

CHZIRI[®]



User's Manual
ZVF9V-M Vector Inverter



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ZIRI ELECTRICAL TECHNOLOGY CO.,LTD

Foreword

- Thank you very much for your purchase of the inverter ZVF9V-M series.
- This manual introduces the installation, operation, function setting, trouble shooting and etc. of the inverter ZVF9V-M series..
- Incorrect installation or use may result in damage or other accidents. Do read all instructions in detail before installing or operating.
- Please forward this manual to the end user, and keep it handy for quick reference.
- If there are any doubts or questions, please contact the Technical Service Center of Our Company.

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Chapter 1 Safety Instructions

1.1 Safety Symbols and Definitions

The safety instructions described in this manual are very important. To avoid any error that may result in damage to equipment, injury to personnel or loss of property, do read and clearly understand all of the safety symbols, symbol definitions and be sure to observe the indicated safety instructions below.

Safety Symbols	Symbol Definitions
 HAZARD	This symbol indicates hazardous HIGH VOLTAGE. Any incorrect operation may result in serious damage to the equipment or death to personnel.
 WARNING	This symbol indicates that any incorrect operation can result in damage to the equipment or minor to moderate injury to personnel.
 CAUTION	This symbol calls your attention to follow the instructions while in operation or in use.
 TIP	This symbol calls attention to some useful messages for the user.
 FORBIDDEN	This symbol indicates anything forbidden to do.
 COMPULSORY	This symbol indicates something must do.

1.2 Application Range



CAUTION

- This inverter is applicable to general industrial purpose three-phase AC asynchronous electric motor.

1.3 Installation Ambient



CAUTION

- Be sure to install the inverter in a well-ventilated indoor location. To get the best cooling effect, it is recommended to fix the inverter vertically, and extra ventilation devices are needed when installed horizontally.
- Be sure that the ambient temperature is between -10~40°C. If the temperature is higher than 40°C, forced heat radiation or derating is needed from the external. It is recommended not to use the inverter in such a high temperature. Otherwise, it may greatly reduce the service life of the inverter.
- The ambient humidity is required to be lower than 90% without dew condensation.
- The inverter shall be installed in a place where the vibration is less than 0.5G. Otherwise, it may fall and cause damage to the equipment. It is also noted worthy that the inverter could not bear any sudden bump.
- The inverter should be kept away from electromagnetic interference (EMI), flammable and explosive ambient.



WARNING

- Be sure to install the inverter on metallic materials (i.e., Metal). Otherwise, there is in the danger of fire.
- Be sure not to let the foreign matter enter into the inverter, such as wire clippings, spatter from welding, metal (zinc or ferrous) meshavings and etc. Otherwise, there is the danger of getting burned due to short circuit.

1.4 Cautions for Installing



HAZARD

- Do not operate electrical equipment with wet hands.
- Do not operate wiring unless the power supply is completely off.
- Do not open the front cover or perform wiring while the inverter is powered ON. Otherwise, there is the danger of electric shock.
- Do wait at least 5 minutes after the power is disconnected before performing the work of wiring or inspection. Otherwise, there is the danger of electric shock.



WARNING

- Do not install or operate if the inverter is damaged or has parts missing to prevent injury to personnel or loss of property.
- The main loop terminal should be tightly connected to the cable. Otherwise, the inverter may be damaged due to loose contact.
- The ground terminal must be reliably and properly grounded to ensure security. To avoid common ground impedance, multi-piece inverters should be grounded with one shared point, as shown in the Figure 1-1.

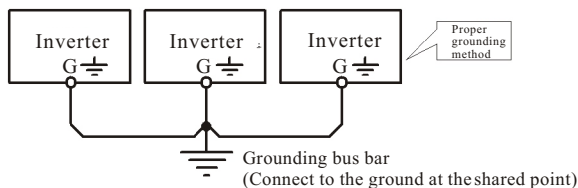


Figure 1-1



FORBIDDEN

- DO NOT connect control terminals (except terminals marked "TA", "TB" and "TC") to AC 220V power supply, which may cause damage to the inverter.
- DO NOT connect AC power supply to the output terminals marked "U", "V" and "W". Otherwise, it may cause damage to the inverter, as shown in the Figure 1-2.

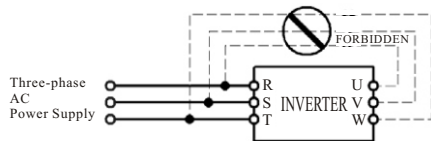


Figure 1-2



COMPULSORY

- DO install a no-fuse circuit breaker or leakage protective circuit breaker in the side of inverter input power supply to prevent expanding of accident due to an inverter problem.



CAUTION

- It is not suitable to install an electromagnetic contactor in the side of output power supply, because the operation of open and close to the contactor when the motor is running may cause damage to the inverter arising from over-voltage produced during this process. But it is still necessary to install a contactor if one of the following three points occurs:

1. The system of frequency converting governor used to control energy-saving usually works at a rated rotation speed. To run the governor economically, there is a must to remove the inverter.
2. The inverter participates in some import procedure and cannot stop operating for a long period of time. To realize freeshift in various control systems and improve the reliability of these systems, there is a must to install a contactor.
3. When an inverter controls several motors, there is a must to install a contactor.

Caution: DO NOT operate the contactor if there is output of the inverter.

1.5 Cautions for Operation

- Do not operate electrical equipment with wet hands.
- An inverter stored for more than half a year should be given power up test before use so that the main circuit filter capacitor could be recovered. When the inverter is in the state of power up, it is necessary to raise the voltage gradually to the rated value with a voltage regulator. Generally, the charging time should be controlled within 2 hours. Otherwise, there is the danger of electric shock or exposure.
- Do not touch the inner side of the inverter while the power is ON, nor put any foreign matter, i.e., rod or other matter inside the inverter. Otherwise, it may result in serious damage to the equipment or electric shock.
- Do not open the front cover while the inverter is powered ON. Otherwise, there is the danger of electric shock.
- Be careful to select the Restart Mode. Otherwise, there is the danger of personnel death.



HAZARD



WARNING

- When the inverter runs at a frequency higher than 50Hz, Make sure it is within the speed range acceptable by your motor bearing and mechanical device. Otherwise, there is the danger of damage to the motor.
- It is not advisory to run the reduction box, gear and other mechanism that need lubricating at low speed for a long period. Otherwise, it may reduce the service life of these equipment or even damage the equipment.
- A general motor should be derated before use due to less effective of heat dissipation when it runs at a low frequency. If it is a constant torque load, then a forced method or a special variable frequency motor should be used to release heat.
- DO cut off the power supply of an inverter set aside for a long time to avoid foreign matter or other things enter in it which may cause damage to the inverter or even lead to fire.
- The output voltage of inverter is PWM impulse wave. DO NOT install a capacitor or surge current sink (i.e., a varistor) in the inverter output port. Otherwise, there is the danger of fault tripping of the inverter or damage to its power elements. DO remove such kind of things if already installed. See the Figure 1-3 below.

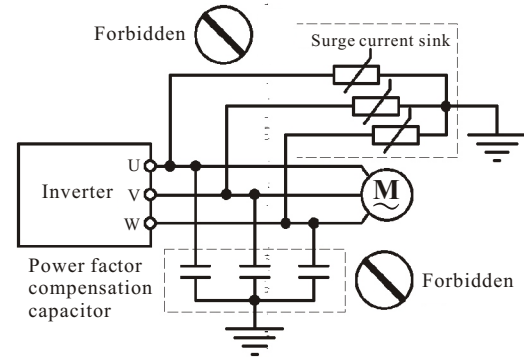


Figure 1-3



CAUTION

- Motor insulation should be checked before the inverter is used for the first use or reused after a long-term idle. Be sure the insulation resistance measured is no lower than 5M?
- If the inverter is used beyond the range of allowable working voltage, then an extra step-up or step-down voltage transformer shall be configured.
- Due to thin air in a place where the altitude is higher than 1,000m, the heat dissipation of inverter will be less effective. Hence derating should be done before use. In general, when the height rises by 1,000m, the rated voltage of the inverter shall reduce by 10%.

Chapter 2 Introduction to the Product

2.1 Unpacking and Inspection upon Arrival

This product is guaranteed a high level of quality with strict outgoing inspection, crushproof and shockproof packaging. But this does not preclude damage to the product due to heavy collision or strong extrusion. So it is necessary to unpack the inverter upon arrival and perform these steps:

- ① Check whether there is a deformed or damaged casing; or any shattered component.
- ② Check the specifications label of the inverter and make sure it matches the product part number you've ordered.
- ③ Check whether the items in the packing list are in readiness or not. If there is any problem with the above-mentioned contents, please contact the supplier or Our Company immediately.

2.2 Demonstration of the Model

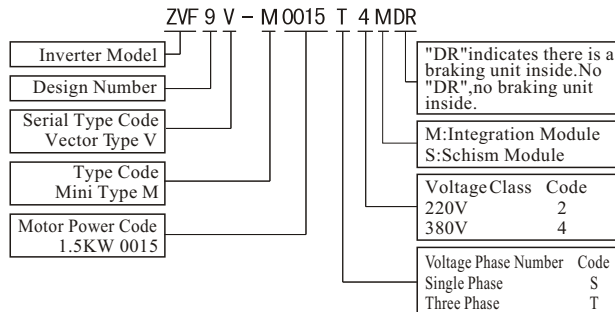


Figure 2-1 Inverter Model Demonstration

2.3 Specifications Label

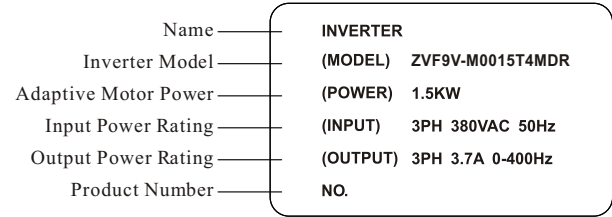


Figure 2-2 Inverter Specifications Label

2.4 Models and Specifications

Table 2-1 Inverter Models and Specifications

Inverter Models M: Mini type	Input Voltage (V)	Rated Output Current (A)	Adaptive Motor Power(KW)
ZVF9V-M0007T2/S	220	4.0	0.75
ZVF9V-M0015T2/S	220	7.5	1.5
ZVF9V-M0022T2/S	220	10.0	2.2
ZVF9V-M0007T4	380	2.3	0.75
ZVF9V-M0015T4	380	3.7	1.5
ZVF9V-M0022T4	380	5.0	2.2

2.5 Technical Indications

Table 2-2 Description Summary for Technical Indications

Item		Item Description
Input	Rated voltage, frequency	Single/three-phase 220VAC, three-phase 380VAC, 50Hz/60Hz
	Allowable voltage range	Voltage fluctuation range: $-20\% \sim +20\%$ Voltage unbalance rate $< 3\%$; frequency fluctuation $\leq \pm 5\%$
Output	Rated voltage	Three-phase 0~input voltage VAC
	Frequency	0.00~400.00Hz
Overload capacity		150% 1 minute; 180% 1 second; 200% transient protection
Control function	Modulation method	Optimal space voltage vector PWM modulation
	Control method	Speed sensorless vector control(SVC)
	Frequency accuracy	digital setting: Max. frequency $\times \pm 0.01\%$ Analog setting: Max. Frequency $\times \pm 0.2\%$
	Frequency resolution	Digital setting: 0.01Hz Analog setting: Max. Frequency $\times 0.1\%$
	Starting frequency	0.00~10.00Hz
	Torque lifting	Automatic torque lifting: To lift the torque automatically according to the output current. Hand-operated torque lifting: Range: 0.1~30.0%
	Slip compensation	Setting range: 0~150%. The inverter output frequency can be auto-regulated within this range according to the motor load so as to reduce the speed variation of the motor due to load fluctuation.
	Acceleration/ deceleration time	0.1~3600.0 sec/min, which can be set in sequence.
	Carrier frequency	1.0~15.0 KHz
	Jog function	Jog frequency range: 0.01~400.0Hz Jog acceleration/ deceleration time, 0.1~3600.0 can be set.
	V/F curve	1. linear curve; 2. quadratic curve(conic); 3. User defined V/F curve

Item		Item Description
Control function	Automatic energy-saving operation	Auto optimize V/F curve according to load fluctuation to realize energy-saving operation.
	Auto voltage regulation(AVR)	When the network voltage changes, it can regulate PWM output automatically to maintain constant voltage.
Control function	Built-in PID	This can form a convenient closed-loop control system(CLCS), and is applicable to pressure control, flow control and other process control.
	Operating command	operator panel control, external terminal control and COM control
Operating function	DC braking	Panel potentiometer setting, operator panel ▲▼ setting, external terminal up/down setting, analog voltage signal or external potentiometer setting, analog current signal setting, analog assembly setting, 485 COM setting and etc.
	Input Signal	Forward/Reverse signal, multiple speed signal, failure signal, reset signal and etc.
	Output signal	Programmable relay, open-collector output, failure signal output and etc.
	Multi-function analog and digital output terminal	This can realize the output of frequency, current and other physical quantity by outputting 0~10V or 0~20mA DC signal and 0~10KHz digital signal.
Braking function	Dynamic braking	With an external braking resistor, the maximum braking torque may reach 100%.
	DC braking	This can be selected when the motor starts or stops with the action frequency of 0~20Hz, action current level of 0~100% and actuation time of 0~30 sec., which can be set in sequence.

Item	Item Description	
Other functions	Leap frequency, Jog function, counter, trace to rotating speed, instant shutdown restarting, Frequency upper/lower limitation, acceleration/deceleration mode regulating, frequency meter and voltmeter output, multiple speed/program operation, two-wire/three wire control, vibration frequency control, Multi-function input terminal selection, Failure auto reset and 485COM.	
Protection function	Input open-phase protection, over-current protection, overload protection, under voltage protection, overheating protection and etc.	
LED, LCD display	Real-time display the running state, monitoring parameters, function parameters, diagnostic trouble codes(DTC) and other information of the inverter.	
Matching parts	Brake assembly, remote operator panel, connecting wire, communication panel	
Ambient	Place to be used	Indoor location free from direct exposure to sunlight, high humidity or dew condensation, high levels of dust, corrosive gas, explosive gas, inflammable gas, oil mist, salt and etc.
	Altitude	Below 1,000M
	Ambient Temperature	-10~+40°C [Bare Machine: -10~+50°C]
	Humidity	20~90%RH without dew condensation
	Vibration	<0.5G
	Storage Temperature	-20~+60°C
Structure	Protective Class	Ip20
	Cooling system	Forced air cooling
	Installation	wall mounted

Chapter 3 Inverter Installation and Wiring

3.1 Installation

3.1.1 Use the inverter in the following environmental conditions:

- Altitude: Maximum 1000m above sea level
- Ambient Temperature: -10~+40°C [Bare Machine: -10~+50°C]
- Humidity: 20~90%RH (Non-condensing)
- Ambient: Indoor places free from direct exposure to sunlight, dust, corrosive gas, flammable gas, oil mist, steam, drip and salt.
- Vibration: <0.5G

3.1.2 Installation Space and Direction

To get better cooling effect and for the convenience of maintenance, the inverter shall be installed vertically with enough space left (refer to the figure 3-1). When two or more inverters are fixed in the same cabinet, it is recommended to fix them in parallel and horizontally to reduce heat produced by them (refer to the figure 3-2). When there is a must to fix them vertically, please fix an insulating board between them so that the heat produced by the lower one could not have direct influence on the upper one (refer to the figure 3-3).

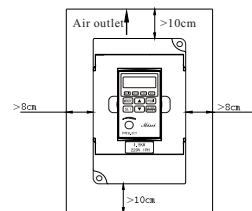


Figure 3-1 Demonstration of Installation Space

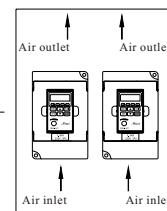


Figure 3-2 Demonstration of Multi-piece Parallel Installation

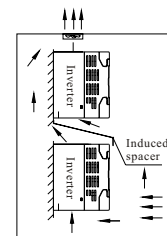


Figure 3-3 Demonstration of Multi-piece Vertical Installation

3.1.3 Installation Instructions



WARNING

- Do not install or operate if the inverter is damaged or has parts missing to prevent injury from personnel or loss of property.
- Be sure the main loop terminals should be tightly connected to the cable. Otherwise, the inverter may be damaged arising from loose connection.
- Be sure that the ground terminals of the inverter and the motor must be properly grounded. Multi-piece inverter should be grounded at one shared point.



FORBIDDEN

- Be sure to install a no-fuse circuit breaker or leakage protective circuit breaker in the side of inverter input power supply to prevent expanding of accident due to an inverter problem.



CAUTION

- Install the inverter in a proper place with moderate temperature. The higher the ambient temperature is, the shorter the service life of the inverter is.
- Keep any other heat-producing equipment as far away from the inverter as possible. When installing the inverter in an enclosure, maintain the clearance around the inverter and verify the temperature is within the allowable range.

3.2 Inverter Wiring

3.2.1 Basic Wiring Diagram for the Inverter

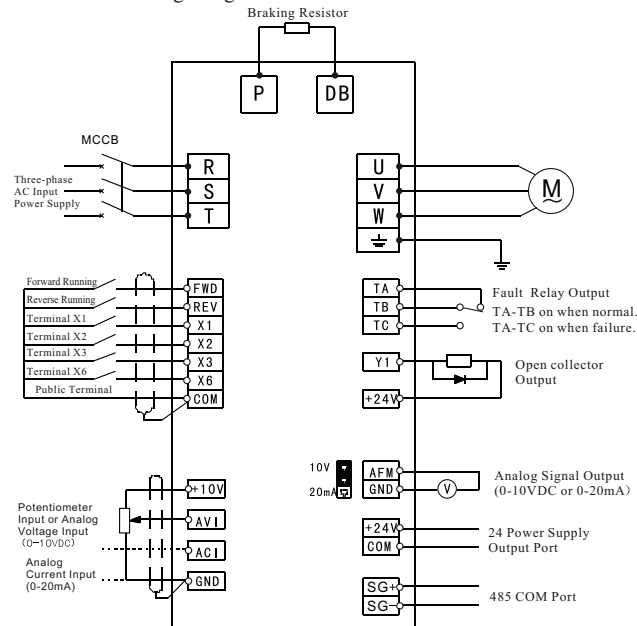


Fig.3-4 Basic Wiring Diagram
Applicable to Model:ZVF9V-M0007T2/S2~M0022T/S2
ZVF9V-M0007T4~M0022T4



Tips

- JP2 is used to realize switching between analog output voltage and current.

3.2.2 Cautions for Wiring



- Wait at least 5 minutes after power OFF before opening the front cover of the inverter.
- Verify the charge indicator lamp is OFF before proceeding with the work, and be sure that the voltage value of the main loop terminal P and DC is less than 36VDC.
- The internal wiring of the inverter should be operated only by authorized qualified personnel.



- Verify the rated input voltage of the inverter is matched with AC power supply. Otherwise, there is the possibility of damage to the inverter.
- Be sure to install a non-fuse circuit breaker in the input power supply side of the inverter to prevent expanding of accident due to an inverter problem, which may cause damage to the distribution equipment or lead to fire.
- Be sure to connect the ground terminal and the motor casing to the ground wire which must be copper core. The diameter of the copper core should conform to the relevant national standard. The ground resistance should be less than 10Ω .



- DO NOT connect AC power supply to the output terminals marked "U", "V" and "W". Otherwise, there will be damage to the inverter.
- DO NOT connect control terminals (except terminals marked "TA", "TB" and "TC") to AC 220V power supply, which may cause damage to the inverter.



- When the open-ended output terminal of the collector connects to any inductive load, i.e., the relay coil, do insert a diode at each end of the load in parallel.
- The control wire in the inverter or the control cabinet should be at least 100mm away from the power cable. DO NOT put them in the same metallic channel. If the signal wire and the power cable need to intersect, they should intersect at an angle of 90° . The control wire must adopt STP (shielded twisted pair wire); the shielded layer must connect to the terminal GND; and the power wire is recommended to use metallic shielded cable.



- The unavoidable strong electromagnetic interference of the inverter may have bad influence on all the electrical equipment and meters in the same environment. To reduce interference, the output cable of the inverter can be inserted in the metal pipe connecting to the ground or in the metallic shielded cable, and connect the metallic shielded layer to the ground. In addition, a magnetic loop put on the output cable is also effective to reduce interference.

3.2.3 Instruction on Main Circuit Terminals

1. The main circuit terminals are shown as in the figure 3-5~3-6.

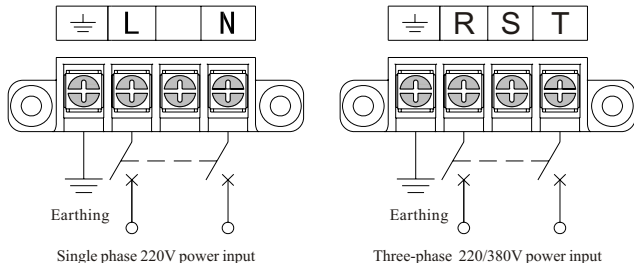


Fig.3-5 Diagram 1 for Main Circuit Terminals

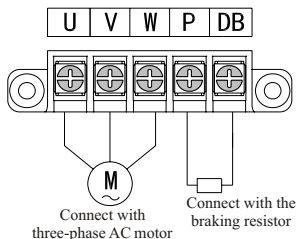


Fig.3-6 Diagram 1 for Main Circuit Terminals

Applicable to Model: ZVF9V-M0007T2/S2~M0022T2/S2,
ZVF9V-M0007T4~M0022T4

2. Function Description on Main Circuit Terminals

Terminal Symbols	Function Description
R、S、T	Power supply input terminals connecting to three-phase 380V or 220V AC input
L、N	Power supply input terminals connecting to single-phase 220V AC input
U、V、W	Inverter output terminals connecting to three-phase AC motor
P、DB	External braking resistor terminals connecting to both ends of the external braking resistor
⊥ G	Ground terminal connecting to the ground



Tips

- The three-phase input power supply connect to the terminals (R, S and T) do not differ on phase sequence and can be connected arbitrarily.
- If the motor counter rotates (reverses) when the output terminals U, V and W connect to three-phase motor, just exchange two phases of U, V and W arbitrarily.

3.2.4 Description of terminals on the control circuit

1. The terminal of control circuit shown in Fig 3-7.

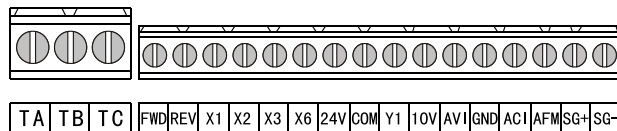


Fig 3-7 Terminals of control circuit

2、Description on Control Circuit Terminals

Table 3-2 Function Description on Control Circuit Terminals

Types	Terminal Symbols	Function Description	Electrical Specifications
Public Port	COM	Digital signal public terminal	
Running Control Terminal	FWD	Forward when FWD-COM short circuit, decelerate and stop when FWD-COM is open.	INPUT, 0~24V power level, low level valid, 5mA
	REV	Reverse when FWD-COM short circuit, decelerate and stop when FWD-COM is open.	
Multi-function Input Terminal	X1	Valid only when there is a short circuit between Xn (n=1, 2, 3, 6) and COM. The functions can be set by the parameter F4.00~F4.05 separately.	INPUT, 0~24V power level, low level valid, 5mA
	X2		
	X3		
	X6		
Multi-function Output Terminal	Y1	Multi-function open-collector output is defined as on-off output terminal, whose function is set by the parameter F4.07 with reference of COM.	OUTPUT, Maximum Current Load $I \leq 50\text{mA}$
Public Port	GND	Analog signal public terminal	

Types	Terminal Symbols	Function Description	Electrical Specifications
Analog Input Terminal	+10V	External analog preset power supply connecting to potentiometer together with terminal GND and AVI. The frequency can be set as required.	INPUT, 10V DC voltage
	AVI	Analog voltage signal input, with reference of GND.	INPUT, 0~10V DC voltage
	ACI	Analog current signal input, with reference of GND	INPUT, 0~20mA DC current
Analog Output Terminal	AFM	Programmable analog voltage output connecting to the voltmeter of frequency meter with corresponding output ranging from "0" to the maximum frequency, with reference of GND.	OUTPUT, 0~10V DC voltage or 0~20mA DC current
Power supply Interface	+24V	24VDC Power Supply Output (Control Power Supply)	24VDC-100mA
Programmable Output Terminal	TA	Relay contact output. When normal, TA-TB turns on and TA-TC turns off. When there is action, TA-TB turns off and TA-TC turns on. This function is set by F4.09.	Contact rated value: 250VAC-3A 250VAC-1A 30VDC-1A
	TB		
	TC		
communication port	SG+	Communication Signal Positive Port	
	SG-	Communication Signal Negative Port	

3.3 Wiring Diagram for Inverter System

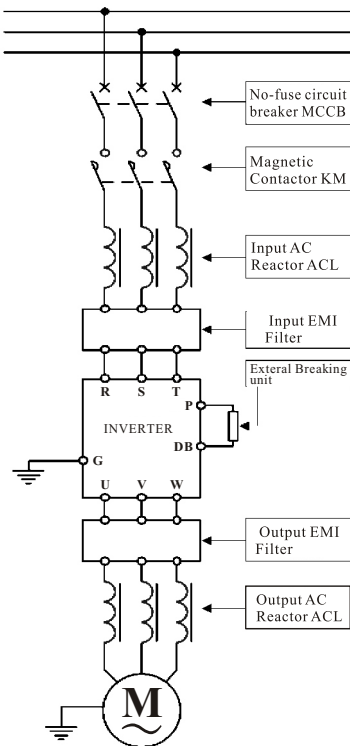


Fig.3-8 Connection between the Inverter and Optional Accessories



Tips

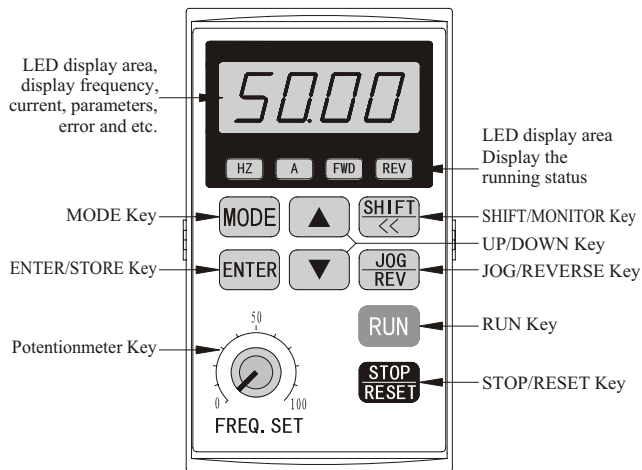
- The circuit breaker has the function of over-current protection, which can avoid extension of external equipment failure. Do pay attention to the capacity of circuit breaker when installing.
- The magnetic contactor is used to disconnect from the main power supply in case of inverter failure, and prevent restarting after power-off or inverter failure.
- The input AC reactor can reduce influence arising from unbalance of three-phase AC power supply, improve the power factor of the inverter input side and reduce damage to the inverter when it is connected to large capacity motor which may result in damage to the rectifier circuit. It is necessary to configure an AC reactor when any of the following occurred:
 - ① The power supply unbalance exceeds 3%.
 - ② The power capacity is 500KVA at least and it is more than 10 times as the inverter capacity.
 - ③ The power factor is used to compensate the connection or disconnection of the capacity, and sudden fluctuation of network voltage caused by other reasons.
 It is recommended to install a reactor with derating voltage of 3%.
- The input and output EMI filters are used to minimize the magnetic or radio frequency interference (RFI) produced by the network or the inverter.
- The brake assembly is used to consume the energy fed back by some heavy potential energy or inertia load to the inverter, so as to avoid inverter tripping arising from over-tension pumping voltage while giving a quick shutdown to the inverter.
- The output AC reactor can filter out with effect the higher harmonic components in the inverter output current and reduce the electromagnetic interference (EMI) due to ultraharmonics. Also, it can improve current waveform, decrease noise and temperature rise of a running motor and enhance the stability of motor running. To avoid influence of leakage current due to distributed capacity of the cable, it is necessary to install an output AC reactor if the motor cable is longer.

Chapter 4 Operator panel and its Operation

4.1 Operator Panel and Description

The inverter ZVF9V series has 3 kinds of operation panels, The standard M Type have potentiometer when out of factory.

4.1.1 Operator Panel Outlay



Applicable to Model: ZVF9V-M0007T2/S2~M0022T2/S2
ZVF9V-M0007T4~M0022T4

4.1.2 Function Description on Keys

- RUN Key:** When the operating instruction is to select operator panel control (F0.04=0), press this key and the inverter begins to run.
- STOP/RESET Key:** When the operating instruction is to select operator panel control (F0.04=0), the inverter is in normal running. Press this key to stop running. When the inverter is in the state of failure alarming, press this key to solve failure and return to the normal status.
- MODE Key:** Mode shifting key: Press this key to realize mode switching from monitoring parameter to function parameter.
- ENTER/STORE Key:** Enter/Store key: Press this key to confirm the current status of the inverter or save the current parameter value.
- JOG/REVERSE Key:** Jog/Reverse key: Press this key to realize jog or reserve function, and decide jog or reverse function by selecting the parameter F0.23. The factory default setting is jog function.
- SHIFT/MONITOR Key:** Shift/Monitor key: When a data needs modifying, press this key to select the modifier bit of the data. In the status of monitoring, press this key to display the status parameter.
- UP Key:** Press this key, the data or parameter code will go up. Press and hold it, the modifying speed upward will rise.
- DOWN Key:** Press this key, the data or parameter code will go down. Press and hold it on, the modifying speed downward will rise.

4.1.3 Function Description on Operator Panel Indicator Lights

Table 4-1 LED Status Description

Display Status	Function Description
● Hz	When this indicator light is switched ON, LED displays frequency data.
● A	When this indicator light is switched ON, LED displays current data.
● V	When this indicator light is switched ON, LED displays voltage data.
● ALM	
● FWD	When this indicator light is switched ON, the inverter is in the state of forward running.
● REV	When the indicator lights is switched ON, the inverter is in the state of reverse running.
●● Hz&A	When these 2 indicator lights are switched ON simultaneously, the rotary speed will be displayed.
●● Hz&V	When these 2 indicator lights are switched ON simultaneously, the percentage will be displayed.
●● A&V	When these 2 indicator lights are switched ON simultaneously, the linear speed will be displayed.
●●● Hz&A&V	When these 3 indicator lights are switched ON simultaneously, temperature will be displayed.

4.1.4 Working mode and display status of the function keyboard

1. Mode of Monitoring State

Press "MODE" key, the inverter enters into the monitoring state mode (LED displays Fd□□). Under this mode, press ▲/▼ to decide what to be monitored (i.e., a running parameter or failure record).

2. Mode of Function Status

Repress "MODE" key, the inverter will enter the mode of function status (LED displays F□.□□). Under this mode, press ▲/▼ or plus "SHIFT" key to decide the function parameter to be checked or modified.

3. Power On/Off Display

The LED displays P.oFF when the inverter start energize or powered off properly.



Tips

- In any event, the operator panel will automatically return to the Monitoring Mode if there is no key entry in 2 continuous minutes.
- In the mode of monitoring, the frequency value will be modified by pressing ▲/▼ on the operator panel when setting F0.01=1.

4. The correspondence between display symbols of the parameter Fd14 and external input terminal status in the monitoring mode is shown below:

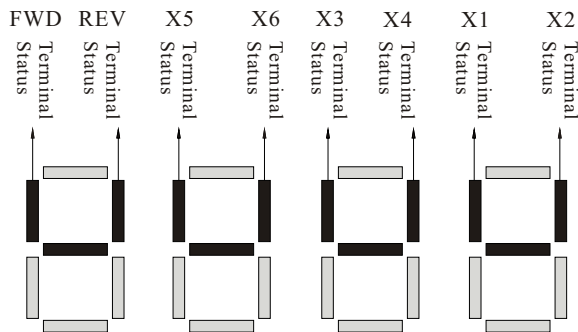
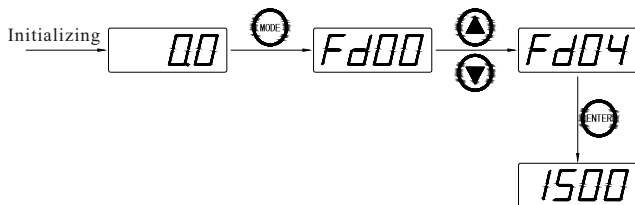


Fig. 4-3 Relationship between input terminal status and display symbols in monitoring mode

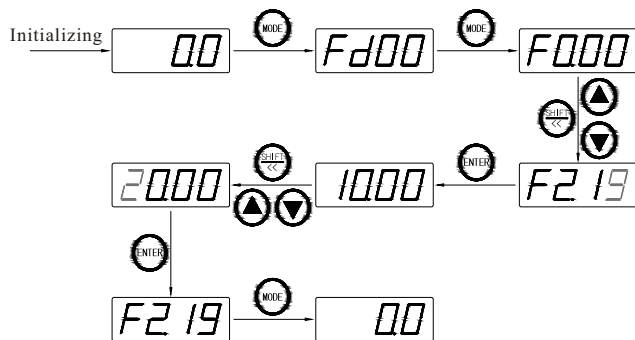
- : Terminal turns ON, valid input of terminal
- : Terminal turns OFF, invalid input of terminal

4.1.5 Use of Operator Panel

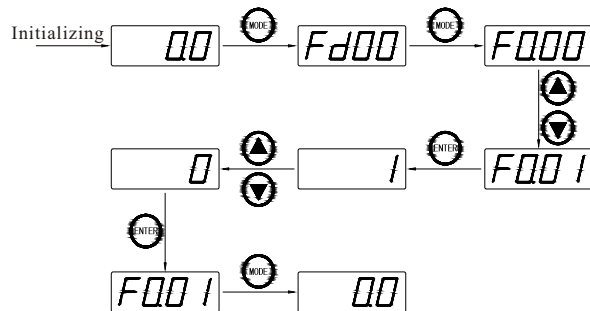
① Parameter modification in the monitoring status(modify the motor rotating speed from Fd00 to Fd04).



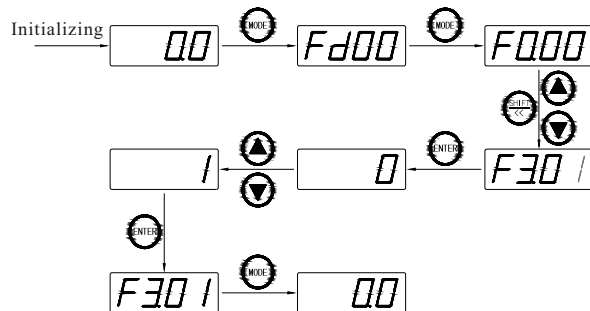
② Modification of parameter value for function codes (modify the parameter value for F2.19 jog function from 10.00Hz to 20.00Hz).



③ Modification of parameter value for function codes (modify the parameter value for F0.01 frequency setting mode from 1 to 0)



④ Parameter initializing (restore to the factory default setting)



Tips

indicates the digital tube is flickering;

indicates the digital tube is not flickering.

4.2 Monitoring Parameter Display

Table 4-2 Monitoring Parameter LED Display List

Category	Display Code	Name	Unit
Monitoring Display Parameters	Fd00	Output frequency	Hz
	Fd01	Setting frequency	Hz
	Fd02	Output current	A
	Fd03	Output voltage	V
	Fd04	Motor rotation speed	r/min
	Fd05	Running linear speed	m/s
	Fd06	Setting linear speed	m/s
	Fd07	DC bus bar voltage	V
	Fd08	Input voltage	V
	Fd09	PID set value	
	Fd10	PID feedback value	
	Fd11	Analog input AVI	V
	Fd12	Analog input ACI	mA
	Fd13	Impulse input frequency	KHz
	Fd14	Input terminal status	
	Fd15	Radiator temperature	℃
	Fd16	Module temperature	℃
	Fd17	Current counter value	
Fd18	Setting counter value		

Category	Display Code	Name	Unit
Monitoring Display Parameters	Fd19	1st diagnostic failure codes	0:OC-1 Acceleration running over current 1:OC-2 Deceleration running over current 2:OC-3 Steady-speed running over current 3:OU-1 Acceleration running over voltage 4:OU-2 Deceleration running over voltage
	Fd20	2nd diagnostic failure codes	5:OU-3 Steady running over voltage 6:OU-4 Over voltage when power off 7:LU Under voltage of running 8:LP Input side open-phase 9:SC Power module failure 10:OH Radiator over heat 11:OL Inverter overload
	Fd21	3rd diagnostic failure codes	12:OL Motor overload 13:EF external equipment failure 14:CE-1 COM error 15:CE-2 Remain 16:CE-3 Current detection error 17:CE-4 Keyboard communication failure 18:CPU failure
	Fd22	Output frequency of the last failure	Hz
	Fd23	Setting frequency of the last failure	Hz
	Fd24	Output current of the last failure	A
	Fd25	Output voltage of the last failure	V
	Fd26	DC bus bar voltage of the last failure	V
	Fd27	Module temperature of the last failure	℃
	Fd28	Software version	

Chapter 5 Operation of Inverter

5.1 Trial Operation

5.1.1 Safety Instruction on Trial Operation

The following steps should be inspected and confirmed before the trial operation of the inverter:

- Be sure the application ambient and installation for the inverter is in accordance with the requirements specified in Clause 3.1.
- Be sure the main circuit is correctly wired. The input power supply of the inverter must be connected to the terminal R, S and T (or L, N). The output terminal U, V and W must be connected to the motor.
- Be sure the ground terminal is reliably and properly grounded.
- Be sure all the switches and terminals are in proper state of off or shut down.
- Be sure there is no short cutting or short to ground of all the terminals and electrified parts.
- Be sure all the terminals, connectors and screws are tightly fastened.
- Be sure the motor has no other loads.

5.1.2 Trial Operation

Try this step only after careful inspection as mentioned in the clause 5.1.1. While in trial operation, it is suggested that the motor has vacant load to avoid damage to this mechanical equipment arising from incorrect operation. During trial operation, if the operating instruction is F0.04, then the RUN/STOP key control (factory default setting) of the operator panel must be selected. The trial operation steps must be followed as shown in the table 5-1 below.

Table 5-1 Trial Operation Steps

Order	Operation	Description
1	Switch on, inverter energized.	When energized, the inverter is in the state of readiness and LED displays 0.00Hz.
2	Press ▲/▼ till LED displays 5.00Hz.	Set the frequency to 5.00Hz. This step can be left out if the displayed frequency is already 5.00Hz when energized.
3	Press RUN.	Motor begins rotating, the frequency displayed on the inverter LED raises from 0.00Hz to 5.00Hz, and the built-in cooling fan begins working.
4	Keep a close eye on the following points: ①if there is any abnormal vibration or noise when the motor runs. ②if there is any tripping or other abnormality of the inverter. ③If the motor runs in the correct direction. ④if the value for rotation speed and frequency is correct.	If there is any anomaly or tripping, stop running immediately and cut off the power supply. Please refer to Chapter 7, find the trouble causes, then proceed trial operation again after troubleshooting. If the motor runs in the wrong direction, change arbitrary two-phase connection of the output terminal U, V or W. Go to the next step if everything is normal.
5	Press ▲ continuously till LED displays 50.00Hz.	The motor accelerates rotating and the displayed frequency rises from 5.00Hz to 50.00Hz. Go to the next step if everything is normal.
6	Press ▼ continuously till LED displays 0.00Hz.	The motor decelerates rotating and the displayed frequency falls from 50.00Hz to 0.00Hz. Go to the next step if everything is normal.
7	Press STOP.	The inverter stops outputting, the motor stops running and the trial operation ends. If everything is normal, please repeat the operation for several times.

5.2 Cautions for Operation

All the inverter functions are determined by set parameters. The parameters of inverter ZVF9V-M series consist of the function codes F0.00~FA.12, see the detail in Chapter 6 of this manual. The displayed parameter value of each function code is the factory default value of the inverter before EX factory, which can be modified by the user according to his needs. It is noteworthy that a user shall change the relative function parameters when he amends a parameter because some of the parameters are inter-related. It is not recommended to modify the set parameter value if there is no special requirement, for the factory default setting has been done properly. Otherwise, this may cause damage to the inverter or equipment due to error parameter. In case there is an error alternation of the parameter, please initialize the parameter with reference to the operation method in the clause 4.1.5 ④ Parameter Initializing (Restoring Factory Default Settings).



HAZARD

- Do not open the front cover while the inverter is powered ON. Otherwise, there is the danger of electric shock.
- Do not touch the inner side of the inverter while the power is ON, nor put any foreign matter, i.e., rod or other matter inside the inverter. Otherwise, it may result in serious damage to the equipment or death to personnel.
- Do not operate the inverter with wet hands.
- If Retry Mode is set, please put a warning sign like "KEEP CLEAR" or "HAZARD" in an eye-catching place before the equipment to avoid sudden restart of the equipment after a trip stop that may result in injury to personnel.



WARNING

- If the inverter runs at a frequency higher than 50Hz, DO confirm it is within the speed range acceptable by your motor bearing and mechanical device. Otherwise, there is the danger of damage to the motor.
- Derating should be done before use due to less effective of heat dissipation when a general motor runs at a low frequency. If it is a constant torque load, then a forced method or a special variable frequency motor should be used to release heat.



WARNING

- DO cut off the power supply of an inverter set aside for a long time to avoid foreign matter or other things enter in it which may cause damage to the inverter or even lead to fire.



CAUTION

- If the inverter is used beyond the range of allowable working voltage, then an extra step-up or step-down voltage transformer shall be configured.
- Due to thin air in a place where the altitude is higher than 1,000m, heat dissipation of the inverter will be less effective. Hence derating should be performed before use. In general, when the height rises by 1,000m, the rated voltage of the inverter shall be reduced by 10%.



FORBIDDEN

- DO NOT touch the radiator or charging resistor of the inverter with hand(s). Otherwise, there is the possibility of getting scalded.
- DO NOT proceed direct start-stop operation frequently with a contactor or any other switch devices in the inverter input side. As large charging current exists in the main circuit of the inverter, frequent power-on/off may produce cumulative effect resulting in heat fatigue of inverter components and great reduction of service life of the inverter.



COMPULSORY

- In case abnormalities occur, such as smoke, off odor, strange sound and so on, DO cut off the power supply immediately, overhaul the equipment or turn to the agent for help via phone call.



WARNING

- The contactor KM1 and KM2 must be designed in interlocked manner to realize converting between power frequency and variable frequency. It is forbidden to close synchronously. Otherwise, it may lead to permanent damage to the inverter.

Chapter 6 Description of Function Parameters

6.1 Schedule of Function Parameters



Tips

- The marked “√” Indicate the setting value of parameter can be modified no matter when the inverter is shut down or running.
- The marked “×” indicates the setting value of parameter can be modified only when the inverter is shut down, and can not be modified when the inverter is running.
- The marked “_” indicates the parameter can be display the parameter can be displayed only and can not be modified .

6.1.1 Basic Operation Functions

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F0.00	Control Mode Setting	0: Open vector control 1: V/F control		1	1	×
F0.01	Frequency setting mode selection	0: Set by the operator panel potentiometer. 1: Digital setting 1, Operator panel ▲/▼ key or digital encoder setting. 2: Digital setting 2, terminal UP/DOWN setting. 3: Digital setting 3, 485 COM setting. 4: AVI analog setting (0~10mA). 5: ACI analog setting (0~20mA). 6: Terminal impulse putting (0~10KHz) 7: Combined setting 8: External terminal selection		1	1	√
F0.02	Digital frequency control	LED units digit, power off storage 0: Store 1: No store LED tens digit: shutdown remain 0: Remain 1: No remain LED hundreds digit: Remain LED thousands digit: Remain Note: Valid only when F0.01= 1, 2, 3		1	00	√
F0.03	Operation frequency setting	0.00Hz ~ Upper limit frequency	Hz	0.01	50.00Hz	√
F0.04	Operation control mode selection	0: Operator panel RUN/STOP key control 1: External terminal control 2: 485 COM control		1	0	√

6.1.1 F0 Series Basic Functions (Continued)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F0.05	Motor rotating direction selection	0: Forward 1: Reverse 2: No reverse		1	0	✓
F0.06	Upper limit frequency	Lower limit frequency~ 400.00Hz	Hz	0.01	50.00Hz	×
F0.07	Lower limit frequency	0.00Hz~upper limit frequency	Hz	0.01	0.00Hz	×
F0.08	Basic operation frequency	1.00Hz~upper limit frequency	Hz	0.01	50.00Hz	×
F0.09	Max. output voltage	380 series:200~500V 220 Series:100~250V	V	1	380V 220V	×
F0.10	Remain					
F0.11	Torque lifting selection	0: Hand-operated 1: Auto		1	0	×
F0.12	Torque lifting setting	0.0~30.0% (Valid only when F0.11=0)	%	0.1	According to specification	✓
F0.13	Slip frequency compensation	0.0~150.0%	%	0.1	0.0%	✓
F0.14	Acceleration time 1	0.1~3600.0s Note: The default unit is "second";	s	0.1	According to specification	✓
F0.15	Deceleration time 1	See unit selection F3.09	s	0.1	According to specification	✓
F0.16	V/F curve setting	0: constant torque 1: fall torque curve 1 (1.7 power) 2: fall torque curve 1 (2.0 power) 3: User setting V/F curve (F0.17~F0.22)		1	0	×

6.1.1 F0 Series Basic Functions (Continued)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F0.17	V/F frequency value F1	0.00~frequency value F2	Hz	0.01	12.50Hz	×
F0.18	V/F voltage value V1	0.0~voltage value V2	%	0.1%	25.0%	×
F0.19	V/F frequency value F2	Frequency value F1~frequency value F3	Hz	0.01	25.00Hz	×
F0.20	V/F voltage value V2	Voltage value V1~voltage value V3	%	0.1%	50.0%	×
F0.21	V/F frequency value F3	Frequency value F2 Basic operation frequency	Hz	0.01	37.50Hz	×
F0.22	V/F voltage value V3	Voltage value V2~100.0%	%	0.1%	75.0%	×
F0.23	REV/JOG function selection	0: REV 1: JOG		1	1	✓

6.1.2 F1 Series Motor and Vector Control Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F1.00	Motor rated voltage	380:200~500V 220:100~250V	V	1	380V 220V	✓
F1.01	Motor rated current	0.1~500.0A	A	0.1	According to specification	✓
F1.02	Motor rated rotary speed	300~6000rpm	rpm	1	According to specification	×
F1.03	Motor rated frequency	1.00~400.00Hz	Hz	0.01	50.00Hz	×
F1.04	Motor vacant load current	0.1~500.0A	A	0.1	According to specification	✓

Chapter 6 Description of Function Parameters

6.1.2 F1 Series Motor and Vector Control Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F1.05	Motor stator resistance	0.001~10.000 Ω	Ω	0.001	According to specification	×
F1.06	Motor rotor resistance	0.001~10.000 Ω	Ω	0.001	According to specification	×
F1.07	Motor stator inductance Motor rotor inductance	0.01~600.00mH	mH	0.01	According to specification	×
F1.08	Motor stator mutual inductance Motor rotor mutual inductance	0.01~600.00mH	mH	0.01	According to specification	×
F1.09	Remain					
F1.10	slip compensate coefficient	0.50~2.00		0.01	1.00	√
F1.11	Motor beforehand excitation selection	0: The condition is valid. 1: Always valid.		1	0	×
F1.12	Motor beforehand excitation duration time	0.1~10.0s	s	0.1	0.2s	×
F1.13	Motor parameter self-learning	0: No action. 1: Static self-learning (valid only when F0.00=0).		1	0	×
F1.14	Speed ring (ASR) proportional gain	0.01~5.00		0.01	1.00	√
F1.15	Speed ring (ASR) integral time	0.01~10.00s	s	0.01	2.00s	√

Chapter 6 Description of Function Parameters

6.1.3 F2 Series Auxiliary Operation Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.00	Starting mode selection	0: Start with initial frequency. 1: Start with rotary speed tracing.		1	0	×
F2.01	Starting frequency	0.00~10.00Hz	Hz	0.01	1.00Hz	√
F2.02	Starting frequency sustain time	0.0~10.0s	s	0.1	0.0s	×
F2.03	Starting DC braking current	0.0~100.0%	%	0.1	0.0%	√
F2.04	Starting DC braking time	0.0: Braking inaction 0.1~30.0s	s	0.1	0.0s	×
F2.05	Acceleration/Deceleration mode selection	0: Linear acceleration/deceleration 1: S curve acceleration/deceleration		1	0	√
F2.06	S curve initial section time ratio	10.0~40.0%	%	0.1	20.0%	×
F2.07	S curve rise/fall section time ratio	10.0~80.0%	%	0.1	60.0%	×
F2.08	AVR function selection	0: Disabled 1: Enabled		1	1	×
F2.09	Auto energy saving operation selection	0: Disabled 1: Enabled		1	0	×
F2.10	FWD/REV dead time	0.0~10.0s	s	0.1	2.0s	×
F2.11	Stop mode selection	0: Accelerated stop 1: Free stop		1	0	×
F2.12	Stop DC braking initial frequency	0.00~20.00Hz	Hz	0.01	0.00Hz	√

6.1.3 F2 Series Auxiliary Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.13	Stop DC braking current	0.0~100.0%	%	0.1	0.0%	✓
F2.14	Stop DC braking time	0.0: Braking inaction 0.1~30.0s	s	0.1	0.0s	×
F2.15	Power cut restarting selection	0: Disabled 1: Regular start 2: Start with rotary speed tracing		1	0	×
F2.16	Power cut restarting wait time	0.0~20.0s		0.1	0.5s	×
F2.17	Failure auto reset times	0~10	s	1	0	×
F2.18	Failure auto reset interval time	0.5~25.0s	s	0.1	3.0s	×
F2.19	JOG operation frequency setting	0.00~400.00Hz	Hz	0.01	10.00Hz	✓
F2.20	JOG acceleration time setting	0.1~3600.0s Note: The default unit is "second".	s	0.1	According to specification	✓
F2.21	JOG deceleration time setting	Refer to F3.09 for unit selection.	s	0.1	According to specification	✓
F2.22	Acceleration time 2	0.1~3600.0s Note: The default unit is "second".	s	0.1	According to specification	✓
F2.23	Deceleration time 2	Refer to F3.09 for unit selection.	s	0.1	According to specification	✓
F2.24	Acceleration time 3	0.1~3600.0s Note: The default unit is "second".	s	0.1	According to specification	✓
F2.25	Deceleration time 3	Refer to F3.09 for unit selection.	s	0.1	According to specification	✓

6.1.3 F2 Series Auxiliary Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.26	Acceleration time 4	0.1~3600.0s Note: The default unit is "second".	s	0.1	According to specification	✓
F2.27	Deceleration time 4	Refer to F3.09 for unit selection.	s	0.1	According to specification	✓
F2.28	1st stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	5.00Hz	✓
F2.29	2nd stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	10.00Hz	✓
F2.30	3rd stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	15.00Hz	✓
F2.31	4th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	20.00Hz	✓
F2.32	5th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	25.00Hz	✓
F2.33	6th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	30.00Hz	✓
F2.34	7th stage speed output frequency	0.00 ~ upper limit frequency	Hz	0.01	40.00Hz	✓
F2.35	Remain				-	-
F2.36	Leap frequency 1	0.00 ~ upper limit frequency	Hz	0.01	0.00Hz	✓
F2.37	Range of leap frequency 1	0.00 ~ 10.00Hz	Hz	0.01	0.00Hz	✓
F2.38	Leap frequency 2	0.00 ~ upper limit frequency	Hz	0.01	0.00Hz	✓
F2.39	Range of leap frequency 2	0.00 ~ 10.00Hz	Hz	0.01	0.00Hz	✓

Chapter 6 Description of Function Parameters

6.1.3 F2 Series Auxiliary Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F2.40	Leap frequency 3	0.00 ~ upper limit frequency	Hz	0.01	0.00Hz	✓
F2.41	Range of leap frequency 3	0.00 ~ 10.00Hz	Hz	0.01	0.00Hz	✓
F2.42	Carrier frequency	1.0 ~ 15.0KHz	KHz	0.1	According to specification	✓
F2.43	PWM adaptive control	0: Fixed carrier 1:Auto Carrier Line Up		1	1	✓

6.1.4 F3 Series User Management Interface Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F3.00	LCD Language Selection	0:Chinese 1: English		1	0	✓
F3.01	Parameter Initializing	0: No operation. 1: Restore to the default setting. 2: Clear failure record.		1	0	×
F3.02	Parameter Write Protection	0:All the parameters are allowed to be modified. (Some parameters can not be modified during operation). 1: Only frequency setting is allowed to be modified. 2: All the parameters are prohibited to be modified. Note: The above limitations are invalid on this parameter.		1	0	✓
F3.03	Remain				-	-

Chapter 6 Description of Function Parameters

6.1.4 F3 Series User Management Interface Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F3.04	Selection of monitoring parameter 1	0~18		1	0	✓
F3.05	Selection of monitoring parameter 2	0~18		1	1	✓
F3.06	Linear velocity coefficient	0.01~100.0		0.01	1.00	✓
F3.07	Closed loop display coefficient	0.01~100.0		0.01	1.00	✓
F3.08	Software Version	0.00~99.99		0.01	-	-
F3.09	Acceleration/Deceleration time unit	0:Second 1:Minute		1	0	✓

6.1.5 F4 Series On-off Input/Input Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.00	Function of input terminal X1	0: No function 1: Multi-stage speed selection 1 2: Multi-stage speed selection 2 3: Multi-stage speed selection 3 4: Acceleration time selection 1 5: Acceleration time selection 2		1	0	×
F4.01	Function of input terminal X2	6: Channel frequency class selection 1 7: Channel frequency class selection 2		1	0	×

Chapter 6 Description of Function Parameters

6.1.5 F4 Series Switch Quantity Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.02	Function of input terminal X3	8: Channel frequency class selection 3 9: FWD jog control 10: REV jog control 11: Free stop control 12: Frequency increasing/UP command 13: Frequency decreasing/DOWN command		1	0	×
F4.03	Function of input terminal X4	14: External equipment failure input 15: Three-wire operation control 16: DC braking command 17: Counter clear input 18: Counter impulse input (Valid for X6 only) 19: External impulse input (Valid for X6 only)		1	0	×
F4.04	Function of input terminal X5	20: External reset signal input 21: UP/DOWN terminal frequency clear 22: PID operation input 23: Programmable multi-stage speed operation input 24: Wobble operation input 25: Wobble StateReset		1	0	×
F4.05	Function of input terminal X6	26: External stop command 27: Operation inhibit command 28: Acceleration/Deceleration inhibit command (remain) 29: Command switches to terminal 30: Frequency switches to VCI 31: Timing starts 32: Timing clear		1	0	×

Chapter 6 Description of Function Parameters

6.1.5 F4 Series Switch Quantity Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.06	FWD/REV Terminal Control Mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2 (Remain)		1	0	×
F4.07	Open-circuit Collector Output terminal Y1 setting	0: Inverter in operation instruction 1: Frequency/Speed arrival signal (FAR) 2: Frequency/Speed level detecting signal (FDT) 3: Inverter zero rotary speed in operation instruction 4: External equipment failure shutdown 5: Output frequency arrival upper limit 6: Output frequency arrival lower limit		1	0	√
F4.08	Open-circuit Collector Output terminal Y1 setting	7: Programmable multi-stage speed operation one cycle finished 8: Inverter overload alarm signal 9: Inverter operation is ready 10: Counter detection signal output		1	1	√
F4.09	Programmable relay output setting	11: Counter reset signal output 12: Inverter failure 13: Under-voltage locking shutdown 14: Wobble upper/lower limit 15: Programmable multi-stage speed operation is finished. 16: Remain 17: Timing impulse output		1	12	√

6.1.5 F4 Series Switch Quantity Input/Output Parameters (Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F4.10	FDT level setting	0.00Hz~Upper limit of frequency	Hz	0.01	10.00Hz	✓
F4.11	FDT lagged value	0.00~30.00Hz	Hz	0.01	1.00Hz	✓
F4.12	Frequency arrival (FAR) checkout range	0.00~15.00Hz	Hz	0.01	5.00Hz	✓
F4.13	Overload pre-alarm level	20~120%	%	1	100%	✓
F4.14	Overload pre-alarm action time	0.0~15.0s	s	0.1	1.0s	×
F4.15	Counter reset value setting	Counter detection value setting~60000		1	1	×
F4.16	Counter detection value setting	0~counter reset value setting		1	1	×

6.1.6 F5 Series Analog Input/Output Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.00	AVI input lower limit voltage	0.0V~AVI input upper limit voltage	V	0.1	0.0V	✓
F5.01	AVI input upper limit voltage	AVI input lower limit voltage ~ 10.0V	V	0.1	10.0V	✓
F5.02	ACI input lower limit current	0.0mA~ACI input upper limit current	mA	0.1	0.0mA	✓
F5.03	ACI input upper limit current	ACI input lower limit current ~ 20.0mA	mA	0.1	20.0mA	✓

6.1.6 F5 Series Analog Input/Output Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.04	Impulse input lower limit frequency	0.0 ~ impulse input upper limit frequency	KHz	0.1	0.0KHz	✓
F5.05	Impulse input upper limit frequency	Impulse input lower limit frequency ~10.0KHz	KHz	0.1	10.0KHz	✓
F5.06	Min. analog input corresponding setting frequency	0.00Hz~upper limit frequency	Hz	0.01	0.00Hz	✓
F5.07	Max. analog input corresponding setting frequency	0.00Hz~upper limit frequency	Hz	0.01	50.00Hz	✓
F5.08	analog input signal delay time	0.1~5.0s	s	0.1	0.5s	✓
F5.09	Multi-function analog output AFM	0: Operation frequency 1: Setting frequency 2: Output current 3: Motor rotating speed		1	0	✓
F5.10	Multi-function digital output DFM	4: Output voltage 5: Bus bar voltage 6: PID feed quantity 7: PID feedback quantity		1	2	✓
F5.11	AFM gain setting	20~200%	%	1	100%	✓
F5.12	Remain				-	-
F5.13	DFM gain setting	20~200%	%	1	100%	✓
F5.14	Remain				-	-

Chapter 6 Description of Function Parameters

6.1.6 F5 Series Analog Input/Output Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.15	Combined feeding path setting	LED units digit: Operation figure 1 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED tens digit: Operation figure: 2 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED hundreds digit: Operation figure: 3 0: Keyboard potentiometer 1: Digital setting 1 2: Remain 3: COM setting 4: AVI 5: ACI 6: Terminal impulse LED thousands digit: Remain		1	000	×
F5.16	Combined feeding algorithm setting	LED units digit: algorithm 1 0: Addition 1: Subtraction 2: Absolute value (subtraction) 3: Take the maximal value 4: Take the minimum value LED tens digit: Algorithm 2		1	00	×

Chapter 6 Description of Function Parameters

6.1.6 F5 Series Analog Input/Output Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F5.16	Combined feeding algorithm setting	0: Addition 1: Subtraction 2: Absolute value (subtraction) 3: Take the maximal value 4: Take the minimum value 5: Operating figure 3 does not participate in algorithm. LED thousands digit: Remain LED thousands digit: Remain Note: The above two parameters are valid only when F0.01=7.		1	000	×

6.1.7 F6 Series PID Function Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F6.00	PID action setting	LED units digit: Function setting 0: Close 1: Open LED tens digit: PID input selection 0: Auto input 1: Input through defined multi-function terminals LED hundreds digit: Remain LED thousands digit: Remain		1	00	×
F6.01	PID given path setting	0: Keyboard potentiometer 1: Digital setting 2: Remain 3: Remain 4: AVI 5: ACI		1	1	×

Chapter 6 Description of Function Parameters

6.1.7 F6 Series PID Function Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F6.02	PID feedback path setting	6: Terminal impulse 7: AVI + ACI 8: ACI ACI 9: MIN (AVI, ACI) 10: MAX (AVI, ACI)		1	4	×
F6.03	Given digital quantity setting	0.00 ~ 10.00V	V	0.01	0.0V	✓
F6.04	Feedback path gain	0.01 ~ 10.00		0.01	1.00	✓
F6.05	Feedback path polarity	0: Positive polarity 1: Negative polarity		1	0	×
F6.06	Proportional gain P	0.01 ~ 10.00		0.01	1.00	✓
F6.07	Integral time Ti	0.1 ~ 200.0s	s	0.1	1.0s	✓
F6.08	Differential time Td	0.0: No differential 0.1~10.0s	s	0.1	0.0s	✓
F6.09	Sampling cycle T	0.00:Self-motion 0.01~10.00s	s	0.01	0.00s	✓
F6.10	Deviation limit	0.0~20.0%	%	0.1	0.0%	✓
F6.11	Closed loop preset frequency	0.00~Upper limit frequency	Hz	0.01	0.00Hz	✓
F6.12	Preset frequency keep time	0.0~6000.0s	s	0.1	0.0s	×
F6.13	Sleep threshold value	0.00~10.00V	V	0.01	10.00V	✓
F6.14	Awake threshold value	0.00~10.00V	V	0.01	0.00V	✓

Chapter 6 Description of Function Parameters

6.1.7 F6 Series PID Function Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F6.15	Sleep/awake threshold value detection value	0.0~600.0s	s	0.1	300.0s	✓

6.1.8 F7 Series Programmable Operation Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.00	Programmable operation control	LED units digit:PLC operation mode selection 0: No action 1: Single cycle 2: Continuous cycle 3: Remaining the ultimate value after single cycle 4: Wobble operation LED tens digit:PLC input mode selection 0: Auto input 1: Input through defined multi-function terminals LED hundreds digit:Remain 0: Auto input 1: Input through defined multi-function terminals LED thousands digit:Remain		1	000	×
F7.01	1st stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.02	2nd stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.03	3rd stage operation time	0.0~6000.0s	s	0.1	10.0s	✓

Chapter 6 Description of Function Parameters

6.1.8 F7 Series Programmable Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.04	4th stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.05	5th stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.06	6th stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.07	7th stage operation time	0.0~6000.0s	s	0.1	10.0s	✓
F7.08	Remain				—	—
F7.09	Multi-stage speed operating direction 1	LED units digit: Stage 1 direction 0: Forward 1: Reverse LED tens digit: Stage 2 direction 0: Forward 1: Reverse LED hundreds digit: Stage 3 direction 0: Forward 1: Reverse LED thousands digit: Stage 4 direction 0: Forward 1: Reverse		1	0000	✓
F7.10	Multi-stage speed operating direction 2	LED units digit: Stage 5 direction 0: Forward 1: Reverse LED tens digit: Stage 6 direction 0: Forward 1: Reverse LED hundreds digit: Stage 7 direction 0: Forward 1: Reverse LED thousands digit: Remain		1	000	✓

Chapter 6 Description of Function Parameters

6.1.8 F7 Series Programmable Operation Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Operation Modification
F7.11	Wobble operation parameters	LED units digit: Remain LED tens digit: wobble control 0: Fixed wobble 1: Variable wobble LED hundreds digit: Wobble shutdown start selection 0: Start according to the state memorized before shutdown 1: Restart LED thousands digit: Wobble status: Memory store or not after power failure 0: Store the wobble status after power failure. 1: Do not store the wobble status after power failure.		1	000	×
F7.12	Wobble preset frequency	0.00~upper limit frequency	Hz	0.01	10.00Hz	✓
F7.13	Wobble preset frequency waiting time	0.0~3600.0s	s	0.1	0.0s	×
F7.14	Wobble range	0.0~50.0%	%	0.1	10.0%	✓
F7.15	Trip frequency	0.0~50.0%	%	0.1	10.0%	✓
F7.16	Wobble cycle:	0.1~3600.0s	s	0.1	10.0s	✓
F7.17	Triangle rising time	0.0~100.0%	%	0.1	50.0%	✓
F7.18	Wobble center frequency standard	0.00~upper limit frequency	Hz	0.01	10.00Hz	✓

Chapter 6 Description of Function Parameters

6.1.9 F8 Series Communication Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Question Modification
F8.00	Host address	0: Host 1~31: Slave		1	1	×
F8.01	Communication configure	LED units digit: Baud rate selection 0:1200BPS 1:2400BPS 2:4800BPS 3:9600BPS 4:19200BPS 5:38400BPS LED tens digit: data format 0: No parity 1: Even parity 2: Odd parity LED hundreds digit: Communication failure action selection 0: Stop 1: Remain the present state LED thousands digit: Remain		1	013	×
F8.02	Communication time-out checkout time	0.0~100.0s	s	0.1	10.0s	×
F8.03	Host response delay	0.0~100.0ms	ms	1	5ms	×
F8.04	gearing rate setting	0.01~10.00		0.01	1.00	√

Chapter 6 Description of Function Parameters

6.1.10 F9 Series Protection Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Question Modification
F9.00	Motor overload protection coefficient	30%~110%	%	1	105%	√
F9.01	Under-voltage protection level	380V:360~480V 220V:180~240V	V	1	400V 200V	√
F9.02	Over-voltage protection level	380V:660~760V 220V:330~380V	V	1	700V 350V	√
F9.03	Current amplitude limiting level	120%~220%	%	1	180%	√

6.1.11 FA Series High-level Function Parameters

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Question Modification
FA.00	Zero frequency operation threshold	0.00~50.00Hz	Hz	0.01	0.00Hz	√
FA.01	Zero frequency return difference	0.00~50.00Hz	Hz	0.01	0.00Hz	√
FA.02	Energy consumption braking initial voltage	380V:600~750V 220V:300~375V	V	1	740V 370V	√
FA.03	Energy consumption braking action proportion	10~100%	%	1	50%	√
FA.04	Cooling fan control	0: Auto operation 1: Operating since energized.		1	0	√

6.1.11 FA Series High-level Function Parameters(Continuation...)

Function Code	Name	Setting Range	Unit	Min. Unit	Default Setting	Setting Modification
FA.05	UP/DOWN terminal modification speed ratio	0.01~100.00Hz/s	Hz/s	0.01	1.00Hz/s	✓
FA.06	Over modulation enabled	0: Disabled 1: Enabled		1	0	×
FA.07	Timing	0~65535s	s	1	0s	✓
FA.07 ~ FA.12	Remain				-	-

6.2 Detailed Description on Function Parameters

F0 Series Basic Operation Parameters

F0.00 Control Mode Setting Setting Range: 0~1 Factory Default Setting: 1

This function is used to select the inverter's control mode.

0: Open-ring Vector Control

This is also called "SVC", indicating no speed sensor vector control, which is applicable to high performance speed regulation without installing an encoder.

1: V/F Control

This is applicable to the speed regulation where there are no high requirements for the speed control precision, low frequency torque and other performances, and can be used when several motors are driven by an inverter.



Tips

- If vector control mode is selected, it is necessary to learn the motor parameters before the first operation to get the exact motor parameters. Be sure the nameplate data of the motor conforms to the motor parameters of the inverter before self-study. Otherwise, self-study can not be accomplished or error results will be turned out. If the nameplate data of the motor can not be received, then V/F control mode is suggested.
- If vector control mode is selected, be sure to set proper parameters (F1.14, F1.15) for speed regulator to ensure a good stability and dynamic performance.
- If vector control mode is selected, one inverter can drive only one motor and there is not too much gap between the inverter capacity and the motor capacity. Otherwise, the control performance may fall or the machine can not run normally.

F0.01 Frequency setting mode selection Setting range: 0~8 Factory default setting: 1

This function is used to select the operation frequency setting mode of the inverter.

0: Operator panel potentiometer setting:

To regulate the operation frequency by operating the potentiometer on the keyboard.

1: Digital setting, 1, operator panel ▲/▼ key or digital encoder setting:

To set the operation frequency by F0.03. The operation frequency can be altered by pressing the keyboard button or by digital encoder. The modified frequency value will be stored into F0.03 after power down. If the frequency is not expected to be saved, just set the parameter F0.02 directly.

2: Digital setting 2, external terminal UP/DOWN setting:

To alter the operation frequency through ON/OFF of external control terminal defined with UP/DOWN frequency function. When UP-COM closes, frequency rises; when DOWN-COM opens, frequency falls; when UP/DOWN closes or opens with COM simultaneously, frequency remains

and will not be changed. The modified frequency value will be stored into F0.03 after power down.

The velocity ratio of operation frequency to be modified by UP/DOWN terminal can be set by parameter FA.05.

3: Digital setting 3, 485 COM setting:

To set the operation frequency by frequency command of RS485 communication interface received from the upper(host) machine.

4: External analog voltage signal AVI (0~10V) or external potentiometer setting:

To set the operation frequency by external voltage input terminal AVI. Refer to F5.00~F5.01 for relevant settings.

5: External analog current signal ACI (0~20mA) setting:

To set the operation frequency by external voltage input terminal AVI. Refer to F5.02~F5.03 for relevant settings.

6: External terminal impulse (0~10KHz) setting:

To set the operation frequency by X6 terminal input impulse signal. Refer to F5.04~F5.05 for relevant settings.

7: Combined setting:

The operation frequency is set by linear combination of each setting path. The combination mode is decided by F5.15~F5.16.

8: External terminal selection

To confirm the frequency input path by 8 kinds switching assemblies of external multi-function terminals. The function terminal is defined by F4.00~F4.05. The path corresponding to the combination is shown in the table below.

Frequency path selection terminal 3	Frequency path selection terminal 2	Frequency path selection terminal 1	Frequency setting path
0	0	0	Keyboard potentiometer
0	0	1	Digital setting 1
0	1	0	Digital setting 2

Frequency path selection terminal 3	Frequency path selection terminal 2	Frequency path selection terminal 1	Frequency setting path
0	1	1	Digital setting 3
1	0	0	AVI analog setting
1	0	1	AVI analog setting
1	1	0	Terminal impulse setting
1	1	1	Combine setting

Table 6-1



Tips

- If the operating keyboard provides a digital encoder, it can substitute the function of ▲/▼ and ENTER keys to realize regulation of digital frequency, modification of parameters and store of data. Therefore, when using the function of this digital encoder, F0.01 shall be set to 1 instead of 0. Otherwise, the frequency setting by digital encoder will be invalid. If the user needs an analog potentiometer to realize frequency setting, do use an analog potentiometer keyboard or an external potentiometer.
- If the frequency setting mode is selected to 6, be sure to select port X6. Others ports are invalid.
- If the frequency setting mode is selected to 8, it is applicable to the occasion of frequency path real-time shifting. E.g., if there is a need to realize shifting of voltage setting to current setting, it can be realized by shifting two combinations: the multi-function terminal "100" and "101". Also, this can be realized by the multi-function terminal defined with "frequency shifting to ACI" directly.

Chapter 6 Description of Function Parameters

F0.02 Digital frequency control Setting range: 00~11 Factory default setting: 00

LED unit digit

0: The setting frequency value is stored in F0.03 after power switches off and restored to this value after power switches on again.

1: The setting frequency will lose automatically after the inverter switches off. The inverter will start rotating at the frequency of 0.0Hz when re-energized.

LED tens digit

0: The setting frequency remains the same after shutdown.

1: The setting frequency will restore to F0.03 if de-energized.



Tips

- LED units digit setting is valid only when F0.01=1, 2,3.
- LED tens digit setting is valid only when F0.01=1, 2,3. If F0.01=1, it is regarded as a default of shutdown setting frequency remaining.

F0.03 Operation frequency setting Setting range: 0.00Hz~upper limit frequency Factory default setting: 50.00Hz

If the frequency setting mode is selected as F0.01=1,2,3, then this parameter will be the initial setting frequency of the inverter. If F0.01=1, the frequency can be modified directly by ▲/▼ key on the operator panel. If F0.01=2, the frequency shall be operated to the initial frequency and decide UP or DOWN according to the open or close of UP/DOWN.

Chapter 6 Description of Function Parameters

F0.04 Operation control mode selection Setting range: 0~2 Factory default setting: 0

This function is used to set the control mode for inverter's operation commands such as forwarding, reversing, jogging and stop.

0: Controlled by the operator panel

To control motor's start or stop by the press button RUN, STOP, REV /JOG on the operator panel.

1: Controlled by external terminal

To control motor's start or stop through ON/OFF of external terminal FWD/REV-COM.

2: Controlled by 485 COM

To control motor's start or stop by 485 COM.

F0.05 Motor rotating direction selection Setting range: 0~2 Factory default setting: 0

This function is used to change motor's rotating direction.

0: Forward

1: Reverse

2: Reverse disabled

F0.06 Upper limiting frequency frequency~400.00Hz	Setting range: lower limiting Factory default setting: 50.00Hz
F0.07 Lower limiting frequency	Setting range: 0.00Hz~upper limiting Factory default setting: 0.00Hz

The upper limit of frequency refers to the allowable maximum output frequency of the inverter, as shown in f3 of Fig. 6-1.

The lower limit of frequency refers to the allowable minimum output frequency of the inverter, as shown in f1 of Fig. 6-1.

During actual running, if the set frequency is smaller than the lower limit of frequency, the inverter will reduce the value of output frequency relevantly. When it reaches the lower limit of frequency, the inverter will decide its steady state output according to the running frequency set by the lower limit of frequency.

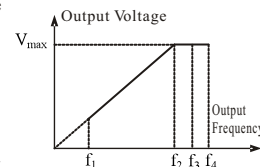


Fig.6-1 Diagram of Upper/Lower Limit of Frequency

F0.08 Basic operation frequency Setting range: 1.00~upper limiting frequency
Factory default setting: 50.00Hz

Basic operation frequency is the minimal frequency corresponding to the maximum voltage output by the inverter. Generally, it is motor's rated frequency, which is the basis for frequency setting and acceleration/deceleration time. Note: This cannot be regulated at will, as shown in Fig.6-1.

F0.09 Maximum output voltage Setting range: 100~500V
Factory default setting: Determined as per specification

This is the maximum output voltage corresponding to the basic frequency output by the inverter. Generally, it is motor's rated voltage. Under the mode of V/F control, output voltage value can be changed by regulating this parameter, while under the mode of vector control, this parameter will be invalid, as shown in Vmax of Fig.6-1.

F0.10 Remain



CAUTION

- This parameter can not be changed at will. Otherwise, there will be error display of the inverter's current, causing abnormal operation.

F0.11 Torque lifting selection Setting range: 0~1 Factory default setting: 0

This parameter is used to lift motor's low frequency torque characteristic under V/F mode. It will be invalid under vector control.

0: Hand-operated

Torque lifting voltage is set by parameter F0.12, and the voltage will rise according to the value set by F0.12.

1: Auto

Torque lifting voltage changes as the rotator current changes. The larger the rotator current is, the larger voltage is lifted. If auto torque lifting is set, magnetic circuit saturation caused by overlarge lifting voltage when the motor has a light load can be prevented and overheat can be avoided when the motor is in low frequency operation.

Torque lifting voltage changes as the rotator current changes. The larger the rotator current is, the larger voltage is lifted. If auto torque lifting is set, magnetic circuit saturation caused by overlarge lifting voltage when the motor has a light load can be prevented and overheat can be avoided when the motor is in low frequency operation.

The formula for auto torque lifting voltage is shown below:

Lifting voltage = $(F0.12 \div 200) \times F0.09 \times (\text{Inverter output current} \div \text{inverter rated current})$ The calculation method for hand-operated torque lifting voltage is similar to auto torque lifting.

The difference lies in that hand-operated torque lifting voltage should remove the ratio of output current to rated current. The torque value shall be moderate in accordance with loads.

F0.12 Torque lifting selection Setting range: 0.0~30.0% Factory default setting: as per spec.

Excitation voltage falls in the zone of low frequency rotation. So, it is necessary to compensate excitation current of the motor and enhance the torque in the state of low frequency rotation (improve V/F characteristic).



CAUTION

- Too high torque lifting may result in over-current protection of the inverter which may lead to failure starting of the motor. When this occurs, the setting value shall be decreased properly.



WARNING

- Heat dissipation will be less effective when a motor runs at a low frequency for a long period. Oversetting of torque lifting value in this case may speed up this phenomena and lead to burnout of the motor. DO keep in mind to take a forced method to release heat from the exterior of motor or perform derating before use.

F0.13 Slip frequency compensation Setting range: 0.0~150.0%
Factory default setting: 0.0%

During actual rotation, a motor's slip is influenced by variation in load torque, which causes deviation of actual speed from the expected value. With slip compensation function, the inverter's output power can be adjusted automatically with load torque fluctuation of the motor, which can compensate off-speed arising from load fluctuation of the motor and thus improve accuracy of speed.

F0.14 Acceleration time 1 Setting range: 0.1~3600.0s Factory default setting: as per spec.

F0.15 Deceleration time 1 Setting range: 0.1~3600.0s Factory default setting: as per spec.



Tips

- This inverter series provide 4 groups of acceleration/deceleration time parameters. Others are defined in the parameter F2.22~F2.27 with default value of "1". Please select other groups of acceleration/deceleration time parameters through control terminal if other groups are preferred.

F0.16 V/F curve setting Setting range: 0~3 Default setting: 0

0: Constant torque

This indicates the inverter's output voltage is of positive ratio to frequency, applicable to most loads.

1: Decreased torque curve 1

This indicates the output is a 1.7 power decreased torque curve.

2: Decreased torque curve 2

The output is the second power decreased torque curve. 6-5. Curve 2 and 3 are applicable to fans, pumps and other variable torque loads. Curve 3 has better effect on energy saving comparing with Curve 2. Noteworthy, when the motor runs according to curve 2 and curve 3, unsteady operation may occur because the motor is in a state of under excitation. Hence it is necessary to set the curve as per detailed conditions. Or adopt a self-defined V/F curve.

3: Self-defined V/F curve

When selecting this mode, just set the expected V/F curve through F0.17~F0.22.

F0.17 V/F frequency value F1 Setting range: 0.00~frequency value F2 Default setting: 12.50Hz

F0.18 V/F voltage value V1 Setting range: 0.0~voltage value V2 Default setting: 25.0%

F0.19 V/F frequency value F2 Setting range: frequency value F1~F3 Default setting: 12.50Hz

F0.20 V/F voltage value V2 Setting range: voltage value V1~V2 Default setting: 25.0%

F0.21 V/F frequency value F3 Setting range: F2~basic frequency Default setting: 12.50Hz

F0.22 V/F voltage value V3 Setting range: voltage value V2~100% Default setting: 25.0%

This function parameter groups are used to set expected V/F curve flexibly.

F0.23 REV/JOG function selection Setting range: 0~1 Default setting: 1

This function is used to set the REV/JOG function on the operator panel.

0: REV function

1: JOG function

Group F1 Motor and Vector Control Parameters

F1.00 Motor rated voltage Setting range: 100~500V Default setting: as per spec.

F1.01 Motor rated current Setting range: 0.1~500.0A Default setting: as per spec.

F1.02 Motor rated rotating speed Setting range: 300~6000rpm Default setting: as per spec.

F1.03 Motor rated frequency Setting range: 1.00~400.00Hz Default setting: 50.00Hz

F1.04 Motor vacant load current Setting range: 0.1~500.0A Default setting: as per spec.

The above parameter groups are electrical parameters for the motor being controlled. If the inverter is not matched with the motor power rate (the gap shall not exceed two specification grades), it is still necessary to ensure the motor's rated current input be set to F1.01, so as to guarantee the accuracy of parameter detection of the controlled motor and get a better control effect.

F1.05 Stator resistance	Setting range: 0.001~10.000 Ω	Default setting: as per spec.
F1.06 Rotator resistance	Setting range: 0.001~10.000 Ω	Default setting: as per spec
F1.07 Stator & rotator inductance	Setting range: 0.01~600.00mH	Default setting: as per spec.
F1.07 Stator & rotator mutual inductance	Setting range: 0.01~600.00mH	Default setting: as per spec.
F1.09 Remain		

The above parameters are used to set basic frequency of the motor. The followings are necessary parameters for vector control.

This software contains a parameter group for a standard four-pole motor and this parameter is already the default one. But this parameter is not always in full accord with actual electrical parameter for the controlled motor. To get a good control effect and exact motor parameter, it is suggested to adopt the motor parameter self-learning function. Once the motor's self-learning is completed, parameter F1.05~F1.08 will be renewed conditionally.



CAUTION

- Before preceding the function of self-learning, DO confirm parameters on the motor's nameplate are correctly entered. If the motor capacity does not match the inverter, yet perform operation in vector mode without having motor's self-learning, it may lead to the inverter's out of control.

F1.10 Slip compensation coefficient Setting range: 0.50~2.00 Default setting: 1.00

Proceeding vector control over no speed sensor, this parameter is used to adjust motor's stability precision. Increase this parameter when the motor has heavy loads with lower speed and decrease this parameter vice versa.

F1.11 Motor pre-excitation selection Setting range: 0~1 Default setting: 0

If the motor is in the state of halting before it is started, it is supposed to build air-gap flux to get enough starting torque.

0: Conditionally valid

If this choice is selected, the motor will perform pre-excitation when the motor is started, sustain for a period of time set by parameter F1.12 and then proceed acceleration; or it will proceed control through multi-function terminals defined with starting pre-excitation command (remained temporarily).

1: Always valid

When the inverter is started, it performs pre-excitation function over the motor (always sustain 0.00Hz).

F1.12 Motor pre-excitation sustaining time Setting range: 0.1~1.0s Default setting: 0.2s

This parameter defines pre-excitation sustaining time of the motor in the mode of vector control. In this state, rated pre-excitation current passes through the motor, as if the motor is in the state of DC braking. Therefore in the mode of vector control, DC braking is invalid. To realize the effect of DC braking, user may regulate the function of pre-excitation and its sustaining time.

F1.13 Motor parameter self-learning Setting range: 0~1 Default setting: 0

0: No action

This indicates there is no action of static self-learning.

1: Static self-learning

If motor parameter self-learning is selected, press the RUN key, self-learning of the motor will be started. This course can be finished automatically without any manual intervention. During self-learning, the inverter does not respond to other operation commands. After parameter self-learning is completed, this parameter will be cleared automatically and the motor parameter received from self-learning will be saved in the inverter's control panel. In other words, parameter F1.05~F1.08 will be updated conditionally.



- This parameter is valid only when vector control is validated (F0.00=0) and the operation mode is controlled by operator panel (F0.04=0)



- If over current occurs during parameter self-learning, please check if the motor's current matches with the inverter's rated current. Before parameter self-learning, DO make sure the motor is in the state of stop, otherwise self-learning cannot perform normally. The advantage of static self-learning is that motor parameter testing can be carried out even though there is load on the motor's shaft.

F1.14 Velocity loop (ASR) proportional gain Setting range: 0.01~5.00 Default setting: 1.00

F1.15 Velocity loop (ASR) integral time Setting range: 0.01~10.00s Default setting: 2.00s

Parameter F1.14 and F1.15 are valid only for vector control and invalid for V/F control.

Increasing proportional gain may quicken dynamic response of the system, but over-large may cause oscillation; Decreasing integral time may quicken dynamic response of the system, but over-small may cause system's severe over-control and oscillation. Generally, it is suggested to increase proportional gain as much as possible on the premise that there is no oscillation of the system, and then adjust the integral time to enable a faster dynamic response and a moderate over-control of the system.

Group F2 Auxiliary Operation Parameters

F2.00 Starting mode selection Setting range: 0~1 Default setting: 0

0: Start at the starting frequency

The inverter starts at a certain initial frequency, which is the starting frequency (F2.01).

1: Start in the mode of rotation speed tracking

Track motor's rotation speed and direction automatically. Then take the tracked speed as its starting speed and run to the set frequency according to the acceleration and deceleration time.

F2.01 Starting frequency Setting range: 0.00~20.00Hz Default setting: 1.00Hz

F2.02 Starting frequency holding time Setting range: 0.0~30.0S Default setting: 0.0S

Starting frequency is the initial frequency when the inverter starts, as shown in Fig.6-7. To ensure enough starting torque, the starting frequency should be set properly.

Starting frequency maintaining time refers to the time kept by starting frequency when the inverter starts running.

F2.03 Starting DC braking current Setting range: 0.0~100.0% Default setting: 0.0%

F2.04 Starting DC braking time Setting range: 0.0~20.0S Default setting: 0.0S

Starting DC braking current: This indicates the percentage of braking current during the inverter is started in the mode of DC starting.

Starting DC braking time: This indicates a specified period of time used to start the motor by DC braking which will be invalid if it is 0.0s.



- DO take into the consideration of loads before generating DC braking current and deciding the braking time. DO NOT overset the current, for over-current may result in current trip. As for high-speed inertia load, it is not advisable to start the machine in the mode of DC braking, which is valid only when F0.00=1.

F2.05 Acceleration/Deceleration mode selection
Setting range: 0~1 Default setting: 0

0: Linear acceleration/deceleration

This indicates the output frequency increases or decreases in accordance with constant slope.

1: S curve acceleration/deceleration

To reduce noise and vibration of the mechanical system, DO change the output frequency slowly and gradually when the acceleration/deceleration begins or ends.

F2.06 S curve initial stage timepercentage Setting range: 10.0~40.0%
Default value: 20.0%

2.07 S curve rise/fall stage timepercentage Setting range: 10.0~80.0%
Default value: 60.0%

S curve initial stage, is the course during which the slope of output frequency gradually increases from 0.

S curve rise stage, is the stage that the slope of output frequency remains constant.

Combined using of the above parameters, is particularly applied to start or stop of loads during delivery or move.

F2.08 AVR function selection Setting range: 0~1 Default value: 1

0: Disabled

1: Enabled

AVR means automatic voltage regulation. When deviation occurs between input voltage and rated input voltage of the inverter, this function is applied to stabilize the output voltage of the inverter through auto regulation of duty factor of PWM.

This function is invalid if the output command voltage is higher than the input power supply voltage. During deceleration, if AVR function is disabled, the deceleration time will be short but the operation current will be bigger; if AVR is enabled, the motor will decelerate steadily but the operation current will be smaller.

F2.09 Selection of automatic energy-saving operation Setting range: 0~1 Default value: 0

When selecting automatic energy-saving operation, the inverter will automatically regulate the motor's output voltage by detecting the load current, so as to get minimum product (electric power) of voltage and current and realize energy saving.

0: Disabled 1: Enabled

F2.10 FRD/REV Dead Time Setting range: 0.0~10.0s Default value: 0.0s

This indicates the interval between FRD and REV when the inverter transfers from forward running to 0.00Hz then to reverse running; or from reverse running to 0.00Hz then to forward running, as shown in Fig.6-2.

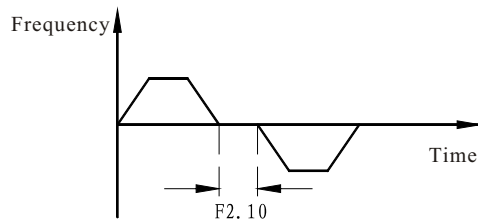


Fig.6-2 FRD/REV Dead Time

F2.11 Stop mode selection Setting range: 0~1 Default value: 0

0: Decelerating stop

When stop command is received, the inverter will drop off output frequency in accordance with the set decelerating mode and decelerating time till the frequency falls to zero and stop. If DC braking function is selected, then the inverter will begin braking when the frequency reaches the braking initial frequency and shutdown after DC braking is accomplished.

1: Free stop

Once stop command is received, the inverter will discard output immediately and the load will stop freely in accordance with the rule of mechanical inertia.



Tips

- If decelerating stop (F2.11=0) is selected, the inverter will discard output upon receiving of stop command. When the motor decelerates to the shutdown DC braking starting frequency (F2.12) (which indicates the inverter's starting frequency when the motor is shutdown by DC braking), the inverter will stop by braking according to shutdown DC braking voltage (which indicates the inverter's voltage when the motor is shutdown by DC braking) set by F2.13 and shutdown DC braking time (which indicates a specified period of time used to stop the motor by DC braking) set by F2.14.

F2.12 Shutdown DC braking initial frequency Setting range: 0.00~20.00 Hz Default value: 0.00Hz

F2.13 Shutdown DC braking current Setting range: 0.0~100.0% Default value: 0.0%

F2.14 Shutdown DC braking time Setting range: 0.0~30.0s Default value: 0.0s

F2.12 indicates the frequency when DC braking begins to perform action during the inverter's decelerating stop.

F2.13 indicates the percentage of output current of shutdown DC braking to the inverter's rated output current.

F2.14 indicates a duration time for shutdown DC braking.



Tips

- Oversetting of shutdown DC braking current may easily lead to inverter tripping. DO increase the value bit by bit.
- If shutdown DC braking time is set to 0.0s, there will be no DC braking process.

F2.15 Power off restart mode selection Setting range: 0~2
Default value: 0

F2.16 Power off restart wait time Setting range: 0.0~20.0s
Default value: 0.5s

0: Disabled

1: Regular start

2: Start in the mode of rotation speed tracking

This function decides whether the inverter will start running automatically or not and the wait time for auto running in different control modes when the inverter is electrified after power failure.

Select "0", the inverter will not run automatically when it is energized after power failure.

Select "1", if starting criteria permits, the inverter will restart automatically at the initial frequency in the time set by F2.16 when it is energized after power failure.

Select "2", if starting criteria permits, the inverter will restart automatically by way of rotation speed tracking in the time set by F2.16 when it is energized after power failure.

During the period of waiting for restarting, it is invalid to input any operating commands. For example, the inverter will automatically abort restarting by rotation speed tracking and restore to the status of normal stop if stop command is given during this period.



HAZARD

- If the power off restart Function (restart after instantaneous power failure) is selected, it may cause unanticipated sudden restart once the power switches on, which may result in heavy loss of property, serious injury or death to personnel in some cases, e.g., the inverter restarts due to disconnection of input power supply undone before performing a mechanical load maintenance. DO put a warning sign like "KEEP CLEAR" or "HAZARD" in an eye-catching place before the equipment to avoid sudden restart of the equipment.

F2.17 Failure self-resetting times Setting range: 0~10 Default value: 0

F2.18 Failure self-resetting interval time Setting range: 0.5~25.0s
Default value: 3.0s

The function of failure self-resetting indicates the failure arising from load fluctuation or other causes can reset automatically as per set times and interval. During the process of self-resetting, the inverter will restore operation by way of rotation speed tracking and restarting. When the self-resetting times are set to "0", self reset is disabled and failure protection should be done immediately. This function is invalid for failure protection caused by overload or over heat.

F2.19 JOG operation frequency Setting range: 0.00~400.00Hz
Default value: 10.00Hz

F2.20 JOG acceleration time Setting range: 0.1~3600.0s
Default value: as per spec.

F2.21 JOG deceleration time Setting range: 0.1~3600.0s
Default value: as per spec.



Tips

- Jog operation begins if F2.00=0 and stops if F2.11=0 according to the starting mode.
- JOG control can be performed by the operator panel, control terminals and COM ports.
- Propriety is always given to JOG frequency operation when pressing the JOG key in any operation states.

F2.22 Acceleration time 2 Setting range: 0.0~3600.0s Default value: as per spec.

F2.23 Deceleration time 2 Setting range: 0.0~3600.0s Default value: as per spec.

F2.24 Acceleration time 3 Setting range: 0.0~3600.0s Default value: as per spec.

F2.25 Deceleration time 3 Setting range: 0.0~3600.0s Default value: as per spec.

F2.26 Acceleration time 4 Setting range: 0.0~3600.0s Default value: as per spec.

F2.27 Deceleration time 4 Setting range: 0.0~3600.0s Default value: as per spec.

F2.22~F2.27 are the acceleration/deceleration time controlled by the inverter's external terminals through selecting "4" and "5" of the multi-function terminal X1~X6 (F4.00~F4.05).

F2.28 1st stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 5.00Hz

F2.29 2nd stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 10.00Hz

F2.30 3rd stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 15.00Hz

F2.31 4th stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 20.00Hz

F2.32 5th stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 25.00Hz

F2.33 6th stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 30.00Hz

F2.34 7th stage speed operation frequency Setting range: 0.00~upper limiting frequency Default value: 40.00Hz

The above parameters are used to set 1st~7th stage frequency of programmable/multi-stage speed operation. Refer to parameter F7.00 for details.

F2.35 Remain

F2.36 Leap frequency 1 Setting range: 0.00~upper limiting frequency Default value: 0.00Hz

F2.37 Range of leap frequency 1 Setting range: 0.00~10.00Hz Default value: 0.00Hz

F2.38 Leap frequency 2 Setting range: 0.00~upper limiting frequency Default value: 0.00Hz

F2.39 Range of leap frequency 2 Setting range: 0.00~10.00Hz Default value: 0.00Hz

F2.40 Leap frequency 2 Setting range: 0.00~upper limiting frequency Default value: 0.00Hz

F2.41 Range of leap frequency 2 Setting range: 0.00~10.00Hz Default value: 0.00Hz

The purpose of setting F2.36~F2.41 is to avoid point of resonant frequency of mechanical load so that the three points of leap frequency of the inverter can be set. If the leap range is set to "0", then no leap function performs at corresponding points of leap frequency.

The inverter's output frequency can act leap operation near some frequency points.

F2.42 Carrier frequency Setting range: 1.0~15.0KHz Default value: as per spec.

This function is used to set the carrier frequency of the inverter's output PWM wave and should be properly regulated. The maximum value of carrier frequency is determined in accordance with power specifications. Refer to Fig.6-3 for details on carrier frequency value, electromagnetic noise, leakage current and heating conditions.

Carrier frequency	electromagnetic noise	Leakage current	Heating value	Interference
1.0KHz	High	Low	Low	Low
↑↓	↑↓	↑↓	↑↓	↑↓
15.0KHz	Low	High	High	High

Fig.6-3 Carrier Frequency Diagram



CAUTION

- Due to rich ultra harmonics existed in output current, under setting of carrier frequency will result in distortion of the waveform of output current, which may cause larger noise of motor, but less loss and lower temperature rise instead.
- Increasing the setting value for carrier frequency can reduce noise of the motor, but the inverter's temperature will rise due to greater loss of power elements. If the carrier frequency value is higher than factory default setting, then the inverter shall be derated before use.

F2.43 PWM adaptive control Setting range: 0~1 Default value: 1

0: Fixed carrier

The carrier does not change as the output frequency changes.

1: Auto carrier regulation

The carrier will automatically make adaptation when there is some change in frequency to improve the pulse of low frequency torque.

Group F3 User Management Interface Parameters

F3.00 LCD Language Selection Setting range: 0~1 Default value: 0

This function is used to set languages on operator panel. It is valid only for LCD display keyboard.

1: Chinese

2: English (Remain temporarily)

F3.01 Parameter Initializing Setting range: 0~2 Default value: 0

0: No operation.

This indicates the inverter is in the normal state of data reading and writing.

1: Restore to default setting.

All the parameters in the parameter group F0~FA will restore to the default value.

2: Clear failure records.

This will clear all the history failure records.



CAUTION

- When F3.01=1, it is invalid for key control parameter F0.00, F0.01, F0.04 and F0.10, which can be modified by hand only. This function will remove all the results received from motor parameter self-learning. If vector control mode is set, then self-learning shall be performed again.

Chapter 6 Description of Function Parameters

F3.02 Parameter Write Protection Setting range: 0~2 Default value: 0

This is used to set parameters' modification rights with detailed setting as follows:

- 0: All the parameters are allowed to be modified but some parameters can not be modified during operation.
- 1: Other parameters are not allowed to be modified except digital frequency setting and this parameter.
- 2: Other parameters are prohibited to be modified except this parameter.

F3.03 Remain

F3.04 Selection of monitoring parameter 1 Setting range: 0~18 Default value: 0

F3.05 Selection of monitoring parameter 2 Setting range: 0~18 Default value: 1

This function is used to set the display contents on LED and LCD when the inverter is just energized. Monitoring parameter 1 is displayed on LED and monitoring parameter 2 is displayed in the upper left corner of LCD.

- | | |
|-----------------------------------|------------------------------|
| 0: Current output frequency | 1: Current setting frequency |
| 2: Output current | 3: Output voltage |
| 4: Motor rotary turns | 5: Operation linear velocity |
| 6: Setting linear velocity | 7: DC bus bar voltage |
| 8: Input voltage | 9: PID setting value |
| 10: PID feedback value | 11: Analog input AVI |
| 12: Analog input ACI | 13: Impulse input frequency |
| 14: Input terminal state | 15: Radiator temperature |
| 16: Power rate module temperature | 17: Current counter value |
| 18: Setting Counter value | |

F3.06 Linear velocity coefficient Setting range: 0.01~100.0 Default value: 1.00

F3.07 Closed loop display coefficient Setting range: 0.01~100.0 Default value: 1.00

Chapter 6 Description of Function Parameters

F3.06 is used to correct the display error of linear velocity. It has no influence on actual rotation speed. The calculation formula is shown below: $\text{Linear velocity} = \text{Frequency} \times \text{Linear velocity coefficient}$
F3.07 is used to correct the display error of PID set quantity or feedback quantity (voltage/current). It has no influence on closed loop PID regulation. The calculation formula is shown below:
 $\text{Displayed PID feedback/setting value} = \text{Closed loop display coefficient} \times \text{actual PID feedback/setting value.}$

F3.08 Software Version Setting range: 0.01~99.99 Default value:-

F3.09 Acceleration/Deceleration time unit
Setting range: 0~1 Default value: 0

- 0: Second
- 1: Minute

This is used to set the unit for acceleration/deceleration time with default setting of "second".

Group F4 On-off Input/Output Parameters

F4.00 Selection of input terminal X1 Setting range: 0~32 Default value: 0

F4.01 Selection of input terminal X2 Setting range: 0~32 Default value: 0

F4.02 Selection of input terminal X3 Setting range: 0~32 Default value: 0

F4.03 Selection of input terminal X4 Setting range: 0~32 Default value: 0

F4.04 Selection of input terminal X5 Setting range: 0~32 Default value: 0

F4.05 Selection of input terminal X6 Setting range: 0~32 Default value: 0

External input terminal X1~X6 are multi-function input terminals. By setting the value for F4.00~F4.05, the function of X1~X6 can be selected. Refer to below for detailed setting value and function.

- 0: No function

- 1: Multi-stage speed selection 1
- 2: Multi-stage speed selection 2
- 3: Multi-stage speed selection 3

The ON/OFF pair selected by multi-speed operation at Stage 1~3 can define maximal 7 speed stages. Multi-stage speed control terminals are selected by the parameter F4.00~F4.05. multi-speed control of external terminals can be operated together with RUN command. The multistage speed of terminal control is shown in Table 6-2.

Multi-stage speed 3	Multi-stage speed 2	Multi-stage speed 1	Multi-stage speed selection
OFF	OFF	OFF	Stage 0: The operation frequency is set by F0.03.
OFF	OFF	ON	Stage 1: The operation frequency is set by F2.28.
OFF	ON	OFF	Stage 2: The operation frequency is set by F2.29.
OFF	ON	ON	Stage 3: The operation frequency is set by F2.30.
ON	OFF	OFF	Stage 4: The operation frequency is set by F2.31.
ON	OFF	ON	Stage 5: The operation frequency is set by F2.32.
ON	ON	OFF	Stage 6: The operation frequency is set by F2.33.
ON	ON	ON	Stage 7: The operation frequency is set by F2.34.

Note: OFF indicates it is connected with the terminal COM; ON indicates it is disconnected with the terminal COM.

Table 6-2 Multi-speed selection

- 4: Acceleration/Deceleration time 1
 - 5: Acceleration/Deceleration time 2
- It is used for external terminal's selection of acceleration/deceleration time, which has four combined groups as shown in Table 6-3.

Acceleration/Deceleration time 2	Acceleration/Deceleration time 1	Multi-stage speed selection
OFF	OFF	Acceleration/Deceleration time 1
OFF	ON	Acceleration/Deceleration time 2
ON	OFF	Acceleration/Deceleration time 3
ON	ON	Acceleration/Deceleration time 4

Table 6-3 Acceleration/Deceleration Time Selection

- 6: Frequency path selection 1;
- 7: Frequency path selection 2;
- 8: Frequency path selection 3

If frequency input path is external terminal selection (F0.01=8), the inverter's frequency setting path is determined by the state of three terminals. Refer to Table 6-1 for correlation.

- 9: FRD JOG control;
- 10: REV JOG control

9 and 10 are used to perform FRD/REV JOG control in the mode of external terminal control. FRD JOG control is always prior to REV JOG control. If they close simultaneously, then FRD JOG control is valid.

- 11: Free stop control

This is used to free stop control under the mode of external terminal control. The inverter will perform free stop when it is closed and start in the mode of rotation speed tracking when it is open.

- 12: Frequency UP Command

- 13: Frequency DOWN Command

Commands of 12 and 13 are used to realize control over frequency up or down, and proceed remote control through operator panel.

- 14: External Failure Input

This terminal paves the way for the inverter to keep an eye on external equipment failure by inputting failure signals of external equipment.

- 15: Three-wire operation control

Refer to the parameter F4.06.

- 16: DC braking command

DC braking command is used to apply DC braking on the motor during stop, to realize emergency shut-down and accurate positioning of the motor. See the parameter F2.12~F2.14 for details.

17: Counter zero-clearance input

Once this function is set, connect this terminal with COM terminal and the counter value will be "0".

18: Counter pulse signal input

This is used to receive external pulse signal which is served as the count value. This function can be set only by the multifunction terminal X6.

19: External pulse signal input

This is used to receive external pulse signal which is served as frequency setting. This function can be set only by the multifunction terminal X6.

20: External reset input

When failure alarm occurs, this terminal is used to perform failure reset of the inverter. This function is in accord with STOP key on the operator panel.

21: UP/DOWN terminal frequency clear

If frequency feeding path is set to UP/DOWN terminal control that are valid, then the operation frequency can be removed directly through this function.

22: PID operation input

When PID input mode is terminal control, PID operation will be valid if this terminal is valid.

23: Programmable multi-stage speed operation input

When the input mode of programmable multi-stage speed operation (PLC) is terminal control, PLC input operation will be valid if this terminal is valid.

24: Wobble operation input

When the wobble input mode is terminal control, the wobble operation will be valid if this terminal is valid.

25: Wobble state reset

If this function is selected, no matter what kind of input it is, auto or hand-operated, close this terminal, the wobble state info kept inside the inverter will be cleared; disconnect this terminal, the wobble will restart.

26: External stop command

This command is valid for all the operation command paths. If this terminal is valid, the inverter will shut down according to the mode set by F2.11.

27: Inverter operation disable command

If this terminal is valid, the inverter in operation will perform free stop. If the inverter is in the state of halting, then starting is disabled. This function is mainly applied to the occasion that safe linking is needed.

28: Inverter acceleration/deceleration disable command

If this terminal is valid, the inverter will not be influenced by any external signals (except the stop command) and remain running at current rotating speed.

29: Command shifts to terminal

If this terminal is valid, the operation command path will shift to the path of terminal operation command forcefully, and restore to the original operation command path if it is disconnected.

30: Frequency shifts to ACI

If this terminal is valid, the frequency feeding path will shift to ACI feeding forcefully and restore to the original frequency feeding path if it is disconnected.

31: Timing start

Connect the terminal to COM when this function is set. Timing will start. The timing time is set by FA.07.

32: Timing clear

Connect the terminal to COM when this function is set. Timing will be cleared.



CAUTION

- 18 and 19 are valid only for multi-function terminal/port X6. The maximum frequency of input pulse is 20KHz with low power level of 0v and high power level of 18~26V.

F4.06 FRD/REV terminal control mode Setting range: 0~3 Default value: 0

This function is used to select four operation modes of the inverter controlled by external terminals.

0: Two-wire control mode 1

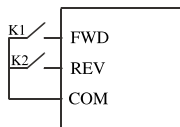
Shown in Table 6-4 and Fig.6-13.

1: Two-wire control mode 2

Shown in Table 6-4 and Fig.6-13.

Table 6-4 Two-Wiremode control running command sheet

ON/OFF state		Two-wire control 1	Two-wire control 2
K2	K1	Operation command 1	Operation command 2
OFF	OFF	Stop	Stop
ON	OFF	REV	Stop
OFF	ON	FRD	FRD
ON	ON	Stop	REV



ig.6-4 Two-wire Control 1/2 Wiring Diagram

ON stands for "switching on" and OFF stands for "switching off".

2: Three-wire control mode 1

Three-wire control is shown in Fig.6-5, in which X_n stands for three-wire operation control terminal which can be any of the multi-function input terminal X1~X6 (refer to parameter F4.00~F4.05) by selecting "15".

- SK1---FRD switch
- SK2---Stop switch
- SK3---REV switch

3: Three-wire control mode 2 (remain)

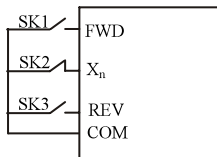


Fig.6-5: Three-wire control wiring diagram

F4.07 Open collector output terminal Y1 setting Setting range: 0~17 Default value: 0

F4.08 Open collector output terminal Y2 setting Setting range: 0~17 Default value: 1

F4.09 Programmable relay output setting Setting range: 0~17 Default value: 12

This set of parameters defines the contents of open collector output terminal Y1 and Y2, and the contents indicated by the relay.

0: Inverter "in operation" signal:

This indicates the outlet indication signal of the inverter in the state of operation.

1: Frequency arrival (FAR) signal:

Refer to the function declaration of F4.12.

2: Frequency level detection (FDT) signal:

Refer to the function declaration of F4.10.

3: Inverter null revolution "in service" instruction:

This indicates the indication signal outlet by the inverter is still in the state of operation though the output frequency of the inverter is 0.00Hz.

4: External failure stop

When failure signal of external equipment is received through input terminal, the inverter will perform trip alarm and the terminal "Y" outlets indication signal.

5: Upper limit of output frequency arrival:

This refers to the indication signal of the inverter output by the inverter when the running frequency reaches the upper limit of frequency.

6: Lower limit of output frequency arrival

This refers to the indication signal output by the inverter when operation frequency reaches the lower limit of frequency.

7: PLC multistage running one cycle ends:

When a PLC multi-speed operating cycle is finished, a valid low power level pulse signal will be output at this port (signal width: 500ms).

8: Inverter overload alarm signal:

When the inverter's output current exceeds overload alarm level, an effective low power signal will be output after waiting for a preset alarm delay period.

9: Inverter is getting ready for power on

If the inverter is ready for power switching on, in other words, the inverter has no failure in it, the bus bar is normal and the inverter's operation terminal disabled is invalid which means the inverter can accept the operation command and start, then the instruction signal will outlet at this port.

10: Counter detection signal output

Refer to the function description of F4.16.

11: Counter reset signal output

Refer to the function description of F4.15.

12: Inverter failure

If the inverter stops running due to fault in it, then failure signal will be output.

13: Inverter under-voltage lockout:

When DC bus voltage is lower than the set level of undervoltage, LED displays "P.oFF" and the terminal "Y" outputs indication signal.

14: Wobble frequency upper / lower limit

When wobble function is selected, if the wobble frequency fluctuation range reckoned from central frequency is beyond the upper limiting frequency or lower than the lower limiting frequency F0.07, this indication signal will be outlet, as shown in Fig.6-6.

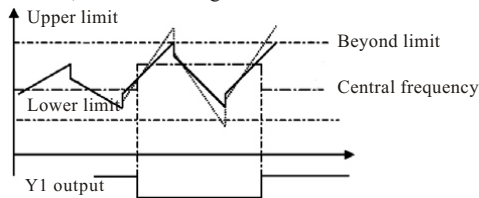


Fig.6-6 Diagram of Wobble Operation Upper/Lower Limit

15: PLC multistage operation ends:

When a PLC multi-speed operating cycle is finished, a valid low power level pulse signal will be output at this port with signal width of 500ms.

16: Remain

17: Timing pulse output

When the time reach to the timing. A valid pulse signal will be sent out (Signal width: 500ms).

F4.10 FDT level	Setting range: 0.00Hz~upper limit frequency	Default value: 10.00Hz
-----------------	---	------------------------

F4.11 FDT lagged value	Setting range: 0.00~30.00Hz	Default value: 1.00Hz
------------------------	-----------------------------	-----------------------

This set of parameters is applied to set the frequency detection level. If the output frequency rises and exceeds the setting value of FDT, then open collector signal (low power level) will be output; if the output frequency falls to the FDT removal of power level, then invalid signal (high resistance) will be output, as shown in Fig.6-7.

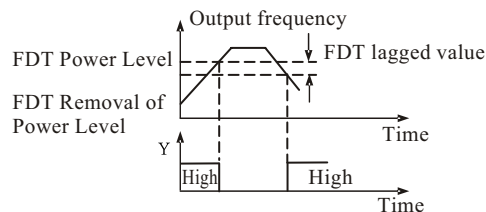


Fig. 6-7 Frequency Level Detection Diagram

F4.12 Frequency Arrival Checkout Range (FAR)

Setting range: 0.00~15.00Hz

Default value: 5.00Hz

If the inverter's output frequency is within the range of positive/negative checkout range of the set frequency, the selected output terminal will output valid signal (low power level), as shown in Fig.6-8.

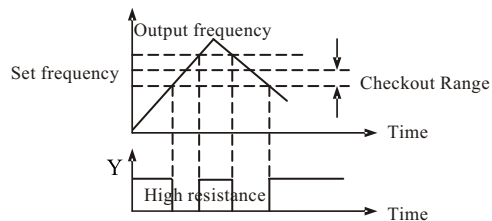


Fig.6-8 Frequency Arrival Checkout Diagram

F4.13 Overload Pre-alarm Level	Setting range: 20~120%	Default value: 100%
--------------------------------	------------------------	---------------------

F4.14 Overload Pre-alarm Action Time	Setting range: 0.0~15.0s	Default value: 1.0s
--------------------------------------	--------------------------	---------------------

Overload pre-alarm level defines the current threshold of overload pre-alarm action. Its setting range is the percentage in respect to rated current. Generally, the overload pre-alarm level should be set lower than overload protection level.

If the output current reaches the overload pre-alarm level and its duration exceeds the set time of overload pre-alarm action, then overload pre-alarm acts, as shown in Fig. 6-18.

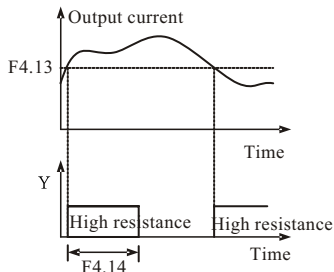


Fig.6-9 Diagram of Overload Pre-alarm Action

F4.15 Counter reset setting	Setting range: detection value ~60000	Default value: 1
-----------------------------	---------------------------------------	------------------

F4.16 Counter detection value setting	Setting range: 0~reset value	Default value: 1
---------------------------------------	------------------------------	------------------

This parameter group stipulates counting work of the counter. The pulse of counter is input by the external terminal X6. When the counting value for external pulse reaches the value set by F4.15, the corresponding multi-function export terminal (counter reset signal output) will outlet an effective cycle signal with width of 500ms and then clear the counter value.

When the counting value reaches the value set by F4.16, the corresponding multi-function export terminal (counter detection signal output) will outlet an effective cycle signal. If the counter continues to count and the value surpasses the value set by the parameter F4.16, this effective signal will be cancelled when the counter is cleared.

In Fig.6-10, Y1 is set to be a reset signal, Y2 is set to be a detection signal output, F4.15 is set to 8 and F4.16 is set to 5.

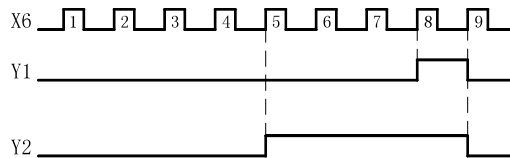


Fig.6-10 Diagram of Counter Reset Value Setting and Detection Value Setting

Group F5 Analog Input/Output Parameters

F5.00 AVI input lower limit voltage	Setting range: 0.0V~upper limit voltage	Default value: 0.0V
-------------------------------------	---	---------------------

F5.01 AVI input upper limit voltage	Setting range: Upper limit voltage~10.0V	Default value: 10.0V
-------------------------------------	--	----------------------

F5.00 and F5.01 are applied to set the maximum and minimum values for external analog input voltage AVI, which should be set in accordance with actual situation of input signals.

F5.02 ACI input lower limit current	Setting range: 0.0mA~upper limit current	Default value: 0.0mA
-------------------------------------	--	----------------------

F5.03 ACI input upper limit current	Setting range: Lower limit current~20.0mA	Default value: 20.0mA
-------------------------------------	---	-----------------------

F5.02 and F5.03 are applied to set the maximum and minimum values for external analog input current ACI, which should be set in accordance with actual situation of input signal.



● Generally, ACI port is used as current input port. If necessary, it can be used as voltage input port, which can be selected through a jumper on the control panel. Their correlation can be converted as $20\text{mA}=10.0\text{V}$.

F5.04 Pulse input lower limit frequency	Setting range: 0.0~upper limit frequency Default value: 0.0KHz
F5.05 Pulse input upper limit frequency	Setting range: Lower limit frequency~20.0KHz Default value: 10.0KHz

F5.04 and F5.05 are applied to set the maximum and minimum values for external input pulse, which should be set in accordance with actual situation of input signal.

F5.06 Minimal input corresponding frequency	Setting range: 0.00~upper limit frequency Default value: 0.00Hz
F5.07 Maximum input corresponding frequency	Setting range: 0.00~upper limit frequency Default value: 50.00Hz

This set of parameters is used to set the correlation between external analog input quantity and the set frequency. The relationship between set frequency and frequency setting signal after treatment of filtering and gain is shown in Fig.6-11. These two kinds of signals can realize the characteristics of direct action and reaction separately. f_{max} and f_{min} in this figure refer to the frequency corresponding to the upper limit of input and the lower limit of input respectively.

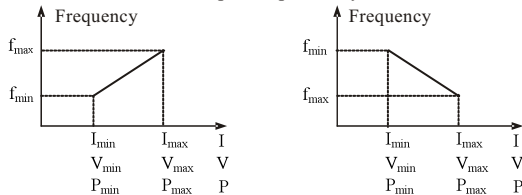


Fig.6-11 Relation Curve of Input Quantity against Setting Frequency

F5.08 Analog input signal delay period Setting range: 0.1~50.0s Default value: 0.5s

This parameter is used to regulate the delay period of analog input signal.

F5.09 Multi-function analog output AFM Setting range: 0~7 Default value: 0

F5.10 Multi-function digit output DFM Setting range: 0~7 Default value: 2

This function is used to select output signal at the analog output port AFM and digital output port DFM.

Output frequency

AFm:(0~AFM Upper limit value) = (0.00~Upper limit frequency)

DFm:(0~DFM Upper limit value) = (0.00~Upper limit frequency)

1: Setting frequency

AFm:(0~AFM Upper limit value) = (0.00~Setting frequency)

DFm:(0~DFM Upper limit value) = (0.00~Setting frequency)

2: Output current

AFm:(0~AFM Upper limit value) = (0.00~2 times for rated current)

DFm:(0~DFM Upper limit value) = (0.00~2 times for rated current)

3: Motor rotating speed

AFm:(0~AFM Upper limit value) = (0.00~2 Motor synchronous rotating speed)

DFm:(0~DFM Upper limit value) = (0.00~2 Motor synchronous rotating speed)

4: Output voltage

AFm:(0~AFM Upper limit value) = (0.00~Maximum/Rated output voltage)

DFm:(0~DFM Upper limit value) = (0.00~Maximum/Rated output voltage)

5: Bus bar voltage

AFm:(0~AFM Upper limit value) = (0.00~800V)

DFm:(0~DFM Upper limit value) = (0.00~800V)

6: PID given value

AFm:(0~AFM Upper limit value) = (0.00~10.00V)

DFm:(0~DFM Upper limit value) = (0.00~10.00V)

7: PID feedback value

AFm:(0~AFM Upper limit value) = (0.00~10.00V)

DFm:(0~DFM Upper limit value) = (0.00~10.00V)

F5.11 AFM gainsetting Setting range: 20~200% Default value: 100%

F5.12 Remain

F5.13 DFM gain setting Setting range: 20~200% Default value: 100%

F5.14 Remain

Parameter F5.11 defines the upper limit value for analog output AFM. If the default value is 100% and the range of output voltage/current is 0.00~10.00V/0.00~20.00mA, then the voltage and current output will be selected by the jumper.

AFM output = $(0 \sim 10V / 0 \sim 20mA) \times F5.11$ (Maximum value $\leq 10V / 20mA$)

Parameter F5.13 define the upper limit value for digital output DFM. If the default value is 100%, then the range of output frequency will be 0.0~10.0KHz.

DFM output = $(0 \sim 10KHz) \times F5.13$ (Maximum value = 20KHz)

F5.15 Combined feed path setting Setting range: 000~666 Default value: 000

This parameter is used to set the frequency feed path.

LED units digit: Operation figure 1

0: Keyboard potentiometer

1: Digital feeding 1

2: Remain

3: Digital feeding 3

4: AVI

5: ACI

6: Digital feeding 2

LED tens digits: Operation figure 2

0: Keyboard potentiometer

1: Digital feeding 1

2: Remain

3: Digital feeding 3

4: AVI

5: ACI

6: Digital feeding 2

LED hundreds digit: Operation figure 3

0: Keyboard potentiometer

1: Digital feeding 1

2: Remain

3: Digital feeding 3

4: AVI

5: ACI

6: Digital feeding 2

LED thousands digit: Remain

F5.16 Combined feed algorithm setting Setting range: 00~54 Default value: 00

This function is used to set the combined feed algorithm.

LED units digit: algorithm 1 LED tens digit: Algorithm 2

0: Addition

0: Addition

1: Subtraction

1: Subtraction

2: Absolute value (subtraction)

2: Absolute value (subtraction)

3: Take the maximal value

3: Take the maximal value

4: Take the minimum value

4: Take the minimum value

5: Operating figure 3 does not participate in algorithm.

LED hundreds digit: Remain

LED thousands digit: Remain

Parameter F5.15 and F5.16 will be valid only when F0.01=7. Its

algorithm formula is shown below:

(Operation figure 1) Algorithm 1 (Operation figure 2) Algorithm 2

(Operation figure 3)

If the tens digit of F5.16 is set to 5, the operation figure 3 will anticipate in algorithm composed of two figures (operation figure 1 and operation figure 2).

Eq.1: If F5.15=534 and F5.16=10, then the algorithm pair will be:

{(AVI + digital feed 3) ACI}

Eq.2: If F5.15=460 and F5.16=21, then the algorithm pair will be:

|(Keyboard potentiometer- digital feed 2) AVI|



- Algorithm rule 1: In any case, the algorithm procedure is always like this: operation figure 1 and operation figure 2 participate in algorithm 1 and get the result 1, then put result 1 and operation figure 3 into algorithm 2 and get the final result. If the algorithm result of previous two figures is a negative number, then the default result of the system will be "0".
- Algorithm rule 2: If the general algorithm result is a negative number and algorithm 2 is not an absolute one, then the default result of the system will be "0".

Group F6 PID Function Parameters

F6.00 PID action setting Setting range: 00~11 Default value: 00

LED units digit: Function setting LED tens digit: PID input selection
 0: Close 0: Auto input
 1: Open 1: Hand-operated input through defined multifunction terminals
 LED hundreds digit: Remain
 LED thousands digit: Remain
 PID regulation function is described below: The built-in PID controller in the inverter detects physical quantity (feedback quantity) through the sensor of the object under control and compares this quantity to the target value of the system. If deviation exists between them, then PID regulation is used to remove deviation. It is a usual process control method used to keep the feedback quantity in accord with the target value. This system structure is as shown in Fig. 6-12.

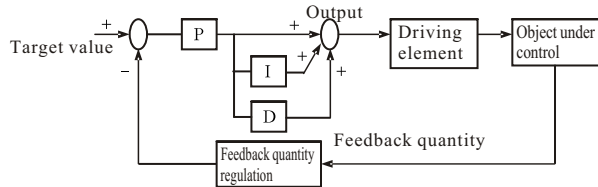


Fig.6-12 PID Control Functional Diagram

F6.01 PID feed path selection Setting range: 0~10 Default value: 1

F6.02 PID feedback path selection Setting range: 4~10 Default value: 4

- 0: Keyboard potentiometer setting
 To set closed-ring feed quantity by the potentiometer on the keyboard.
- 1: Digital quantity setting
 To set the close-ring feed quantity by the target value F6.03.
- 2: Remain
- 3: Remain
- 4: AVI setting
 To set the target value by external voltage signal AVI (0~10V).
- 5: ACI setting
 To set the target value by external current signal I (0~20mA).
- 6: Terminal pulse setting
 To set the target value by external pulse.
- 7: AVI + ACI setting
 To set the target value by the algebraic sum of AVI + ACI.
- 8: AVI - ACI setting
 To set the target value by the algebraic difference of AVI - ACI. If AVI ≤ ACI, the result will always be "0".
- 9: Min {AVI, ACI}
 To take the smaller one from AVI and ACI.
- 10: Min {AVI, ACI}
 To take the bigger one from AVI and ACI.



- Do not set the same value for the feed path and feedback path. Otherwise, the feed quantity will be the same as the feedback quantity without any deviation, resulting in PID's abnormal work. Besides, do not set the feedback path within 0~3, or there will be no meaning.

F6.03 Feed digital setting Setting range: 0.00~10.00V Default value: 0.0V

This parameter is used to set the target value (unit: V) controlled by PID when PID target value is selected to be set by digital setting (F6.01=1). Do take full consideration of the relationship between manometer range and its output feedback signal when setting this parameter in a constant closed-loop water supply system. Generally, its calculating formula is: Feed digital quantity setting = $10.00V \div \text{manometer range} \times \text{required pressure value}$ Eg. If the manometer range is 12Mpa and required pressure setting value is 6Mpa, then the feed digital quantity setting shall be 6.00V instead of 5.00V.

F6.04 Feedback path gain Setting range: 0.01~10.00 Default value: 1.00

If the feedback quantity is not in accord with the actual target value, then this parameter can be used to regulate the PID value till it is in accord with the request.

F6.05 Feedback path polarity Setting range: 0~1 Default value: 0

0: Positive:

This indicates the maximum feedback quantity corresponding to the maximum input signal.

1: Negative:

This indicates the maximum feedback quantity corresponding to the minimum input signal. Refer to Fig.6-13 for details.

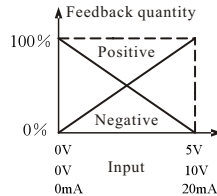


Fig.6-13 Diagram of Feedback Polarity Selection

F6.06 Proportional gain P Setting range: 0.01~10.00 Default value: 1.00

Proportional gain (P) decides response degree of output frequency to deviation. The greater the P value is, the quicker response is, but excessive value of P may result in oscillation and too low value of P may lead to response lagging.

F6.07 Integral time constant Ti Setting range: 0.0~200.0s Default value: 10.0s

Integral time constant decides the proportional relation between output frequency change speed and deviation. The function of integral is to integrate the output value in accordance with deviation to compensate deviation between feedback value and set value. Too long integral time may result in slow response to external disturbance. The shorter the constant time is, the quicker the response speed is, but too short integral time may result in oscillation.

F6.08 Differential time constant Td Setting range: 0.0~10.0s Default value: 0.0s

The function of differential is to proportionate output frequency to deviation, and respond timely to abruptly changing deviation. The longer the differential time is, the faster decay of system oscillation arising from proportional action is, but too long differential time may result in oscillation. Vice versa, the shorter the differential time is, the less decay of oscillator is. If F6.08=0.0, differential will be invalid.

F6.09 Sampling period T Setting range: 0.01~10.00s Default value: 0.00s

Sampling period refers to the cycle in which the system conducts sampling over feedback quantity. PID regulator makes a calculation in each period of sampling and gets the output value of PID regulation. The longer the sampling period is, the slower the response is. If F6.09=0.00, the sampling period will be finished automatically.

F6.10 Deviation limit Setting range: 0.0~20.0% Default value: 0.0%

Deviation limit refers to the maximum value of deviation between feedback quantity and set quantity within allowable range of the system. When the difference (modulus) between feedback quantity and set quantity is lower than this set parameter value, PID controller will be disabled, as shown in Fig. 6-23.

Proper setting of this parameter is of advantage to improve the stability of the output of system which needs to avoid frequent regulation though it has no high requirement on control precision.

F6.11 Closed loop preset frequency	Setting range: 0.00~upper limit frequency
	Default value: 0.00Hz

F6.12 Closed loop preset frequency holding time	Setting range: 0.0~6000.0s
	Default value: 0.0s

This parameter defines the inverter's pre-operation frequency and operation time before PID puts into real operation when PID control is enabled. In some control systems, the inverter shall output forcefully a certain frequency value F6.11 to the preset time F6.12 according to this parameter setting so that the controlled object will reach the preset value instantly. PID controller will not put into use until the controlled object approaches the controlling object to raise response speed.

F6.13 Sleep threshold	Setting range: 0.00~10.00V	Default value: 10.00V
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F6.14 Wake-up threshold	Setting range: 0.00~10.00V	Default value: 0.00V
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F6.15 Sleep/ Wake up threshold value check-out time	Setting Range: 0.0~600.0s
	Default value: 300.0s

F6.13 indicates the pressure limit of water supply system in the state of sleep.

When network pressure is higher than this setting value and the frequency changing the water supply system is adjusted to run at lower frequency, the inverter will automatically enter into the state of sleep (zero speed running) through F6.15. and wait for wake-up.

F6.14 indicates the pressure limit of water supply system when it enters into working state from sleeping state.

When network pressure is lower than the setting value, After the inverter pass the delay time through F6.15, the frequency changing water supply system will automatically shift to working state from sleeping state. as shown in Fig.6-25.

Group F7 Programmable Operation Parameters

F7.00 Programmable operation mode selection	Setting range: 000~114
	Default value: 000

LED units digit: Operation mode selection

0: No action

1: Single cycling

2: Continuous cycling

3: Remain the ultimate value after single cycling

4: Wobble operation

LED tens digit: PLC input mode selection

0: Auto input 1: Input by hand through defined multi-function terminals

LED hundreds digit: Wobble operation input mode

0: Auto input 1: Input by hand through defined multi-function terminals

LED thousands digit: Remain

Description on the functions of operation modes

1: Single cycling

Multi-speed operation of the inverter stops automatically after a cycle and starts only if the operation command is given again. E.g., suppose the operation time at a stage is 0, then the inverter will skip to the next stage directly, as shown in Fig.6-26.

f₁~f₇ in this figure refers to the operation frequency at stage 1~7 separately.

T₁~T₇ refers to the operation time at stage 1~7 separately.

a₁~a₆ refers to acceleration time at stage 1~6 separately.

d₃, d₅ and d₇ refer to the deceleration time at stage 3, 5 and 7 separately.

2: Continuous cycling:

This indicates the multi-speed operation of inverter recycles repeatedly and stops only if stop command is given, as shown in

3: Maintaining the ultimate value after single cycling

After finishing a single cycling, the inverter will run according to the set frequency and direction of the latest multi-speed operation (except stage 0), as shown in Multi-speed operation time must be longer than the acceleration/deceleration time.

This parameter group only defines operation time. So multi-speed acceleration/deceleration time should be converted.

Multi-speed acceleration/deceleration time = { (Current multi-speed frequency - initial multi-speed frequency) ÷ Basic operation frequency} × acceleration/deceleration time 1 (F0.14, F0.15)

Eg. If basic operation frequency is 50Hz, acceleration time is 10s and deceleration time is 20s, then the acceleration time of the system in multi-speed operation operated from 20Hz to 30Hz is:

$$T1 = \{ (30\text{Hz} - 20\text{Hz}) \div 50\text{Hz} \} \times F0.14 = 2\text{s}$$

The deceleration time when the system operated from 30Hz to 10Hz is:

$$T1 = \{ (30\text{Hz} - 10\text{Hz}) \div 50\text{Hz} \} \times F0.14 = 8\text{s}$$

4: Wobble Control

The output frequency of the inverter changes periodically during the preset accelerating /decelerating time. This function is especially applied to textile and chemical fiber system in which rotation speed changes due to differential diameter in the front and at the back of a bobbin, as shown in Fig.6-25.

F7.01 1st stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.02 2nd stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.03 3rd stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.04 4th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.05 5th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.06 6th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S
F7.07 7th stage operation time	Setting range: 0.0~6000.0S	Default value: 10.0S

F7.01~F7.07 are used to set the time for programmable multi-speed operation.

F7.08 Remain

F7.09 Multi-speed operation direction 1 Setting range: 0000~1111 Default value: 0000

F7.10 Multi-speed operation direction 2 Setting range: -000 ~ -111 Default value: -000

F7.09~F7.10 are used to set the direction for programmable multi-speed operation.

Programmable multi-speed operation is always prior to external terminal control multistage speed.

F7.11 Wobble operation mode Setting range: 000 ~ 111- Default value: 000-

LED units digit: Remain

LED tens digit: wobble range control

0: Fixed wobble range

1: Variable wobble range

LED hundreds digit: Wobble stop and start mode selection

0: Start as per the state memorized before shutdown.

1: Restart

LED thousands digit: Wobble status stored or not after power failure

0: Wobble status is stored after power failure.

The status is recovered automatically after power failure and the equipment continues to run at the break point.

1: Wobble status is not stored after power failure.

The inverter restarts its wobble operation after it is started.

F7.12 Wobble preset frequency
Setting range: 0.00~upper limit frequency Default value: 10.00Hz

F7.13 Wobble preset frequency waiting time
Setting range: 0.0~3600.0s Default value: 0.0s

Preset frequency refers to operation frequency of the inverter before it enters into wobble operation or separated from wobble operation. If parameter F7.00=004, the inverter will enter into wobble operation at a preset frequency directly after it is started. Then the inverter will enter

into the mode of wobble operation after the waiting time for wobble preset frequency is finished. If terminal hand-operated input is selected, F7.13 will be invalid.

If the hundreds digit of the parameter F7.11 is set to "0", then wobble operation will restart after halting, wobble preset frequency will be invalid and the system will run in the state memorized before shutdown. If it is set to "1", then wobble operation will be started after each halting and the frequency will be started at the preset wobble frequency. The thousands digit of F7.11 decides whether to save previous operation info for wobble start or not when the power is switched on after power failure. If the store is valid, then the hundreds digit of parameter F7.11 decides whether the first start will be started at the wobble preset frequency. If there is a decision not to save the info, then the first operation will be started at the wobble preset frequency once the power is switched on. Besides, the wobble status will be reset by multi-function terminals defined with wobble operation status reset.

F7.14 Wobble amplitude range Setting range: 0.0~50.0% Default value: 10.0%

This parameter refers to the percentage of wobble range. If fixed wobble range is selected, then the actual wobble value will follow the formula below:

Wobble range = $F7.14 \times$ upper limit frequency

If variable wobble range is selected, then the actual wobble range will follow the formula below:

Wobble range = $F7.14 \times$ defined frequency setting (wobble center frequency reference $F7.18 + F0.01$)

F7.15 Kick frequency Setting range: 0.0~50.0% Default value: 0.0%

This parameter refers to the range of quick fall after the frequency reaches the upper limit during the course of wobulation, or the range of quick

rise after the frequency reached the lower limit. The formula is shown below:

Actual trip frequency = $F7.15 \times$ wobble range

F7.16 Wobble period Setting range: 0.1~3600.0s Default value: 10.0s

This parameter is used to set the period for wobble operation.

F7.17 Time for triangle wave rise Setting range: 0.0~100.0% Default value: 50.0%

This parameter defines the operation time for wobulation from the lower limit to the upper limit, which is also the acceleration time in a period of wobble operation. Its formula is shown below:

Actual time for triangle wave rise = $F7.17 \times$ wobble period

It is sure that the difference of time between wobble period and triangle wave rise is the time of fall for triangle wave.

F7.18 Wobble center frequency reference frequency Setting range: 0.00~upper limit Default value: 10.00Hz

This parameter refers to the reference value of wobble center for inverter's output frequency when there is a wobble operation.

The actual wobble center is accumulated value of this parameter value and the setting frequency decided by external frequency setting path F0.01. Its formula is shown below:

Wobble center frequency = $F7.18 + F0.01$ (given path setting frequency)



Tips

- Wobble operation frequency is limited by the upper or lower limit frequency. Improper setting may cause abnormal wobble operation.

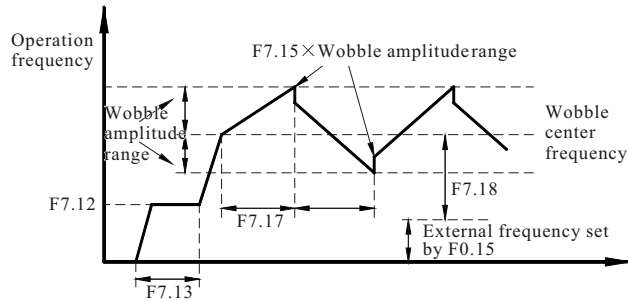


Fig.6-14 Wobble Setting Description

Group F8 Communication Parameters

F8.00 Local address Setting range: 0~31 Default value: 1

This parameter is used to identify the local inverter's address which is unique when an inverter communicates with other inverters or upper machines through COM port.

If this parameter is set to "0", the local inverter under linking control will act as the main station, which decides the operation of other inverters connected to it.

If this parameter is not set to "0", the local inverter will act as a secondary receiving commands and data from the upper machine or the inverter acting as the role of main station. The inverter receives only commands and data from the upper machine or the main station in accord with marked address.

F8.01 Communication configuration. Setting range: -000~ -125
Default value: - 013

This parameter defines the baud rate of COM. The data format adopted in the protocol shall be in accord, which is the premise for normal communication.

LED units digit: Baud rate setting

0: 1200BPS 1: 2400BPS

2: 4800BPS 3: 9600BPS

4: 19200BPS 5: 38400BPS

LED tens digit: Data format

0: No parity 1: Even parity 2: Odd parity

LED hundreds digit: Communication failure action selection

0: Shutdown

1: Remain the current state

LED thousands digit: Remain

All the data formats select 1-bit as their starting digit, 8-bit as their data digit and 1-bit as their stop digit.

F8.02 COM over time checkout time Setting range: 0.0~ 100.0s
Default value: 10.0s

If correct data signal is not received by the local machine within/exceeding the interval defined by this parameter, then communication error will be judged by the local machine. Hence, the inverter will decide whether to stop running or maintain the current state according to the treatment method of communication failure.

F8.03 Local machine response delay time Setting range: 0~1000ms
Default value: 5ms

This parameter defines the delay time that the local machine delivers the response data frames to the upper machine after the local machine accepts correctly the information codes from the upper machine.

F8.04 Linking proportion setting Setting range: 0.01~10.00
Default value: 1.00

If local inverter is set to be controlled by master inverter and the setting frequency of local machine is given by the master inverter, then this parameter is used to set weight coefficient of frequency instruction received by the local inverter which acts as a secondary through RS485/232 port. The actual setting frequency of local inverter is equivalent to the product of local parameter value and the frequency setting instruction value received through RS485/232 port.

Group F9 Protection Parameters

F9.00 motor overload protection coefficient Setting range: 30~110%
Default value: 105%

If the inverter's driving power rate matches the motor, the motor overload protection coefficient can be set to 100%. If the output current is smaller than or equivalent to 150% of the inverter's rated current at this time, then motor protection is not validated, because inverter's overload protection precedes over action, as shown in Fig.6-15.

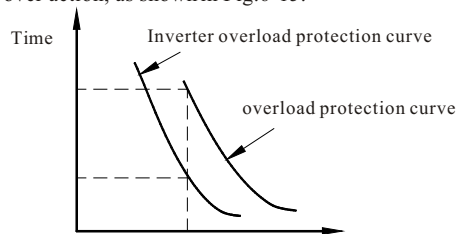


Fig.6-15 Inverter Overload Protection Curve and Motor Overload Protection Curve

If the inverter capacity is larger than the motor capacity, to perform effective overload protection of load motors with different specifications, it is necessary to set proper overload protection coefficient for each type of motor and restrict the maximum current value within the allowable output range of the inverter, as shown in Fig.6-16.

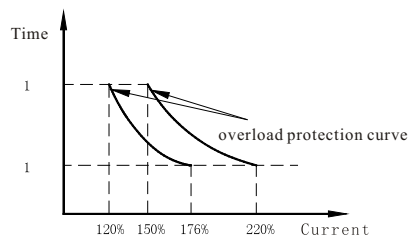


Fig.6-16 Motor Overload Protection Coefficient Setting

The formula for motor protection coefficient is shown below:
Motor overload protection coefficient = $\text{Motor rated current} \div \text{Inverter rated current} \times 100\%$

F9.01 Under-voltage protection level Setting range: 180~480V
Default value: As per spec.

This parameter stipulates the lower limit voltage allowed by DC bus bar when the inverter is in normal operation.



CAUTION

- If the grid voltage is too low, the output torque of the motor will decrease. As for constant power rate and constant torque load, ultra-low grid voltage will increase the inverter's input or output current. So the inverter should be derated if it is operated at low grid voltage for a long term.

F9.02 Over voltage protection level Setting range: 330~760
Default value: As per spec.

This parameter defines the voltage vector protection threshold of the motor during deceleration. If DC side pump-up voltage inside the inverter exceeds the value set by this parameter, the inverter will adjust the deceleration time to delay falling or even stop falling of output frequency. It will not perform the action of deceleration again till the bus bar voltage is lower than the over-voltage limiting level. Shown in Fig.6-17.

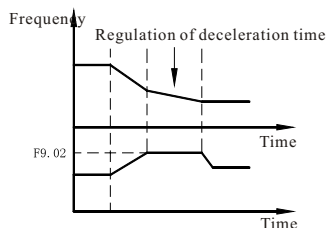


Fig.6-17 Over-voltage Limiting Level Declaration

F9.03 Current limiting level Setting range: 120~220% Default value: 180%

This parameter defines current limiting level. During acceleration, the inverter will adjust its acceleration time automatically when output current of the inverter surpasses the value stipulated by this parameter. When the current falls to this level, just continue to accelerate to target frequency value. During constant speed operation, if the inverter's output current exceeds the value stipulated by this parameter, the inverter will adjust its output frequency to limit the current within the range to avoid current trip. The default setting for this parameter is that the function of auto current limiting is always valid during the whole process.

Group FA Advanced Function Parameters

FA.00 Zero frequency operation threshold Setting range: 0.00~50.00Hz
Default setting: 0.00Hz

FA.01 Zero frequency clipping Setting range: 0.00~50.00Hz
Default setting: 0.00Hz

This parameter defines frequency's zero characteristic. If analog signal is used to set the frequency, the inverter's output will be interfered due to instability of analog signal. The lagging function of this parameter

can be used to avoid fluctuation near zero point, as shown in Fig.6-33. Take the example of analog voltage input path AVI:
Once the operation command is ordered, if the parameter (FA.00, FA.01) is not set, the output frequency will output in strict accordance with the correlation between analog voltage and frequency. Once FA.00 and FA.01 setting is done, if the corresponding input AVI does not reach the frequency A.00+FA.01, the inverter will not run till the corresponding input AVI reaches the frequency FA.00+FA.01. Then the motor will begin the starting and accelerate to the frequency value corresponding to AVI in the preset acceleration time. During deceleration, the inverter will not stop when the frequency reaches FA.00+FA.01. It will stop only when the setting frequency corresponding to AVI reaches or is lower than FA.00. By using this function, inverter's sleep function can be performed and energy-saving can thus be realized.

FA.02 Energy consumption dynamic braking initial voltage
Setting range: 300~750V Default setting: As per spec.

FA.03 Energy consumption dynamic braking proportional action
Setting range: 10~100% Default setting: As per spec.

This function defines action parameters for inverter's built-in braking units. If the inverter's inside DC-voltage is higher than dynamic braking initial voltage, then the built-in braking units start action. If a braking resistor is connected at the moment, DC voltage will fall after a rise through a braking resistor which releases DC voltage pumping-up inside the inverter. When DC voltage falls to a certain value, the inside braking units of the inverter will shut down.

Dynamic braking proportional action is used to define average voltage value applied onto braking

resistors when braking units start action. The braking resistor voltage is the voltage pulse width modulation wave, whose duty ratio is equivalent to braking action ratio. The larger value the proportional action is, the faster the energy releases, the more obvious the effect is and the larger power rate consummated by braking resistors. Therefore, user may set this parameter with full consideration of the braking resistance value, power rate and expected braking effect.

FA.04 Cooling fan control Setting range: 0~1 Default setting: 0

This function is used to control the action of the inverter's built-in cooling fan.

0: Auto control mode

The cooling fan works once the inverter is started and stops automatically if the inverter stops or the radiator temperature is detected to be below 40°C.

1: The fan keeps running once being energized and doesn't stop until power failure.

FA.05 UP/DOWN terminal modification velocity
Setting range: 0.01~100.0Hz/s Default setting: 1.00Hz/s

This parameter can regulate the frequency up and down velocity by UP/DOWN Terminal control frequency.

FA.06 Over modulation enabled Setting range: 0~1 Default setting: 0

This function can raise the output voltage which increases torque output if PWM works in an occasion that the modulation ratio > 1, whereas it may increase the harmonic component of output voltage, resulting in waveform variation of current. If the line voltage maintains low (the rated voltage < 15%) for a long time, or the motor's output torque is lower than power frequency when the inverter is in the state of operation, i.e., with long-term heavy loads, then this function shall be recommended.

FA.07 Clacking time Setting range: 0~65535s Default setting: 0s

This function is used to set the time for clacking, Compare F4.00~F4.05 with F4.07~F4.09 for use.

Chapter 7 Common Problems, Anomalies and Troubleshooting

7.1 Diagnostic Trouble Codes and Troubleshooting

Table 7-1 Common Error Codes and Solutions

Error Codes	Error Name	Probable Cause(s)	Solution(s)
OC-1	Over current during acceleration	① Excessively short acceleration time; ② Excessively heavy load inertia; ③ Over torque lifting or improper V/F curve; ④ Power grid voltage below level; ⑤ Lower inverter power; ⑥ Restart the rotating motor when instantaneous power failure occurred.	① Extend acceleration time. ② Reduce load inertia. ③ Reduce torque lifting value or regulate V/F curve. ④ Check input power supply. ⑤ Replace an inverter with larger power. ⑥ Set starting mode selection F2.00 to rotation speed tracing.
OC-2	Over current during deceleration	① Excessively short deceleration time; ② Excessively heavy load inertia; ③ Lower inverter power.	① Extend deceleration time. ② Reduce load inertia. ③ Replace an inverter with higher power level.
OC-3	Over current while at constant speed	① Abnormal input power supply; ② Load fluctuation; ③ Lower inverter power.	① Check input power supply. ② Reduce load inertia. ③ Replace an inverter with higher power level.
OU-1	Over voltage during acceleration	① Abnormal input power supply; ② Restart the rotating motor when instantaneous power failure occurred.	① Check input power supply. ② Set starting mode selection F2.00 to rotation speed tracing.

Error Codes	Error Name	Probable Cause(s)	Solution(s)
OU-2	Over voltage during deceleration	<ol style="list-style-type: none"> ① Excessively short deceleration time; ② Existence of load with energy feedback; ③ Abnormal input power supply. 	<ol style="list-style-type: none"> ① Extend deceleration time adequately. ② Select suitable brake assembly. ③ Check input power supply.
OU-3	Over voltage while at constant speed	<ol style="list-style-type: none"> ① Abnormal input power supply; ② Load with energy feedback; ③ Abnormal voltage detecting channel. 	<ol style="list-style-type: none"> ① Check input power supply ② Install or reselect brake assembly. ③ Seek service.
OU-4	Over voltage while at stop	<ol style="list-style-type: none"> ① Abnormal input power supply 	<ol style="list-style-type: none"> ① Check input power supply
LU	Under-voltage during running	<ol style="list-style-type: none"> ① Input power supply below level; ② Instantaneous power failure; ③ Input power failure; ④ DC circuit loose contact; ⑤ Bad contact of contactor. 	<ol style="list-style-type: none"> ① Check if power supply voltage is below level. ② Reset the inverter and check input powersupply. ③ Check if power grid capacity is below level. Verify if power supply voltage is normal. Is there any strong surge current, open phase or short circuit; ④ Check the main circuit or seek service. ⑤ Check the contactor or seek service.
LP	Input end open-phase	<ol style="list-style-type: none"> ① Open phase of power input end “R” , “S” or “T” . 	<ol style="list-style-type: none"> ① Check input voltage. ② Check installation wiring.

Error Codes	Error Name	Probable Cause(s)	Solution(s)
SC	Power module error	<ol style="list-style-type: none"> ① Phase fault or ground fault of three output phases of the inverter; ② Instantaneous over current of the inverter; ③ Excess ambient temperature; ④ Air channel binding or fan damaged; ⑤ DC accessory power supply failure; ⑥ Abnormal control panel. 	<ol style="list-style-type: none"> ① Check wiring. ② Improve ventilation conditions and reduce carrier frequency. ③ Clear up air channel or replace the fan. ④ Seek service. ⑤ Seek service.
OH	Radiator overheat	<ol style="list-style-type: none"> ① Excess ambient temperature; ② Fan damaged; ③ Air channel binding. 	<ol style="list-style-type: none"> ① Lower the ambient temperature. ② Replace the fan. ③ Clear up air channel or improve ventilation conditions.
OL-1	Inverter overload	<ol style="list-style-type: none"> ① Over torque lifting or improper V/F curve; ② Excessively short acceleration time; ③ Overload; ④ Power grid voltage below level. 	<ol style="list-style-type: none"> ① Reduce torque lifting value or regulate V/F curve. ② Extend acceleration time. ③ Replace an inverter with higher power level. ④ Check power grid voltage.
OL-2	Motor overload	<ol style="list-style-type: none"> ① Over torque lifting or improper V/F curve; ② Power grid voltage below level; ③ Motor stalled or excessive load fluctuation; ④ Improper setting of the motor's overload protection coefficient. 	<ol style="list-style-type: none"> ① Reduce torque lifting value or regulate V/F curve. ② Check power grid voltage. ③ Check loads and motor's status. ④ Set proper overload protection coefficient F9.00 of the motor.

Error Codes	Error Name	Probable Cause(s)	Solution(s)
EF	External equipment failure	① Close of fault input terminal of external equipment.	① Disconnect fault input terminal of external equipment and clear failure.
CE-1	COM communication error	① Improper setting of baud rate; ② Communication failure due to interference at serial port; ③ No communication signal of the upper machine.	① Adjust baud rate. ② Check the communication cable and take anti-interference measures. ③ Check if the upper machine runs normally and the communication cable is disconnected.
CE-2	Remain		
CE-3	Current detection error	① Damaged hall elements or circuit failure; ② DC accessory power supply failure.	① Seek service. ② Seek service.
CE-4	Panel communication failure	① Circuit failure of patch panel and control panel; ② Loose connection of terminals.	① Seek service. ② Check and re-connect.
CPU	CPU error		① Seek service.

7.2 Anomalies and Solutions

Table 7-2 Anomalies and Solutions

Anomalies		Solutions
No display when the power is ON	① Power grid voltage below level or open phase; ② DC accessory power supply failure; ③ Charging resistor damaged.	① Check power grid voltage. ② Seek service. ③ Seek service.
Power trip	① Short circuit in the inverter's input side; ② Exiguous air switching capacity.	① Check wiring or seek service. ② Expand air switching capacity.
Motor doesn't run	① Incorrect wiring; ② Error setting of operation mode; ③ Overload or motor stalled.	① Check wiring. ② Reset the operation mode. ③ Reduce loads or regulate motor's status.
Motor reverses	① Error phase sequence of motor wiring.	① Swap random two phases of the output terminals U, V and W.
Motor acceleration /deceleration failed	① Improper setting of acceleration/deceleration time; ② Under setting of over-current stall points; ③ Over-voltage stall prevention enabled; ④ Improper setting of carrier frequency or oscillation occurred; ⑤ Overload.	① Reset acceleration/ deceleration time. ② Increase setting value for over-current stall point. ③ Extend deceleration time or reduce load inertia. ④ Reduce carrier frequency. ⑤ Reduce load or replace an inverter with higher power level.

Anomalies		Solutions
Motor's speed fluctuates while at constant speed.	① Excessive fluctuation of loads; ② Under setting of motor's overload protection coefficient; ③ Loose contact of frequency setting potentiometer.	① Reduce load fluctuation. ② Increase overload protection coefficient. ③ Replace the potentiometer or seek service.

Chapter 8 Inverter Inspection and Maintenance

8.1 Inspection and Maintenance

The following influences may lead to latent failure of the inverter such as ambient temperature, humidity, dust, vibration, as well as device ageing, wear and other causes of the inverter itself during long-period operation on industrial occasions. So it is necessary to perform daily and periodic inspections and maintenance on the inverter.

8.1.1 Daily Inspection Items

Table 8-1 Daily Check List

Target of Inspection	Check Content	Inspection Cycle	Inspection Method	Criteria	Measuring Instrument
Operating ambient	<ul style="list-style-type: none"> ● Ambient temperature; ● Humidity, dust, corrosive gas, oil mist and etc. 	Daily	<ul style="list-style-type: none"> ● Thermometer; ● Scent; ● Visual. 	<ul style="list-style-type: none"> ● Ambient temperature between -10 to 40°C, no-condensing; ● Humidity between 20 to 90%, no dew or special odor 	<ul style="list-style-type: none"> ● Thermometer ● Hygrometer
Inverter	<ul style="list-style-type: none"> ● Vibration ● Heat ● Noise 	Daily	<ul style="list-style-type: none"> ● Touch the housing; ● Aural. 	<ul style="list-style-type: none"> ● Stable vibration ● Normal temperature ● No abnormal noise 	

Target of Inspection	Check Content	Inspection Cycle	Inspection Method	Criteria	Measuring Instrument
Motor	<ul style="list-style-type: none"> ● Vibration ● Heat ● Noise 	Daily	<ul style="list-style-type: none"> ● Touch the housing; ● Aural. 	<ul style="list-style-type: none"> ● Stable vibration ● Normal temperature ● No abnormal noise 	
Electric Parameter	<ul style="list-style-type: none"> ● Input voltage ● Output voltage ● Output current 	Daily	<ul style="list-style-type: none"> ● Thermometer 	<ul style="list-style-type: none"> ● Each electric parameter is within the rated value. 	<ul style="list-style-type: none"> ● Moving-iron voltmeter; ● Rectifier voltmeter; ● Clip-on ammeter



WARNING

- Make sure that only qualified personnel will perform maintenance, inspection and part replacement.
- Wait at least 5 minutes after turning OFF the input power supply before performing maintenance or an inspection. Otherwise, there is the danger of electric shock.
- Make sure to open the front panel only after the indicator on the control keypad turns OFF and verify the charge indicator at the right side of main loop terminal is OFF after the panel is opened.
- Do use an insulated appliance while performing check and do not operate the equipment with wet hand(s) to avoid unexpected accidents.
- Always keep the equipment clean so that dust and other foreign matter does not enter the inverter.
- Keep electronic equipment away from moisture and oil. Dust, steel filings and other foreign matter can damage the inverter, causing unexpected accidents, so do take special care.

8.1.2 Periodic Inspection Items

Table 8-2 Periodic Inspection Items

Target of Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criteria
Main circuit	Overall	<ul style="list-style-type: none"> ● Check if there is any loose connector or terminal. ● Check if there is any device burnt. 	Regular	Visual	<ul style="list-style-type: none"> ● No loose connector or loose terminal. ● No burnt device.
	Main power module	<ul style="list-style-type: none"> ● Check if it is damaged or not. 	Regular	Visual	<ul style="list-style-type: none"> ● No sign of damage.
	Filter capacitance	<ul style="list-style-type: none"> ● Check if there is any leakage. ● Check if there is any inflation. 	Regular	Visual	<ul style="list-style-type: none"> ● No leakage; ● No inflation.
	Contactor	<ul style="list-style-type: none"> ● Check if there is any abnormal sound of actuation. ● Check if dust has been cleaned. 	Regular	Visual	<ul style="list-style-type: none"> ● Normal sound; ● Clean.
Main circuit	Resistor	<ul style="list-style-type: none"> ● Check if there is any big crack. ● Check if the color is abnormal. 	Regular	Visual	<ul style="list-style-type: none"> ● No crack. ● Normal color.

Target of Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criteria
Main circuit	Fan	● Check if there is any abnormal noise or vibration.	Regular	Audio Visual	● Normal sound and stable vibration.
	PCB	● Check if dust has been cleaned	Regular	Visual	● Neat and clean.
Control circuit	FPC strand socket	● Check if it is loose.	Regular	Visual	● No loose connection.
	Overall	● Check there is any special odor or discoloring. ● Check if there is any crack.	Regular	Scent or audio	● No odor and discoloring; ● No crack, smooth surface.
Keyboard	LED	● Check if the LED display is normal.	Regular	Visual	● Normal and clear.
	Connecting cable strand	● Check if there is any scratch. ● Check if it is connected tightly.	Regular	Visual	● No scratched surface. ● No loose connection.



WARNING

- Do not remove or shake the device arbitrarily, nor pull out the connector during inspection. Otherwise, this may result in inverter failure or damage.
- Do not leave any inspection tool (i.e., a screwdriver) in the machine after periodic check. Otherwise, there is the danger of damage to the inverter.

8.2 Replacement of Wearing Parts

The wearing parts of inverter mainly include cooling fan and filter electrolytic capacitor. Usually, a cooling fan's service life is 20,000-30,000 hours and an electrolytic capacitor's service life is 40,000-50,000 hours. User can decide when to replace these parts according to the corresponding operation time.

1. Cooling Fan

It is advisory to replace the fan when abnormal noise or even vibration occurred to the fan due to bearing wear and fan blade aging. The standard replacement age is 2~3 years.

2. Filter Electrolytic Capacitor

The performance of filter electrolytic capacitor is subject to the pulsating current of main circuit. High ambient temperature or frequent load jump may cause damage to the filter electrolytic capacitor. Generally, every 10°C rise in temperature may lead to reduction of the capacitor's service life by half (as shown in Fig. 8-1). If there is any electrolytic leakage or safety valve emission, just replace it at once. The standard replacement age for electrolytic capacitor is 4~5 years.

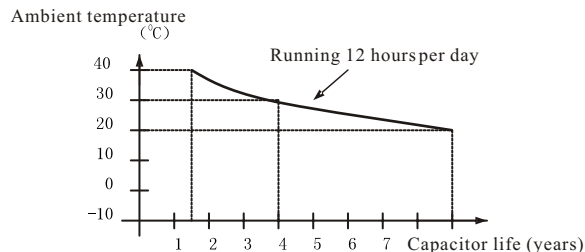


Fig. 8-1 Capacitor Life Curve

3. The above replacement duration for inverter's wearing parts is applied to the following conditions:

- Ambient Temperature: 30°C averagely all year round;

- Load Proportion: <85%;
- Operation Time: ≤12h/day.

If used beyond the above mentioned range, the service life of the inverter's wearing parts will minimize.

8.3 Storage of Inverter

Please pay attention to the following points if an inverter is set aside or stored for a short/long period:

- DO not keep the inverter in a place with high temperature, humidity, heavy dust, metal shavings, corrosive gas and vibration, and ensure a good ventilation.
- Long-term idle of the inverter may cause decreasing in filter characteristic of the electrolytic capacitor. So it should be recharged within half an year and the recharging period should be at least 2 hours. DO raise the voltage gradually by using a voltage regulator to some rated value before it is recharged. At the same time, check whether the inverter's function is normal or not, whether there is a short circuit caused by some problems. In case the above problems occur, just remove or seek service as soon as possible.



CAUTION

Chapter 9 Outline Dimension & Mounting Dimension

9.1 Inverter Outline Dimensions & Mounting Dimensions

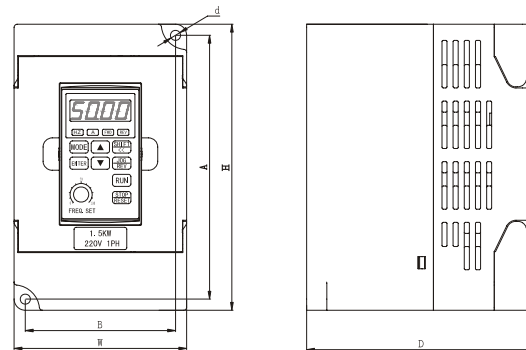


Fig.9-1 Inverter Model A Outline Dimensional Drawings

Inverter Models	Power (KW)	Dimension (MM)						Figure	Gross Weight (kg)
		H	W	A	B	D	d		
ZVF9V-M0007T2/S2	0.75	151	100	140	89.5	116.5	Φ5	9-1	
ZVF9V-M0015T2/S2	1.5								
ZVF9V-M0022T2/S2	2.2								
ZVF9V-M0007T4	0.75								
ZVF9V-M0015T4	1.5								
ZVF9V-M0022T4	2.2								

9.2 Operator Panel Outline Dimensions & Mounting Dimensions

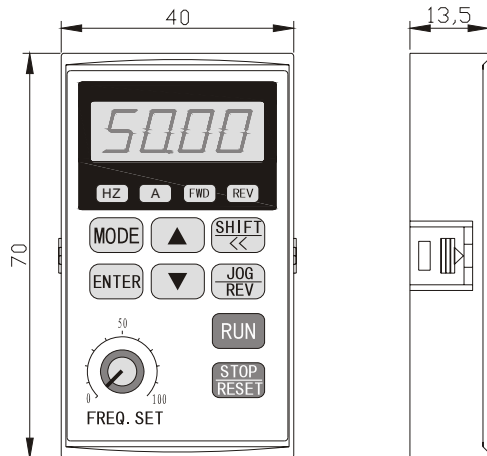


Fig.9-2 ZR06 Operator Panel Dimension



Tips

- Extra mounting socket shall be assembled when ZR06 operator panel is pulled out to install.
- The hole dimension of the installation socket is
Width:45mm Height:75mm

Chapter 10 Quality Warranty

1. Warranty Period under Normal Conditions
 - We provide guarantees for repair, replacement and return of the purchase in 1 month from the date of use.
 - We provide guarantees for repair and replacement in 3 months from the date of use.
 - We provide guarantee for repair in 12 months from the date of use.
2. If the date of use can not be verified, then the warranty period shall be 18 months from the date of manufacture. Service exceeding the warranty period shall be charged to the purchaser. The purchaser enjoys life-long paid service whenever and wherever he uses an inverter made in our company.
3. Service in the following cases, even within the warranty period, shall be charged to the purchaser:
 - Damage caused by mal-operation in violation of this manual;
 - Damage caused by improper use of an inverter that is off technical standard and requirement;
 - Malfunction or damage caused by fire, earthquake, flood, abnormal input voltage or other natural disasters;
 - Artificial damage caused by unauthorized repair or renovation;
 - Induced failure or aging of the device due to poor ambient;
 - Delayed or unsatisfied payment in violation of purchase appointment;
 - Unidentifiable nameplate, mark and date of manufacture;
 - Malfunction or damage caused by improper transit or storage after purchase;
 - Fail to give an objective description on the use of installation, wiring, operation, maintenance or else;
 - Defective products should be sent to us for repair, replacement and return, which can be proceeded only after verifying the burden of liability.
4. In case there is any quality problem or accident, we merely promise to bear the above-mentioned responsibilities. If a user needs more guarantees for liabilities, please assure on the insurance company voluntarily.

Appendix Optional Parts

All the optional parts can be ordered for with us if needed.

1.Brake Assembly

The brake assembly consists of two parts: braking unit and braking resistor. It is necessary to install a brake assembly on the occasion that quick stop is required though there is a heavy potential load (e.g., elevator) or inertia load.

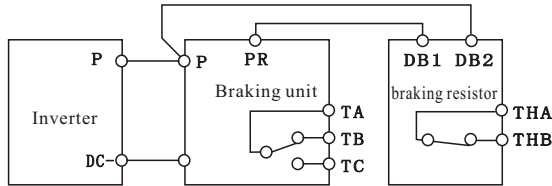


Fig. Appendix 1-1 Brake Assembly Wiring Diagram

Sheet Appendix 1-1

Recommended Break Assembly Matching Specifications

Inverter		Breaking Unit		Breaking Resistor		
Voltage (V)	Motor (KW)	Model	Quantity	Recommended Resistor value	Resistor Specification	Quantity (PCS)
220V	0.75KW	Built-in		80W200 Ω	80W200 Ω	1
	1.5KW	Built-in		200W100 Ω	200W100 Ω	1
	2.2KW	Built-in		300W70 Ω	300W70 Ω	1
380V	0.75KW	Built-in		80W750 Ω	80W750 Ω	1
	1.5KW	Built-in		200W400 Ω	200W400 Ω	1
	2.2KW	Built-in		300W250 Ω	300W250 Ω	1

2.Remote-operated adapter and extended cable

There are two selections available for remote operation on the inverter ZVF9V-M series. If it is operated at short range (=15m), just extend the shielding cable directly and connect it to the operator panel. Our company can provide a range of extended shielding cables with different specifications such as 1m, 1.5m, 2m, 3m, 5m, and 10m. If there is any special requirement on cable length, just place an order with the company.



WARNING

● When proceeding remote controlled wiring Do disconnect power supply.

3.Serial Communication (COM)

The standard machine type of the inverter ZVF9V-M series does not provide RS232 and RS485 communication function. User shall mark out the function at the same time of order. The control terminals of standard RS232 and RS485 communication interface may connect to RS232 or RS485 communication cable to realize network control or ratio interlocking control.

RS232 and RS485 serial communication protocol for the inverter ZVF9V-M series can be operated under windows98/2000. And the monitoring software for this series, featured by friendly man-machine operation interface, can easily realize networking operation and perform monitoring and other functions of the inverter. Please contact the service center of this company or its agents if it is needed.

Inverter User's Warranty

User's Details

Inverter Model		Tel	
Add.		Pos code	
Contact Person		Department	

Repair Records

Name of Distributor		The date of Purchase	
Inverter Model		Serial Number	
Equipment Name		Motor Power	
The date of Installation		The date of begin use	
Fault :			
Solution:			
The date of repair:		The name of repair workers:	



Tips

- The user should keep this warrantybill .