7.

P4.20	DO max pulse output freq.	Range: 0.1~20.0(Max 20K)	10.0K

P4.21	Set counts given	Range: P4.20~9999	0
P4.22	Specified counts given	Range: 0~P4.19	0

P4.21,P4.22 are the complement to function 12,13 listed in Table 6-6.

Set counts given: It refers to when how many pulse signals input from Xi (count trigger signal input function terminal), OC (2-way open collector output terminal) or relay outputs an index signal.

When Xi inputs the 8th pulse signal, OC outputs an index signal, that is P4.21=8, shown as Fig.6-27.

Specified counts given: It refers to when how many pulse signals input from Xi, OC or relay outputs an index signal, until set counts arrival.

When Xi inputs the 5th pulse signal, relay outputs an index signal, until set counts 8 arrival, that is P4.22=5, shown as Fig.6-27. When specified counts bigger than set counts, specified counts invalid.

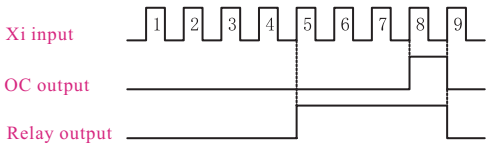


Fig.6-27 **Set counts given and specified counts given**

P4.23	**Overload pre-alarm detection level**	Range: 20~200(%)	**130(%)**
P4.24	**Overload pre-alarm delay time**	Range: 0.0~20.0s	**5.0S**

If output current exceeds continously current detection level set by P4.23 (the actual detection level current = P4.23 × inverter rated current), after the delay time set by P4.24, the open collector outputs valid signal shown as Fig. 6-28 (refer to P4.11).

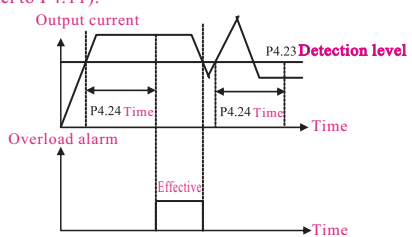


Fig.6-28 Overload alarm

P4.25	**2-way open collector output terminal OC2 output selection**	Range:0~20	**0**

Please refer to Table 6-6.

6.6 Protection Function Parameter (P5 Group)

P5.00	**Motor overload protection mode selection**	Range: 0,1	**0**

This parameter defines the inverter protection mode in the case of overload, overcurrent.

0: Stop outputting: In the case of overload, overcurrent, the inverter will stop outputting at once, and the motor will go to free stopping.
1: Inaction: Without overload protection to load motor, please use this function in caution.

P5.01	**Motor overload protection coefficient**	Range:20(%)~120(%)	**100(%)**

This parameter is used for setting sensitivity of thermal relay protection to load motor. When motor output current doesn't match inverter rated current, by setting this parameter it could get correct protection to motor, shown as Fig.6-29.

$$[P5.01] = \frac{\text{Motor rated current}}{\text{Inverter rated output current}} \times 100$$

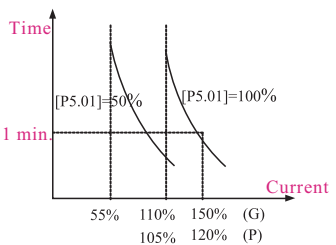


Fig.6-29 Thermal relay protection

Note: When one inverter drives multi-motor in linkage running, the thermal relay protection will be out of action. Please install thermal relay to each motor input terminal as to protect the motor effectively.

P5.02	**Overvoltage stall selection**	Range: 0,1	**1**
P5.03	**Overvoltage stall point**	Range: **380V: 120—150(%)**	**140(%)**
		220V: 110~130(%)	**120(%)**

0: Prohibited
1: Allowed

In inverter Dec running process, because of the effection of load inertia, the actual Dec rate of motor speed may be lower than output frequency Dec rate.
At this moment the motor will feed back electrical energy to inverter which will cause the busbar voltage rising. If don't take measures, the overvoltage protection will be triggered.

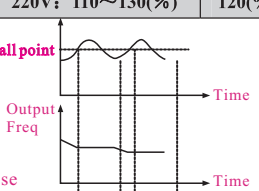


Fig.6-30 Overvoltage stall

In the inverter Dec running process, the overvoltage stall protection function will detect the burbar voltage and compare it with overvoltage stall point defined by P5.03 (relative to standard busbar voltage), if it exceeds overvoltage stall point, the inverter will stop decreasing output frequency. After detecting busbar voltage lower than overvoltage stall point again, the Dec process will restart, shown as Fig.6-30.

P5.04	Auto current limit level	Range: 110~200(%)	150(%)
P5.05	Freq.drop rate during current limit	Range: 0.00~99.99Hz/s	10.00Hz/S
P5.06	Auto current limit mode selection	Range: 0,1	1

Auto current limit function is to auto limit the load current not to exceed auto current limit level(P5.04) by real time monitoring the load current in order to prevent fault trip caused by overcurrent. It is suitable to some applications with bigger inertia or load change in intensity.

Function code P5.04 defines the current threshold value of auto current limit action, the set range is a percentage to inverter rated current.

Function code P5.05 defines regulating rate to output frequency during auto current limit action.

If freq.drop rate(P5.05) during current limit is too small to get rid of auto current limit state, it may finally cause load fault. If freq.drop rate is too big to intensify frequency regulating range, it may cause inverter overvoltage protection.

Auto current limit function is always valid during Acc/Dec state. Auto current limit mode selection (P5.06) defines whether auto current limit function is valid in constant speed running state.

P5. 06=0 **Auto current limit invalid in constant speed running**

P5. 06=1 **Auto current limit valid in constant speed running**

Auto current limit function is not suitable to constant speed running requiring stable ouput frequency, because the output frequency may changes during auto current limit action.

P5.07	Restart setting after power failure	Range: 0,1	0
P5.08	Restart waiting time after power failure	Range: 0.0~10.0s	0.5S

P5. 07 = 0, Restart after momentary power failure inaction

P5. 07 = 1, Restart after momentary power failure action

If there occurs momentary power failure (LED displays 'E-11') in inverter running state, when power comes back, the inverter will automatically execute tracking speed restart mode after waiting for time set by P5.08. During the waiting time, even there is a runn-command inputting, the inverter will not restart. If stopping command is input at that time, the inverter will cancell tracking speed restart.

P5.09	Fault self -recovery times	Range: 0~10	0

P5.10	Self-recovery interval time	Range: 0.5~20.0s	5.0S

During inverter running, fault may occurs accidentally and inverter ouput may stop due to load fluctuation. At the moment, user may use fault self-recovery function in order not to stop running of equipment driven by inverter.

In the process of self-recovery, the inverter will execute tracking speed restart mode. If the inverter fails to restart successfully in set times defined by P5.10, it will execute fault protection and stop output.

Note:(1) This function is used on condition that the inverter has no substantial fault and self-recovery function is allowed by equipment.

(2) This function is invalid to fault protection due to overload or overheat.

P5.11	Output missing phase protection	Range: 0,1	1

0: Inaction

1: Action

Note:

U phase missing protection, displays E-26

V phase missing protection, displays E-27

W phase missing protection, displays E-28

6.7 Fault Record Function Parameter (P6 Group)

P6.00	Last fault record	Range: 0~23	0
P6.07	Last 2 fault record	Range: 0~23	0
P6.08	Last 3 fault record	Range: 0~23	0
P6.09	Last 4 fault record	Range: 0~23	0
P6.10	Last 5 fault record	Range: 0~23	0
P6.11	Last 6 fault record	Range: 0~23	0

0: No fault

1~17: E-01~E-17 fault, refer to Chapter 7.

P6.01	Output freq.in last fault	Range: 0~upper limit freq	0
P6.02	Set freq.in last fault	Range: 0~upper limit freq	0
P6.03	Output current in last fault	Range: 0~999.9A	0
P6.04	Output voltage in last fault	Range: 0~999V	0
P6.05	DC busbar voltage in last fault	Range: 0~800V	0
P6.06	Module temperature in last fault	Range: 0~100	0

6.8 Close Loop Running Control Function Parameter (P7 Group)

Analog feedback control system:

Input pressure given value by VI and input 4~20mA feedback value of pressure sensor by CI, constitute an analog feedback control system through built-in PI adjuster shown as Fig.6-31.

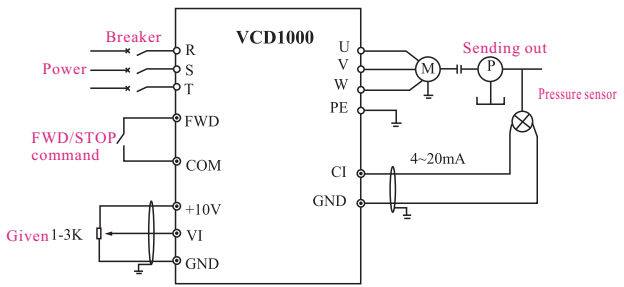


Fig.6-31 built-in PI analog feedback control system

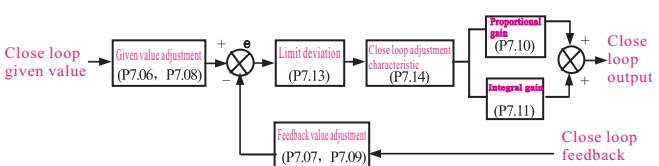


Fig.6-32 PI control principle

Please refer to function code P7.01~P7.11.

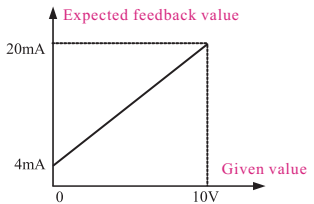


Fig.6-33 Given value and expected feedback value

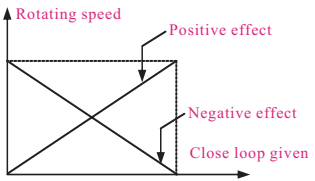


Fig.6-34 Close loop adjustment characteristic

The steps of close loop parameter setting as follow.

(1) Determine close loop given and feedback channel(P7.01,P7.02).

(2) Analog close loop needs to set the relationship between close loop given and feedback (P7.06~P7.09).

(3) Determine close loop adjustment characteristic (P7.14), shown as Fig.6-34.

(4) **Set close loop preset frequency function(P7.16~P7.17).**

(5) Set close loop filtering time, sampling period, limit deviation, gain coefficient (P7.03, P7.04, P7.12, P7.13)

P7.00	Close loop running control selection	Range: 0,1	0

0: Invalid

1: Valid

P7.01	Close loop given channel selection	Range: 0,1,2	1

0: Digital given

1: VI analog 0~10V voltage given

2: CI analog given. 0~10V voltage given or 4~20mA current given.

To speed close loop, analog given 10V corresponding the rotate speed of max output frequency.

P7.02	Feedback channel selection	Range: 0~6	1

0: VI analog 0~10V input voltage

1: CI analog input

2: VI +CI

3：VI - CI

4：Min（VI、CI）

5：Max（VI、CI）

P7.03	Given channel filtering time constant	Range: 0.01~50.00s	0.50S
P7.04	Feedback channel filtering time constant	Range: 0.01~50.00s	0.50S

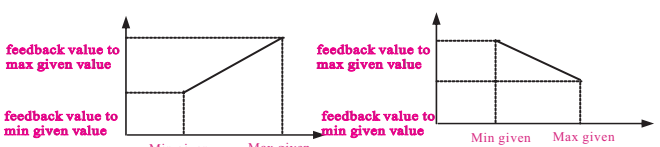
There are some certain interference included in the external given channel and feedback channel. By setting P7.03 and P7.04 filtering time constant to filter channel. The longer filtering time is, the stronger anti-interference, but the slower response is. The shorter filtering time is , the weaker anti-interference, but the faster response is.

P7.05	Given value digital setting	Range: 0.00~10.00V	0.00V

As P7.01=0, P7.05 defined value is used as close loop control system given value, that user can change system given value by revising P7.05 when using control panel or serial port to control close loop system.

P7.06	Min given value	Range: 0.0~Max given value	0.0%
P7.07	feedback value to min given value	Range: 0.0 ~100.0(%)	0.0%
P7.08	Max given value	Range: Min given value ~100.0%	100.0%
P7.09	feedback value to max given value	Range: 0.0 ~100.0(%)	100.0%

P7.06~P7.09 define the relationship curve between analog close loop given and expected feedback shown as Fig.6-35.



(1) Positive adjustment feedback (2) Negative adjustment feedback

Fig.6-35 Given,feedback curve

P7.10	Proportional gain(KP)	Range: 0.000~9.999	0.500
P7.11	Integral gain(KI)	Range: 0.000~9.999	0.500
P7.12	Sampling period(T)	Range: 0.01~10.00s	1.00S

The higher proportional gain is, the quicker response is, but more easy to oscillate. The deviation can not be eliminated completely by only using proportional gain KP

adjustment. In order to eliminate residual deviation, integral gain KI can be used to constitute PI control. The higher integral gain is , the quick response is , but more easy to oscillate. P7.12 defines the sampling period of feedback value. The longer sampling period, the slower response is.

P7.13	Deviation limit	Range: 0.0~20.0(%)	2.0(%)

As to the max deviation value which is allowed by close loop given value, when feedback value is within the range shown as Fig. 6.36, the PI adjuster will shop regulating. The reasonable usage of this function will help to solve the contradiction between system output accuracy and system stability.

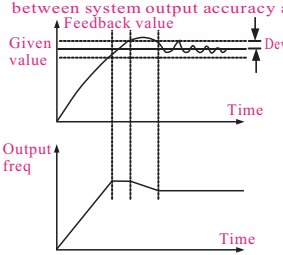


Fig.6-36 Deviation limit

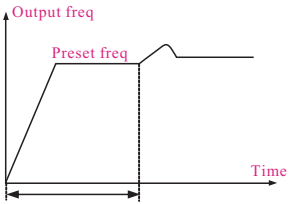


Fig.6-37 Close loop preset freq running

P7.14	Close loop adjustment characteristics	Range: 0,1	0

0: Positive effect

1: Negative effect

P7.15	Integral adjustment selection	Range: 0,1	0

0: Freq.upper/lower limit arrival, integral adjustment stops.

1: Freq.upper/lower limit arrival, integral adjustment continues.

It is suggested to cancel integral continuous adjustment for system which requires quick response.

P7.16	Close loop preset freq.	Range: 0~Upper limit freq.	0.00Hz
P7.17	Close loop preset freq.hold time	Range: 0.0~6000.0s	0.1S

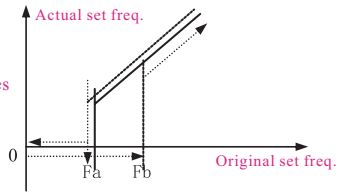
This function enables close loop adjustment to enter into stable state quickly. After close loop starts, the inverter will at first increase frequency to preset frequency P7.16 by set Acc time, and keeps running at this frequency for a while set by P7.17, then goes to close loop running shown as Fig. 6-37.

Note: If close loop preset freq function is unwanted, just set P7.16,P7.17=0.

P7.18	PI zero-frequency awakening threshold	Range: 0.00~400.0Hz	0.01Hz
P7.19	PI zero-frequency awakening hysteresis	Range: 0.00~400.0Hz	0.01Hz

Start process:
After sending running command, only when the set frequency is equal to or exceed Fb, the motor starts and accelerates to set frequency in set acc time.

Stop process:
When set frequency is lower than Fb in running state, the inverter will still keep running. Only when set frequency is equal to Fa, the inverter stops output.



Fa: zero-frequency awakening threshold
Fb: Fa + zero-frequency awakeninghysteresis

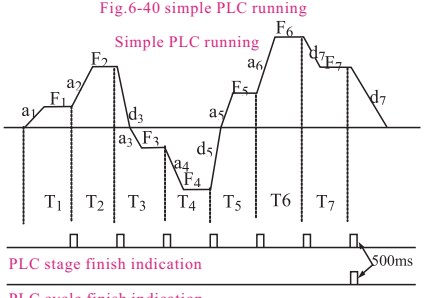
Fig.6-39 zero-frequency hysteresis running

This function can be used to achieve sleep function for energy save.
The hysteresis width can avoid inverter frequent starts at threshold freq.

6.9 PLC Running Parameter (P8 Group)

Simple PLC function is a multi-stage speed generator. The inverter can auto change frequency and running direction in set running time to satisfy the technics command shown as Fig.6-40.

Fig.6-40 simple PLC running



a1~a7, d1~d7 are Acc and Dec time in each stage shown as Fig.6-40, which are defined by Acc/Dec time parameter P0.17,P0.18 and P3.14~P3.25.
F1~F7, T1~T7 are running frequency and running time which are defined by function code P8.01~P8.14.

P8.00	PLC running mode selection	Range: LED unit: 0~3;ten: 0,1; hundred: 0,1; thousand:0,1	0000

LED unit's place: PLC running mode selection

0:Inaction

1:Stop after single cycle

The inverter will stop automatically after one cycle. It will restart after receiving a new running command shown as Fig.6-41.

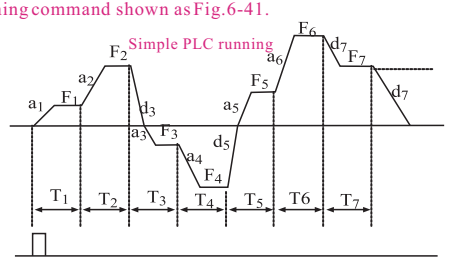


Fig.6-41 PLC stop after single cycle

2: Running at final frequency after single cycle

The inverter will keep running at the frequency and direction of final stage after one cycle. It will stop in set dec time after receiving stopping command shown as Fig.6-42.

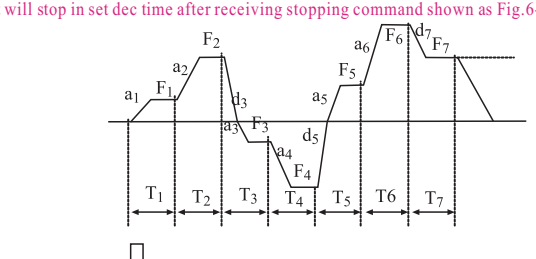


Fig.6-42 PLC running at final frequency after single cycle

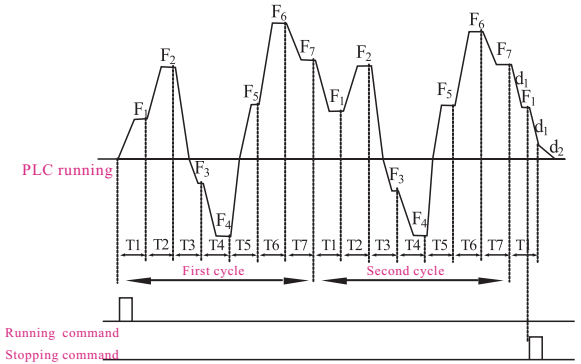


Fig.6-43 PLC continuous cycle

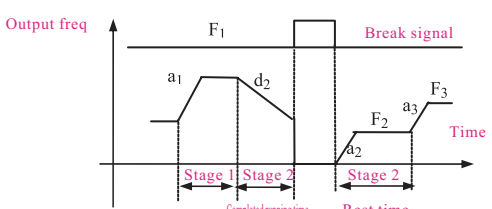
3:Continuous cycle

The inverter automatically starts a new cycle after one cycle finish until receiving stopping command shown as Fig.6-43.

LED ten's place: PLC restart mode selection

0:Restart from the first stage after stop caused by stopping command, fault or power failure.

1:Restart from the freq. of break stage. After stop cased by stopping command or fault, the inverter wil record the running time completed of present stage, then after restarts from break stage and runs at set freq. of break stage in rest time of break stage shown as Fig6-44.



a1: Acc time of stage 1 a2: Acc time of stage 2 a3:Acc time of stage 3
d2: Dec time of stage 2 F1: freq of stage 1 F2: freq of stage 2 F3: freq of stage3

Fig.6-44 PLC restart mode 1

LED hundred's place:PLC state parameter save mode selection

0: No save. Inverter don't save PLC running state after power failure and restart from the first stage.

1: Save. Inverter saves PLC running state after power failure, including running frequency and running time of break stage.

LED thousand's place:PLC running time unit

0: Second

1: Minute

P8.01	**Stage 1 setting**	Range: 000~621	**000**
P8.02	**Stage 1 running time**	Range: 0.1~6000.0	**10.0**
P8.03	**Stage 2 setting**	Range: 000~621	**000**
P8.04	**Stage 2 running time**	Range: 0.1~6000.0	**10.0**
P8.05	**Stage 3 setting**	Range: 000~621	**000**
P8.06	**Stage 3 running time**	Range: 0.1~6000.0	**10.0**
P8.07	**Stage 4 setting**	Range: 000~621	**000**
P8.08	**Stage 4 running time**	Range: 0.1~6000.0	**10.0**
P8.09	**Stage 5 setting**	Range: 000~621	**000**
P8.10	**Stage 5 running time**	Range: 0.1~6000.0	**10.0**
P8.11	**Stage 6 setting**	Range: 000~621	**000**
P8.12	**Stage 6 running time**	Range: 0.1~6000.0	**10.0**
P8.13	**Stage 7 setting**	Range: 000~621	**000**

P8.14	Stage 7 running time	Range: 0.1~6000.0	10.0

Function code P8.01~P8.14 are used to define PLC running frequency, direction, and Acc/Dec time by LED unit's, ten's, hundred's place as follow.

LED unit's place: frequency setting

0: Multi-stage frequency i (i=1~7) defined by P3.26-P3.32

1: Freq.defined by P0.01 function code

LED ten's place: running direction selection

0: Forward

1: Reverse

2: Controled by running command

LED hundred's place: Acc/Dec time selection

0: Acc/Dec time 1

1: Acc/Dec time 2

2: Acc/Dec time 3

3: Acc/Dec time 4

4: Acc/Dec time 5

5: Acc/Dec time 6

6: Acc/Dec time 7

6.10 Swing Frequency Function Parameter (P9 Group)

Swing frequency running is used in textile, chemical fiber industry, etc., and in application which needs traverse drive and winding. The typical application is shown as Fig.6-45.

The swing frequency process is normally as follow:

Firstly it accelerates to preset swing freq(P9.02)in set Acc time and waiting for a while(P9.03), then after goes to swing centre frequency in set Acc/Dec time , finally it enters into swing freq cycle running in set swing amplitude(P9.04), kick freq(P9.05), swing freq cycle(P9.06) and delta wave ascent time(P9.07) until receiving stop command to stop in set Dec time.

The swing centre frequency comes from set frequency of normal running, multi-stage speed running or PLC running.

The swing freq running will be invalid automatically as JOG running or close loop running mode starts.

When PLC running works together with swing freq running, the swing frequency will be invalid during switch of PLC stage , and it will go to PLC set frequency according to PLC Acc/Dec setting, then after swing frequency restarts.

When stopping command is received, it will decelerate to stop in PLC Dec time.

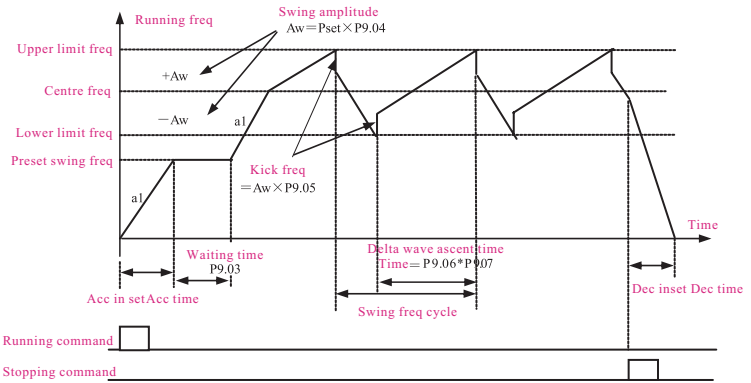


Fig.6-45 Swing frequency running

P9.00	Swing freq selection	Range: 0,1	0

0: Inaction

1: Action

P9.01	Swing freq running mode	Range: 0000~1111	0

LED unit's place: start mode

0: Auto start. It keeps running at preset swing frequency(P9.02) for a while(P9.03) after start, then after automatically enters into swing frequency running state.

1: Manual start by terminal. When multifunctional terminal is valid (function 25 of Xi),it enters into swing frequency running state. When termianl is invalid, it quits from swing frequency running and keeps running at preset swing frequency(P9.02).

LED ten's place: swing amplitude control

0: Variable swing amplitude. Swing amplitude AW changes according to centre freq, refer to P9.04.

1: Fixed swing amplitude. Swing amplitude AW is defined by max frequency and function code P9.04.

P9.02	Preset swing freq.	Range: 0.00~650.00Hz	0.00Hz

P9.03	Preset swing freq.waiting time	Range: 0.0~6000.0s	0.0s

P9.02 is used for defining the running freq before swing freq running state.
When auto start mode is selected, P9.03 is used for defining the duration of running at preset swing frequency. When manual start mode is selected, P9.03 is invalid.
Refer to Fig.6-45.

P9.04	Swing amplitude	Range: 0.0~50.0%	0.0%

Variable swing amplitude: AW=centre freq × P9.04
Fixed swing amplitude: AW=max running freq P0.06 × P9.04

Note: Swing freq is restricted by upper/lower limit frequency.

P9.05	Kick freq.	Range: 0.0~50.0%	0.0%

P9.05=0, there is no kick freq.

P9.06	Swing freq.cycle	Range: 0.1~999.9s	10.0s

This function code is to define the time of a completed cycle of swing freq running.

P9.07	delta wave ascent time	Range: 0.0~98.0%	50.0%

Swing freq ascent stage running time=P9.06×P9.07 (second),
Descent stage running time=P9.06×(1－P9.07) (second).
Note: User can select S curve Acc/Dec mode at the same time when swing frequency running is selected. It can make swing freq running smooth.

P9.08	Set length	Range: 0.000~65.535km	0.000(km)
P9.09	Actual length	Range: 0.000~65.535km	0.000(km)
P9.10	Length magnification	Range: 0.001~30.000	1.000
P9.11	Length correction coefficient	Range: 0.001~1.000	1.000
P9.12	Measurement axis circumference	Range: 0.01~100.00(cm)	10.00(cm)
P9.13	Axis pulse	Range: 1~9999	1

These function codes are used for fixed-length stopping function.
The inverter inputs counts pulse by terminal(function 35 of X4), and calculates the length by measurement axis pulse (P9.13) and axis circumference(P9.12).
Calculated length=counts pulse÷axis pulse×measurement axis circumference.

Actual length is calculated by correction of length magnification (P9.10) and length correction coefficient to calculated length.
Actual length=calculated length ×length magnification÷length correction coefficient.
When actual length(P9.09)≥set length(P9.08), the inverter auto sends out stopping command to stop. It is necessary to clear actual length(P9.09) to zero before restart, otherwise, the inverter is unable to start.
Note:
(1) It can use multifunctional input terminal (function 36 of Xi) to clear actual length. Only after this terminal is off, the inverter is able to count normally and calculate actual length.
(2) The actual length will be automatically saved when power failure.

(3) When set length (P9.08)=0, the fixed-length stopping function is invalid, but length calculation is still valid.

P9.14	User password	Range: 0000~9999	0000

This function is used for prohibiting non-authorized personnel to view and amend the function parameter. When P9.14=0000, this function is invalid.
When this function is needed, please enter 4 digits as password, then after press ENTER/DATA key to confirm it, the password will be effective immediately.
Amend password: press MENU/ESC key to enter into password verification state, After original 4 digits password is entered correctly, it goes to parameter edit state.
Select function code P9.14 (P9.14=0000 now), enter a new password, and press ENTER/DATA key to confirm it, the new password will be effective immediately.
The super user password is 9999.

6.11 Vector Control Parameter (PA Group)

PA.00	Motor parameter self-learning function	Range: 0,1	0

0: Inaction
1: Resting self-learning

PA.01	Motor rated voltage	Range: 0~400V	Depends on model type
PA.02	Motor rated current	Range: 0.01~500.00A	Depends on model type
PA.03	Motor rated frequency	Range:1~500Hz	Depends on model type
PA.04	Motor rated rotating speed	Range:1~9999r/min	Depends on model type
PA.05	Motor poles number	Range: 2~16	Depends on model type
PA.06	Motor stator inductance	Range: 0.1~5000.0mH	Depends on model type

PA.07	Motor rotor inductance	Range: 0.1~5000.0mH	Depends on model type
PA.08	Motor stator and rotor mutual inductance	Range: 0.1~5000.0mH	Depends on model type
PA.09	Motor stator resistance	Range: 0.01~50.000Ω	Depends on model type
PA.10	Motor rotor resistance	Range: 0.01~50.000Ω	Depends on model type

PA.01~PA.10 are defined as motor parameter. The inverter has its own factory default set parameter which depends on model type. User is able to reset above parameter according to parameter of motor used. These parameter should be entered correctly, otherwise, the vector control function can't achieve desired control effect.

PA.11	Overcurrent protection coefficient of torque current	Range: 0~15	15

In vector control mode, this function is used for controlling torque current as to prevent overcurrent .The range of 0-15 correspond to 50%-200%.

PA.12	Proportion adjustment coefficient of speed deviation	Range: 50~120	85
PA.13	Integral adjustment coefficient of speed deviation	Range: 100~500	360

In vector control mode, PA.12~PA.13 are used for controlling motor rotating speed. It can achieve better motor speed control effect by proper adjustment of these two function parameter .

PA.14	Vector torque boost	Range: 100~500	100

In vector control mode, this function is used to boost output torque of motor. It can properly increase this parameter in application with heavy load as to boost output torque of motor.

6.12 Factory Function Parameter (PF Group)

PF.00	Factory function	Range: 0000~9999	0000

Factory function, user no need to amend it.

Chapter 7 Troubleshooting

7.1 Fault Alarm and Troubleshooting

When the inverter is abnormal, protection function acts: LED displays fault code and the content, fault relay acts, the inverter stops output and the motor coasts to stop. VCD1000 series inverter's fault contents and troubleshooting is shown in Table 7-1. After fault alarm occurs, fault phenomenon should be recorded in detail, the fault should be processed according to Table 7-1. When in need of technical assistance, please contact your supplier.

Table 7-1 Alarms and troubleshooting

Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-01	Acc overcurrent	Acc time is too short	Adjust Acc time
		V/F curve setup is not suitable	Adjust V/F curve
		Restart the motor in running	Set up start mode as speed tracking restart
		Torque boost setup is too big	Adjust torque boost or set as auto mode
		Inverter capacity is too low	Select inverter with proper capacity
E-02	Dec overcurrent	Dec time is too short	Adjust Dec time
		Potential load or load inertia is too big	Add suitable braking device
		Inverter capacity is too low	Select inverter with proper capacity
E-03	overcurrent at constant speed running	Load mutation	Reduce load mutation
		Acc or Dec time is too short	Adjust Acc or Dec time
		Abnormal load	Check load
		Input voltage abnormal	Check input power supply
		Inverter capacity is too low	Select inverter with proper capacity
E-04	Acc overvoltage	Input voltage abnormal	Check input power supply
		Acc time is too short	Adjust Acc time
		Restart the motor in running	Set up start mode as speed tracking restart

Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-05	Dec overvoltage	Dec time is tooshort	Adjust the Dec time
		Potential load or load inertia is too big	Add suitable braking device
E-06	overvoltage at constant speed running	Input voltage abnormal	Check input power supply
		Acc or Dec time is too short	Adjust the Accor Dec time
		Abnormal change of inputvoltage	Mount input reactor
		Load inertia is too big	Add suitable braking device
E-07	overvoltage of control power supply	Input voltage abnormal	Check input power supply
E-08	Inverter overheat	Air duct obstruction	Clean air duct
		Environment temperature is too high	Improve the ventilation or decrease the carrier frequency
		Fan damaged	Replace a new fan
		Inverter module abnormal	Contact supplier
E-09	Inverter overload	Acc time is tooshort	Adjust Acc time
		DC braking value istoo high	Decrease DC braking current and increase braking time
		V/F curve setup is notsuitable	Adjust V/F curve
		Restart the motor inrunning	Set up start modeas speed tracking restart
		Mains voltage is toolow	Check mains voltage
		Too heavy load	Select inverter with proper capacity
E-10	Motor overload	V/F curve setup is notsuitable	Adjust V/F curve
		Mains voltage is toolow	Check mains voltage
		General motor runs at low speed with heavey load for long term	Use a special motorfor long term running
		Wrong setting of motor overload protection factor	Set the factor right
		Motor choked or sudden change of load	Check load
E-11	Undervoltage in running	Very lowmains voltage	Check mains voltage

Fault code	Type of faults	Possible fault reasons	Troubleshooting
E-12	Inverter module protection	Inverter overcurrent	Refer to overcurrent troubleshooting
		Output 3-phase fault or ground short	Re-wiring
		Air duct obstruction or fan damaged	Clean air duct or replacea new fan
		Environment temperature too high	Decrease environment temperature
		Control board connecting wire or plug-in unit loose	Check and re-wiring
		Current waveform abnormal due to output missing phase, etc.	Check wiring
		Auxiliary power damaged, or driving voltage undervoltage	Contact supplier
		Control board abnormity	Contact supplier
E-13	Peripheral fault	Close external fault terminals	Check the reason
E-14	Current detecting circuit fault	Loose wiring or terminal connections	Check and re-wiring
		Auxiliary power source damaged	Contact supplier
		Hall component damaged	Contact supplier
		Abnormal amplifier circuit	Contact supplier
E-15	RS232/485 Communication fault	Wrong baud rate setting	Set baud rate properly
		Serial port communication fault	Press STOP RESET key to reset or contact supplier
		Improper fault alarm parameter setting	Revise function code P3.09~P3.12
		Upper computer doesn't work	Check upper computer and connecting cable
E-16	System interference	Serious interference	Press STOP RESET key to resetor install input power source filter
		DSP read/write error	Reset or contact supplier
E-17	E^2PROM Error	Read/write error of control parameter	Press STOP RESET key to reset, or contact supplier
E-26	U phase missing protection	U phase ouputs missing fault	Press STOP RESET key to reset, or check U phase outputcircuit

E-27	V phase missing protection	V phase ouputs missing fault	Press STOP RESET key to reset, or check V phase output circuit
E-28	W phase missing protection	W phase ouputs missing fault	Press STOP RESET key to reset, or check W phase output circuit

7.2 Fault Record Search

This series inverter record the fault codes occured in the last 6 times and inverter running paratmeter when last fault occured. The fault information is saved in P6 group.

7.3 Fault Reset

When fault occured, please select the following methods to recover.

(1) When fault code is displayed, after ensure it can be reset, press STOP RESET key to reset.
(2) Set any one of X1~X8 terminal as external RESET input (P4.00~P4.07=17).

(3) Cut off power.

Attention

(1) Reset the inverter after throughly investigating the cause of fault and clearing, otherwise, the inverter may be damaged.
(2) If it can't be reseted or fault occurs again after reset, please check the cause of fault, continuous reset may damage inverter.
(3) Reset the inverter after waiting for 5min when overload or overheat protection occurs.

Chapter 8 Preservation and Maintenance

8.1 Preservation and Maintenance

Potential hazards exist due to aging, wear and tear of inverter internal components as well as environmental influences to the inverter, such as temperature, humidity particles etc.. Therefore, daily inspection, periodic preservation and maintenance must be performed to the inverter and its driving mechanism during their storage and operation.

8.1.1 Daily Maintenance

The following must be verified before starting up:

(1) No abnormal vibration and no abnormal noise.
(2) No abnormal heat.
(3) No abnormal ambient temperature.
(4) The ammeter satisfy the specification
(5) Fan is working in good condition.

8.2 Periodic Preservation and Maintenance

8.2.1 Periodic Maintenance

Cut off the power when inverter is maintained termly, check after the main circuit power indicator light is off. The checking content is shown in Table 8-1.

Table 8-1 Periodic inspections

Checking item	Checking content	Troubleshooting
Screws of control terminals and main circuit terminals	The screws are loose or not	If loose, tighten them with screw driver
Heatsink	Whether there is dust	Clean thoroughly the dust
Printed circuit board	Whether there is dust	Clean thoroughly the dust
Cooling fans	Whether there is abnormal vibration or abnormal noise	Replace cooling fans
Power element	Whether there is dust	Clean thoroughly the dust
Electrolytic capacitor	Whether there is discoloring, peculiar smell	Replace electrolytic capacitor

8.2.2 Termly maintaining

In order to let inverter work well for a long term, user must maintain the inverter termly. The replace time of element of inverter is shown in Table 8-2.

Table 8-2 Replace time of element

Part	Lifetime
Cooling fans	2~3 years
Electrolytic capacitors	4~5 years
Printed circuit board	5~8 years
Fuse	10 years

The working condition of the inverter as following:
(1) Environment temperature: average 30 ℃.
(2) Load coefficient: under 80%.
(3) Running time: under 12 hour everyday.

8.3 Warranty of Inverter

Our company supply warranty in the following condition:
(1) Only inverter noumenon in the warranty range.
(2) In the normal using, inverter damaged in 12 month. Over 12 month, our company will charge for the repair service.
(3) In the following condition in 12 month, our company also will charge for the repair service:
a. Inverter is damaged caused by user not complying with instructions.
b. Inverter is damaged caused by fire, flood, and abnormal voltage.
c. Inverter is damaged caused by wrong wiring.
d. Inverter is damaged when it is used in the abnormal applications.