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CHZIRI®

User's Manual

ZVF200-M Vector Inverter

ZIRI ELECTRICAL TECHNOLOGY CO.,LTD

Foreword

- Thank you very much for your purchase of the inverter ZVF200-M series.

  This manual introduces the installation, operation, function setting, trouble shooting and etc. of the inverter ZVF200-M series..

- Incorrect installation or use may result in damage or other accidents. Do read all instructions in detail be fore 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

Table of Contents

Chapter 1 Safety Instruction

1.1 Safety Symbols and Definition

The safety instructions described in this manual are very important. To avoid any error that may resul t 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 threephase AC asynchronic electric motor.

WARNING

- This inverter can not be used in the equipment that may result in threat or injury to personnel due to inverter trouble or error, such as nuclear power control equipment, aviation equipment, transportation equipment, life supporting system, safety equipment, weapon system and etc. Please consult Ziri Company before using it for special purposes.
- This product is made under strict quality control and supervision. But when used in some key equipment, protective measures should be taken to avoid further extension of accident due to inverter trouble.

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 -10~45℃. If the temperature is higher than 40℃, please remove the upper cover. If the temperature is higher than 50℃, 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 noteworthy 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 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 10 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, multipiece inverters should be grounded at one shared point, as shown in the Figure 1-1.

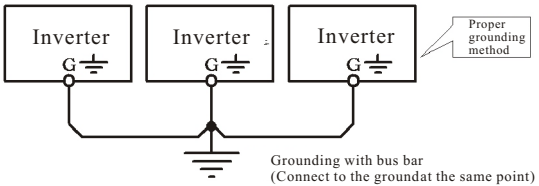


Figure 1-1

FORBIDDEN

- DO NOT connect control terminals (except terminals marked "TA", "TB"and "TC") to AC220V 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 shownin theFigure 1-2.

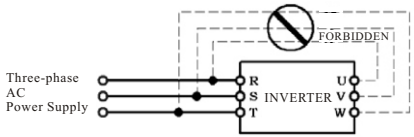


Figure 1-2

COMPULSORY

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

CAUTION

- It is not advisable 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 there have one situation of the following three points:

1. The system of frequency inverter used to control energy saving usually works at a rated rotation speed. To run the inverter economically, there is a must to remove the inverter.
2. The inverter participates in some important procedure and cannot stop operating for a long period of time. To realize free shift 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

HAZARD

- Do not operate electrical equipment with wet hands.
- An inverter stored for a year or longer 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 1~2 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, or 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 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.

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.
- 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.

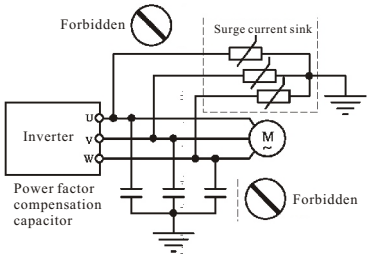


Figure 1-3

CAUTION

- Motor insulation should be checked before the motor is used for the first use or reused after a long-term idle. Be sure the insulation resistance measured is no lower than 5MΩ.
- 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%. Refer to the Figure 1-4 for details of the derating curve.

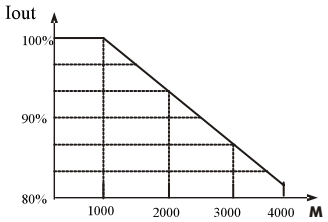


Figure 1-4 Diagram of Inverter Derating Curve

FORBIDDEN

- DO NOT touch the radiator or charging resistor of the inverter with hands. Otherwise, there is the possibility of getting scaled.
- 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, frequency power-on/off may produce cumulative effect resulting in heat fatigue of inverter components and great reduction of service life of the inverter. See the detail in the Figure 1-5.

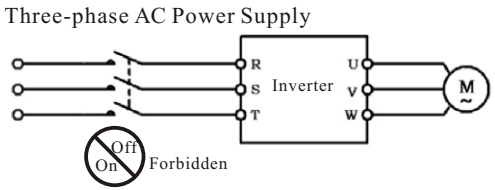


Figure 1-5

COMPULSORY

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

1.6 Cautions for Disposing

WARNING

- Exposure may happen when the electrolytic capacitor (ELCC) of the inverter burns. Be careful to cope with it.
- The plastic parts on the operator panel will give off tox ic gas when getting burned. Be careful to cope with it.

CAUTION

- Dispose damaged inverter as industrial waste.

Chapter 2 Introduction to the Product

2.1 Inspection upon Arrival

The inverter have excellent quality assurance system . Passed through strict test before shipment .and made a crash ,shock or other package treatment . But we can not rule out the inverter subject to strong shock or extruded during transportation . Please check and confirm the products as flows when open the package .

① Check whether the case of inverter is deformed or damaged . or the components are damaged or drop off .

② Check the label of inverter are matched with the product that you ordered.

③ Check weather the items of packing list are complete .

2.2 Demonstration of the Model

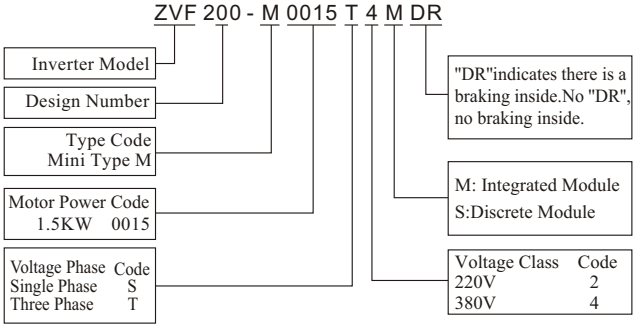


Figure 2-1 Inverter Model Demonstration

2.3 Specification Label

Name	INVERTER	
Inverter Model	MODEL	: ZVF200-M0015T4MDR
Adaptive Motor Power	POWER	: 1.5KW
Input Power Rating	INPUT	: 3PH 380VAC 50/60Hz
Output Power Rating	OUTPUT	: 3PH 4.0A 0-400Hz

Figure 2-2 Inverter Specifications Label

2.4 Outside Drawing & Structure

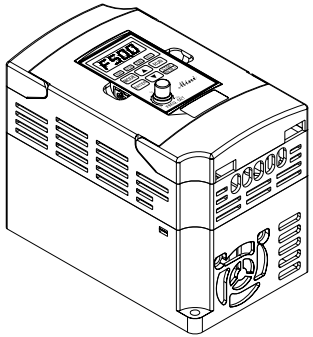
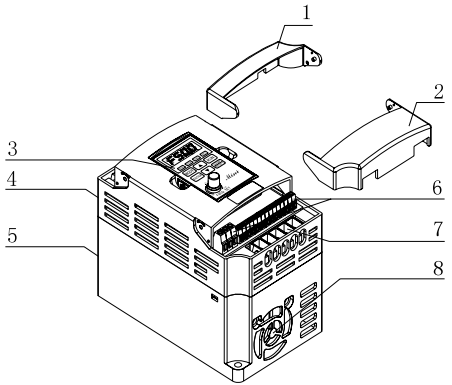


Figure 2-3 Model A Outside Drawing



1. Upper Cover
2. Bottom Cover
3. Digital Keypad
4. Upper Shell
5. Lower Shell
6. Input Output Terminal
7. Power Terminal
8. Fan

Figure 2-4 Model A Structural Representation

2.5 Models and Specifications

Table 2-1 Inverter Models and Specifications

Inverter Models (ZVF200-M)	Input Voltage (V)	Rated output current (A)	Adaptive Motor Power (KW)
ZVF200-M0004T2/S2	220	2.5	0.4
ZVF200-M0007T2/S2	220	5.0	0.75
ZVF200-M0015T2/S2	220	7.0	1.5
ZVF200-M0022T2/S2	220	10.0	2.2
ZVF200-M0037T2	220	17.0	3.7

Inverter Models (ZVF200-M)	Input Voltage (V)	Rated output current (A)	Adaptive Motor Power (KW)
ZVF200-M0055T2	220	25.0	5.5
ZVF200-M0007T4	380	3.0	0.75
ZVF200-M0015T4	380	4.0	1.5
ZVF200-M0022T4	380	5.0	2.2
ZVF200-M0037T4	380	8.5	3.7
ZVF200-M0055T4	380	13	5.5
ZVF200-M0075T4	380	18	7.5

2.6 Technical Indication

Item		Item Description
Input	Rated voltage frequency	Single phase/Three phase 220VAC. Three phase 380V.50HZ/60HZ
	Allowable Voltage range	Voltage fluctuate range: 220V:180V~264V ;380V:342~528V. Voltage unbalance rate:<3%. Frequency fluctuation:≤±5%
Output	Rated voltage	0~ three phase input AC voltage
	Frequency	0.1~400HZ.
Control Function	Modulation mode	SPWM (sinusoidal Pulse Width modulation)
	Control mode	V/F control & sensorless vector control
	Frequency resolution	Digital setting :0.1HZ. Analog setting :Max. Frequency x0.1%.
	Overload capacity	150% of rated current for 1 minute
	Torque Characteristic	Including the auto-torque .Auto-slip compensation . Start torque can be 150% at 5.0HZ.
	Acel/Decel Time	0.1~600 seconds (2 independment setting for Accel/Decel time)

Item		Item Description
Control Function	V/F pattern	Adjustable V/F Pattern
	DC Breaking	Operation frequency 0~50HZ . Output 0~100 % rated current . Starting time 0~5 seconds. Stop time 0-25 seconds
	Carrier frequency	1.0~15.0KHZ
	Stall prevention level Frequency setting	20%~200% setting of rated current of inverter according to the motor load characteristic
Operation Function	Command	Keypad .External terminal control . COM Serial control
	Frequency setting	Keypad potentiometer setting . Operation panel ▲▼ setting . external Terminal UP/DOWN setting . Analog signal setting . 485 COM Setting.
	Multi-function analog output	0-10VDC singal . Output frequency . current .output.
	Output signal	Programmable relay . open collector output . Fault signal output .
Other Function		AVR.Over voltage . Over-current stall prevention . 3-Groups fault records .Reverse inhibition . Momentary Power loss restart. DC braking . Auto torque& slip compensation. acceleration/ deceleration. S- curve .auto tuning . adjustable carrier frequency. Frequency limits . Parameter lock /reset. Vector control . PID control . Counter .remote control .MODBUS communication .Abnormal reset , Abnormal restart . energy saving running .sleep/ revival function . 1st/2nd frequency source selection .
LED Display		can show the inverter running status. monitor parameters. function parameters .error and ect.
Optional parts selection		braking assembly,remote keypad and connection cable and soon.

Item		Item Description
Protection Function		Over Current .Over current.Under voltage .external fault .Overload. Ground fault.Overheating .
Ambient	Installation location	Altitude 1000m or less.Keep from corrosive gas. liquid and dust
	Ambient Temperature	-10 ℃ to 40 ℃(-10℃ to 50 ℃ without blind plate)
	Ambient Humidity	Below 90% RH (no-condensing).
Ambient	Vibration	<0.5G
	Storage temperature	-20 ℃ to 60 ℃
Structure	Protection Level	IP20
	Cooling mode	Forced air cooling
	Installation	Wall mounted

Chapter 3 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~+45℃ [Bare Machine: -10~+50℃]
- 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 convenience of maintenance, the inverter shall be installed vertically with enough space left (refer to the figure 3-1). When two and two 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).

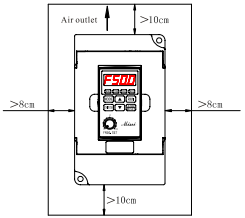


Figure 3-1 Installation Space

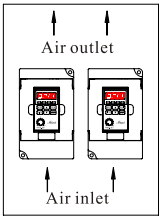


Figure 3-2 Multi-piece Parallel Installation

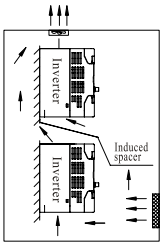


Figure 3-3 Multi-piece Vertical Installation

3.2 Remote control keypads and wiring connection

STEP 1.Hand on the notch of the two sides(right and left) of the keypad and pull it up by inward,remove the keypad.(as shown in the figure 3-4).

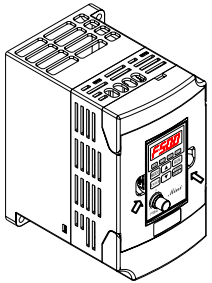


Fig. 3-4

STPE 2.Install the optional interface board at the position of keypad.(as shown in the figure 3-5).

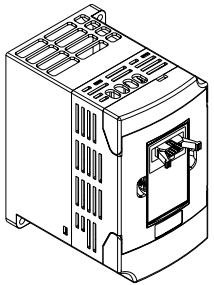


Fig. 3-5

STEP 3.Insert the optional cable with the grounding side into the slot of interface board. (as shown in the figure 3-6).

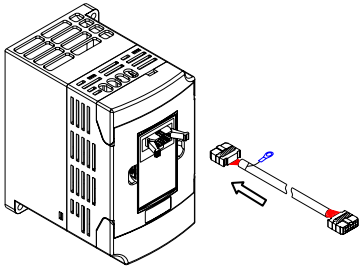


Fig. 3-6

STEP 4.Put the dismantled keypad into the installation frame .Fix and fasten it . Put the other side cable insert into the keypad.(as shown in the figure 3-7).

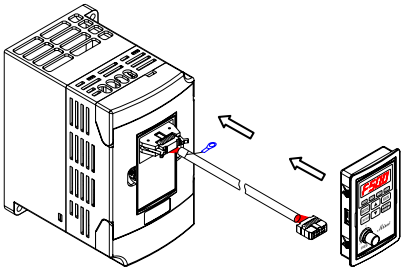


Fig. 3-7

3.3 Wiring Diagram

3.3.1 Basic Wiring Diagram

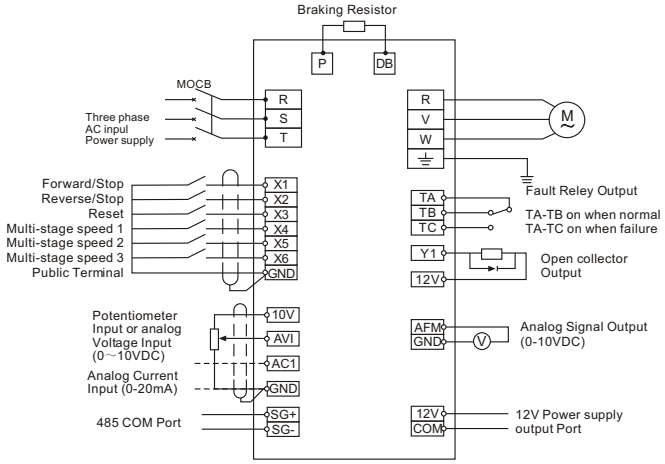


Fig.3-8

Model : ZVF200-M0004S2～M0022S2
ZVF200-M0004T2～M0055T2
ZVF200-M0007T4～M0075T4

3.2.2 Cautions for Wiring

HAZARD

- Wait at least 10 minutes after power OFF before opening the front cover of the inverter.
- Verify the charge indicator lamp is OFF before proceeding 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 people.

WARNING

- Verify the rated input voltage of the inverter is matched with AC power supply. Otherwise, there is the possibility of damage to the inverter.
- Install in order and only operate wiring after finishing main parts install ation. Otherwise, there is an electric shock or damage to the inverter.
- Do not perform over-voltage withstand to the inverter, for this had been done properly before EX-factory.
- Be sure to install a no-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.

TIP

- 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.

TIP

- 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.

TIP

- Input power RST disorder, it can connect any one arbitrary
- When inverter runs the direction of motor is not same as your required direction. Please change any two of three iuput motor wires
- When inverter have disconnector to protect current leakage. In order to avoid something wrong with disconnect ,please choose current leakage above 200mA and finish it within more than 0.1 second

3.3.3 Instruction on Main Circuit Terminals

1. The main circuit terminals are shown as in the figure 3-9~3-10.

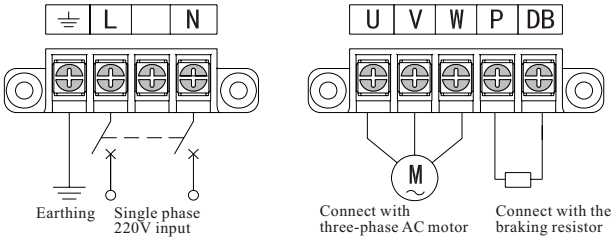


Fig.3-9 Diagram 1 for Main Circuit Terminals

Model: ZVF200-M0004S2～M0022S2

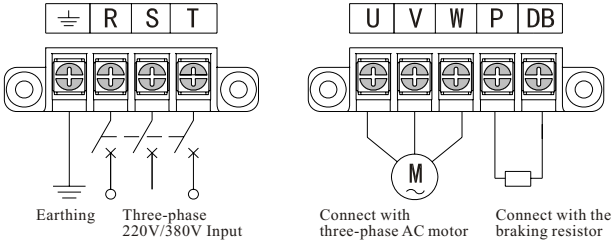


Fig.3-10 Diagram 2 for Main Circuit Terminals

Model：ZVF200-M0004T2～M0055T2

ZVF200-M0007T4～M0075T4

2、Function Description on Main Circuit Terminals

Terminal Symbols	Function Description
R、S、T	AC line input terminals, connecting with three-phase 380V or 220V AC input
L、N	AC line input terminals, connecting with single-phase 220V AC input
U、V、W	Inverter output terminals connecting with three-phase AC motor
P、DB	External braking resistor terminals, connecting with two side of the external braking resistor
⏚G	Ground terminal connecting to the ground

3.2.4 Description of terminal of the control circuit

1.The terminal of control circuit shown in Fig 3-11.

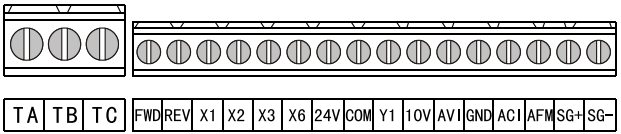


Fig 3-7 Control circuit terminal

2. Description of the control circuit terminal

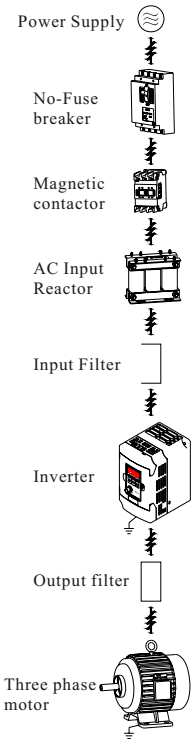
Type	Terminal Symbols	Function Description	Electrical Specifications
Multi-function Input Terminal	X1	Xn (n=1, 2, 3,6)-GND is Valid only when there is a short circuit The functions can be set by the parameter P38～P42	INPUT, 0~12V power level low level valid, 10mA
	X2		
	X3		
	X4		
	X5		
	X6		
Multi-function Output Terminal	Y1	Multi-function open collector output is defined as on-off output terminal, whose function is set by the parameter P45 with reference of GND	OUTPUT, Maximum Current Load I≤50mA
Public port	GND	Analog signal public terminal	
Analog Input Output terminal	+10V	External analog preset power supply, connecting to potentiometer together with termianl GND and AVI. The frequency can be set as required	Output,10VDC
	AVI	Analog voltage singal input, with reference of GND	Input .0～10VDC
	ACI	Analog current Singal input, with reference of GND	Input .0～20mA
	AFM	Program mable Analog voltage output P43 with reference of GND	Output .0～10VDC

Type	Terminal Symbols	Function Description	Electrical Specifications
Power port	12V	12VDC output(control power)	12VDC～100mA
Programmable output terminal	TA	Relay contact output. when normal TA and TB ON, TA-TC off. Action TA and TB off,TA-TCON.Set by P46	Contact rated value NO 250VAC-5A NO 250VAC-3A
	TB		
	TC		
COMMUNICATION PORT	SG+	Communication singal positive port	
	SG-	Communication singal negative port	

Capacity of breakswitch and section area of wire

Inverter Models	Break Switch (A)	Main Circuit mm^2		Control Wire (mm^2)
		Input Wire	Output wire	
ZVF200-M0004T2/S2	5/15	2.5		0.75
ZVF200-M0007T2/S2	10/20	2.5		0.75
ZVF200-M0015T2/S2	20/30	2.5		0.75
ZVF200-M0022T2/S2	30/50	4		0.75
ZVF200-M0037T2	40	6		0.75
ZVF200-M0055T2	50	6		0.75
ZVF200-M0007T4	5	2.5		0.75
ZVF200-M0015T4	10	2.5		0.75
ZVF200-M0022T4	15	2.5		0.75
ZVF200-M0037T4	20	4		0.75
ZVF200-M0055T4	30	4		0.75
ZVF200-M0075T4	40	6		0.75

3.4 Inverter System Wiring



Power Supply
- Please follow the specific power supply requirement shown in . Avoid the inverter damage .
- Be sure to install No-Fuse breaker between the AC power and inverter .

No-Fuse breaker
- Make sure use the No-fuse that matched with the rated voltage and current of the inverter for ON/OFF control. and for the inverter protection .
- No-Fuse breakers can not used as START or STOP control.

Magnetic contactor
- Please do not use a magnetic contactor as the I/O switch of the inverter this will reduce the operating life cycle of the AC inverter .
- Please do not use the magnetic contactor as START and STOP of the inverter .

AC Input Reactor
- AC line reactor should be installed when the power supply capacity is 500kVA.
- Used to improve the input power factor, to reduce harmonics and provide protection from AC line disturbances. (Surge, switching spike, power flick, etc.)

Input Filter
- There have inductive load beside the inverter . The input filter should be installed.

Inverter
- The AC input line connect with R.S.T or L.N. No phase different .
- The output connect with U.V.W . It only change any two phase among the three phases if the inverter run forward. while the motor run reverse .
- The output terminal can not connect with AC input line. Avoid the inverter damage .
- Good connection with earth ground .

Output filter
- It's necessary to install on the inverter output side when the inverter interfered by the sensitive equipment. and can reduce the electromagnetic interference.

Fig.3-12

Chapter 4 Operation panel and Operation

4.1 Operation Panel and Description

4.1.1 Operation Panel

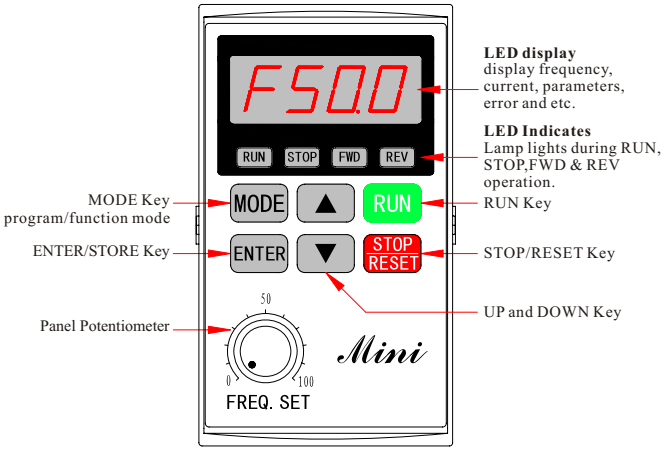


Fig.4-1 ZR06 Operation Panel Description

Model: ZVF200-M0004S2～M0022S2
ZVF200-M0004T2～M0055T2
ZVF200-M0007T4～M0075T4

4.1.2 Function Description on Keys

RUN

- Run Key. When the run command selected bey the keypad control (P01=00).Press this key and the inverter start running .

STOP RESET

- STOP/RESET key. when the run command is selected by the keypad control .(P01=00). The inverter is under normal running. Press this key to stop running.When the inverter is in the state of failure alarm.Press this key remove the fault .and return to the normal status .

MODE

- Program/Function mode key Press this key to displays the AC drive status, setting frequency .output current . FWD/REV. parameters settings and so on.

ENTER

- Enter/Store key. Press this key to confirm the current status of the inverter or save the current parameter value.

▲

- Up key. Press this key, the data or parameter code will go up. Press and hold it, the modifying speed upward will rise.

▼

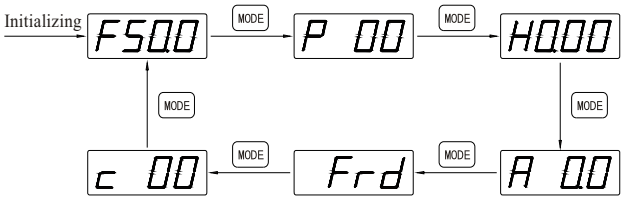
- Down key. Press this key, the data or parameter code will go down. Press and hold it, the modifying speed downward will rise.

4.1.3 Function Description on Operation Panel Indicator Lights

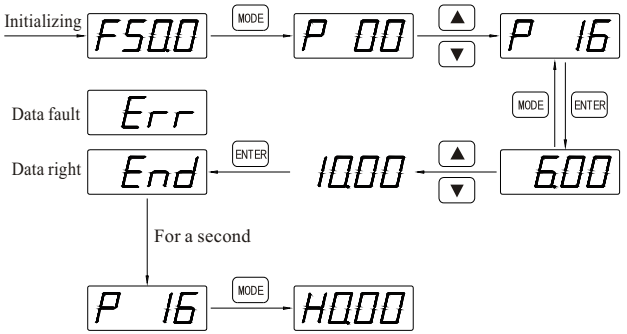
Display Status	Function Description
F50.0	The AC drives master frequency.
H50.0	The actual running frequency
U500	The customer unit(V)
A 5.0	The output current presetat terminal U、V、W
1 50	Run program automatic
P 01	Parameter item
01	Parameter value
Frd	the inverter is inthe state of forwardrunning.
rEu	the inverter is inthe state of reverserunning
End	"End" displays for approximately1 second if inputhas been accepted. Aftera parameter value hasbeen set, the new value is automaticallystored in memory. To modify an entry, usethe ▲ and ▼ keys.
Err	"Err" displays, if theinput is invalid.
●RUN	When the light is ON,inveter is running
●STOP	When the light is ON,inverter will stop
●FWD	When the light is ON, the inverteris in the state of forward running
●REV	When the light is ON, theinverter is in the state ofreverse running.

4.1.4 Use of Operation panel

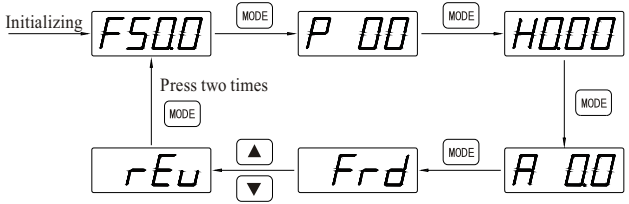
① State parameter view



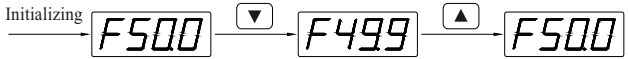
② Modification of parameter value (modify the parameter value for P16 jog function from 6.00Hz to 10.00Hz).



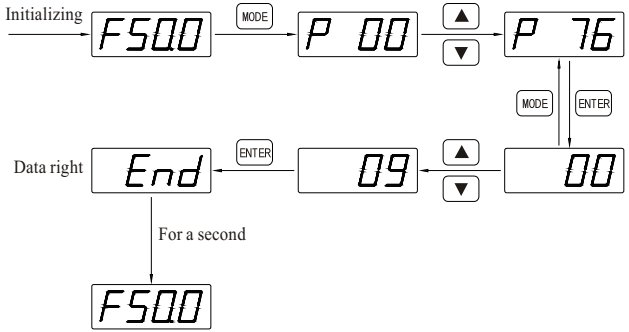
③ When running mode is controlled by keypads, revise the methods of running direction



④ When frequency is set by key up and down



⑤ Parameter initializing (restore to the factory default setting 50.00Hz)



Chapter 5 Inverter Use

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 good grounded.
- Be sure all the switches and terminals are in proper state of off or shut down.
- Be sure there is no short circuit 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 5.1.2. While in trial operation, it is suggested that the motor without load to avoid damage to this mechanical equipment arising from incorrect operation. During trial operation, if the operating instruction is P01, then the RUN/STOP key control (factory default setting) of the operation 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.	After energized, the inverter is in the state of readiness and LED displays F50.00Hz. the built-in cooling fan begin to work.
2	Press ▲/▼ till LED displays F5.00Hz.	Set the frequency to F5.00Hz. This step can be left out if the displayed frequency is already F5.00Hz when energized.
3	Press RUN.	Motor begins running, the frequency rise from H0.00Hz to H5.00Hz, under the frequency monitor
4	Keep a close eye on the following points: ① if there is any abnormal vibration or noise when the motor runs. ② if there is any tripping or other abnormality of the inverter. ③ If the motor runs in the correct direction. ④ if 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 F50.00Hz.	The motor accelerates rotating and the displayed frequency rises from H5.00Hz to H50.00Hz. Go to the next step if everything is normal.
6	Press ▼ continuously till LED displays F0.00Hz.	The motor decelerates rotating and the displayed frequency falls from H50.00Hz to H0.00 Hz. 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.

5.1.3 Cautions for Operation

All the inverter functions are determined by set parameters. The parameters of inverter ZVF200 series consist of the function codes P00~P157, 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 4.1.4 ⑤Parameter Initializing Restoring Factory Default Settings.

5.2 Examples of Use

This manual provides the following examples for users' reference on the use of inverter.

5.2.1 Eg. 1: Run or stop the inverter with operation panel, and feed the frequency with panel potentiometer .

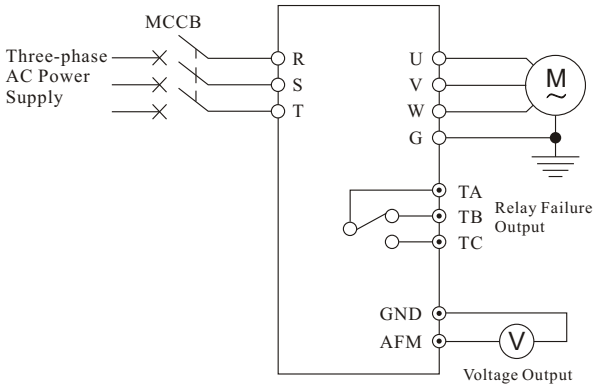


Fig.5-1

- P00-Master frequency source selection .
  If the set value 04—Panel Potentiometer setting.
- P01-Source of operation command .
  If the value is 0—keypad control
- Run or stop the inverter with RUN or STOP RESET keys on the operation panel.
- Adjust the speed by turning the potentiometer on the operate panel.

5.2.2 Eg.2: Start and stop the inverter with the external terminal , feed the frequency with external potentiometer.

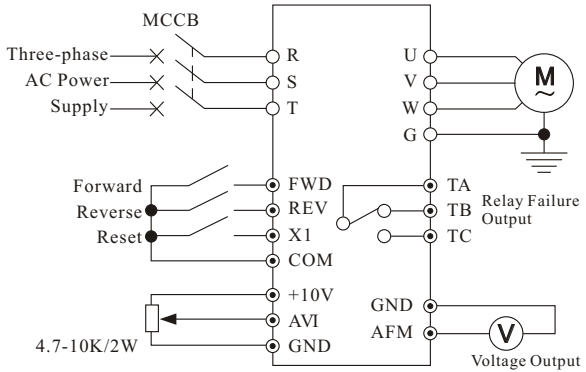


Fig. 5-2

- P00-Master frequency source selection .
  The set value 01 is external voltage or external potentiometer value .
- P01-Source of operation command .
  If the value is 01- External terminal control .
- P38- The input terminal X1.2 function selection .
  The value 00-Two Wire running control
- P39-Input terminal X3 function selection . 05-External reset input.
- X1-GND switch on. The motor run forward .
  X2-GND switch on. The motor run reverse .
  X1 X2-GND both switch on or switch off at the same time. The inverter will stop .The fault alert X3-GND switch on . the fault reset .
- The speed control by the regulating value of "AVI" .(controlled by 4.7-10K/2W potentiometer control.)

5.2.3 Eg.3: Run or stop the inverter with external terminal. Multi-stage speed running.

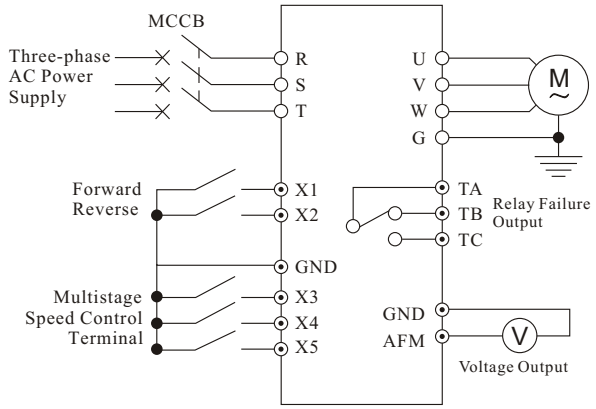


Fig. 5-3

- P01-Source of operation command. If the value is 01- External terminal control .
- P38-The input terminal X1.2 function selection.
  The value 00-Two Wire running control.
- P39-P41—The input terminal X3-X5 function selection. The setting value 06,07,08—Multi stage speed.
- P17-P23-Multi-stage speed frequency setting . There have 7 stages frequency . and use the factory fault .
- X1-GND switch on. The motor run forward .
  X2-GND switch on. The motor run reverse .
  X1 X2-GND both switch on or switch off at the same time .The inverter will stop .
- There have an arbitrary terminal or Multi terminals and GND switch off (7 Pairs of such complex in total),The inverter will run under the multi-stage speed frequency selected from X3-X5.

5.2.4 Eg.4: Run and stop the inverter with the external terminal , feed the frequency with external potentiometer . Multiple motors run in parallel .

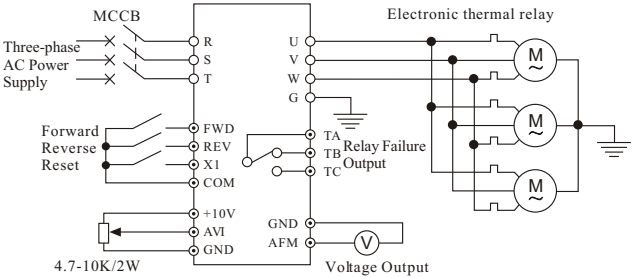


Fig. 5-4

- P00-Master frequency source selection . The set value 01 is external voltage or external potentiometer value .
- P01-Source of operation command. If the value is 01- External terminal control .
- P38- The input terminal X1.2 function selection .
  The value 00-Two Wire running control
- P39-Input terminal X3 function selection . 05-External reset input.
- X1-GND switch on. The motor run forward .
  X2-GND switch on . The motor run reverse .
  X1 X2-GND both switch on or switch off at the same time .The inverter will stop .
  The fault alert X3-GND switch on. the fault reset .
- The speed control by the regulating value of "AVI" .(controlled by 4.7-10K/2W potentiometer control.)
- Each motor will use the thermal relay to do overload protection . The total power of all motors are less than the rated power of inverter .

5.2.5 Eg.5: Inverter use for PID control Pressure Water supply control.

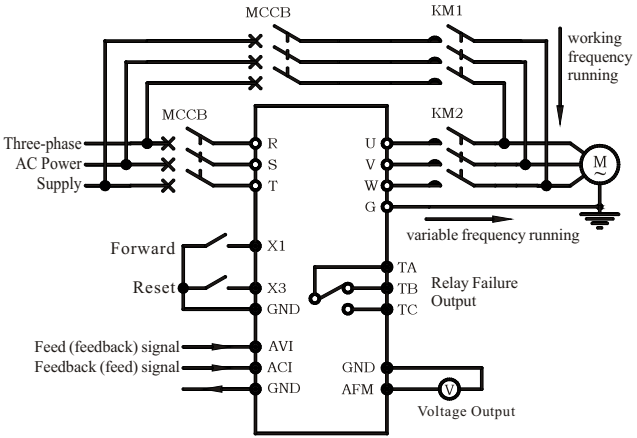


Fig. 5-5

- P01-Source of operation command. If the value is 01- External terminal control .
- P38- The input terminal X1.2 function selection .
  The value 00-Two Wire running control
- P39-Input terminal X3 function selection .05-External reset input.
- P115-PID set point selection. If we set 02-Select the external voltage or potentiometer setting.
- P116-PID Feedback terminal selection . The setting value 03— Select external current negative feedback .
- P117-Proportional gain P: Set according to the actual request . No need to change.

- P118- Integral time I : Set according to the actual request . No need to change .
- P119- Differential time D: Set according to the actual request . No need to change .
- P131- Minimum frequency corresponding to the ACI input current value. No need to change .
- P132- Maximum frequency corresponding to the ACI input current value. No need to change .
- P133-The reverse ACI . Set according to the actual request . No need to change .
- P136-The sleep time: Set according to the actual request . No need to change .
- P137-The sleep frequency: Set according to the actual request. No need to change.
- P138- The wake up frequency. Set according to the actual request. No need to change.

When use the PID function. In order to meet the control demands. Customers can modify the parameter according to the actual request.

WARNING

- The contactor KM1, KM2 are shifting from working frequency and variable frequency. Must be designed in interlocked manner.
- It is forbidden to close at the same time. Otherwise the inverter will be permanent damaged .

Chapter 6 Parameters

6.1 Schedule of Function Parameters


TIP

- The mark " √ " indicates the setting value of parameter can be modified no matter when the inverter is shutdown or running.
- The mark "×" indicates the setting value of parameter can be modified only when the inverter is shutdown, and can not be modified when the inverter is running.
- The mark "_" indicates the parameter can be displayed only and can not be modified.

6.1.1 Basic Operation Functions

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P00	Source of Frequency Command	00: Master frequency determined by operation panel (▲/▼) 01: Master frequency determined by 0 to +10V input on AVI terminal with jumpers 02: Master frequency determined by 4 to 20mA input on ACI terminal with jumpers 03: Master frequency determined by RS-485 Communication port 04: Master frequency determined by potentiometer on operation panel		1	00	√
P01	Source of Operation command	00: Operation determined by operation panel RUN / STOP 01: Operation determined by external control terminals, keypad STOP is effective 02: Operation determined by external control terminals, keypad STOP is ineffective 03: Operation determined by RS-485 communication port, keypad STOP is effective 04: Operation determined by RS-485 communication port, keypad STOP is ineffective		1	00	√
P02	Stop Method	00: Ramp stop 01: Coast Stop		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P03	Maximum Output Frequency	50.00 to 400.0 Hz	Hz	0.1	50.00Hz	×
P04	Maximum Voltage Frequency (Base Frequency)	10.00 to 400.0Hz	Hz	0.1	50.00Hz	×
P05	Maximum Output Voltage(Vmax)	220V: 0.1 to255.0V 380V: 0.1 to510.0V	V	1	220.0V 440.0V	×
P06	Mid-point Frequency	0.10 to 400.0Hz	Hz	0.1	1.50Hz	×
P07	Mid-point Voltage	220V: 0.1 to255.0V 380V: 0.1 to510.0V	V	0.1	10.0V 20.0V	×
P08	Minimum Output Frequency	0.10 to 20.00Hz	Hz	0.1	1.50Hz	×
P09	Minimum Output Voltage	220V: 0.1 to255.0V 380V: 0.1 to510.0V	V	0.1	10.0V 20.0V	×
P10	Acceleration Time 1	0.01 to 600.0 sec Note:The decimal digits are determined by P147	s	0.1	10.0s	√
P11	Deceleration Time 1		s	0.1	10.0s	√
P12	Acceleration Time 2	0.01 to 600.0 sec Note:The decimal digits are determined by P147	s	0.1	10.0s	√
P13	Deceleration Time 2		s	0.1	10.0s	√
P14	Accel S-curve	00 to 07		1	00	×
P15	Jog Accel/Decel Time	0.01 to 600.0 sec Note:The decimal digits are determined by P147	s	0.1	1.0s	√

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P16	Jog Frequency	0.00 to 400.0 Hz	Hz	0.1	6.00Hz	√
P17	1st Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P18	2nd Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P19	3rd Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P20	4th Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P21	5th Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P22	6th Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P23	7th Step Speed Freq.	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P24	Reverse Operation Inhibition	00: Enable REV operation 01: Disable REV operation		1	00	×
P25	Over-Voltage Stall Prevention	00: Disable 220V: 330 to450 V 380V: 660 to900 Vdc	V	0.1	390.0V 780.0V	×
P26	Over-current Stall Prevention during Acceleration	00: Disable 20% to 200%	%	1	150%	×
P27	Over-current Stall Prevention during Operation	00: Disable 20% to 200%	%	1	150%	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P28	DC Braking Current Level	00 to 100 %	%	1	00%	×
P29	DC Braking during Start-up	0.0 to 5.0 sec	s	0.1	0.0s	×
P30	DC Braking during Stopping	0.0 to 25.0 sec	s	0.1	0.0s	×
P31	Start-point for DC Braking	0.00 to 60.00 Hz	Hz	0.1	0.00Hz	×
P32	Momentary Power Loss Operation Selection	00: Stop operation after momentary power loss 01: Continues after momentary power loss, speed search starts with Master Frequency 02: Continues after momentary power loss, speed search starts with Minimumoutput Frequency		1	00	×
P33	Maximum Allowable Power Loss Time	0.3 to 5.0 sec	s	0.1	2.0s	×
P34	Base-Block Time for Speed Search	0.3 to 5.0 sec	s	0.1	0.5s	×
P35	Maximum Current Level for Speed Search	30 to 200%	%	1	150%	×
P36	Upper Bound of Output Frequency	0.10 Hz to 400.0Hz	Hz	0.1	400.0Hz	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P37	Lower Bound of Output Frequency	0.00 Hz to 400.0Hz	Hz	0.1	0.00Hz	×
P38	Multi-function Input Terminal (X1,X2)	00: X1: FWD/STOP, X2: REV/STOP 01: X1: RUN/STOP, X2: REV/FWD 02: X1, X2, X3: 3-wire operation control mode		1	00	×
P39	Multi-function Input Terminal (X3)	00: No Function 01: Output OFF (NC) (enabled when running) 02: Output OFF (NO) (enabled when running) 03: External Fault (normally open) (NO) 04: External Fault (normally close) (NC) 05: RESET 06: Multi-Step Speed Command 1 07: Multi-Step Speed Command 2 08: Multi-Step Speed Command 3 09: Jog Operation 10: Accel/Decel Speed Inhibit 11: First or Second Accel/Decel Time 12: Base-block (B.B.) (NO) 13: Base-block (B.B.) (NC) 14: Increase Master Frequency 15: Decrease Master Frequency 16: Run PLC Program 17: Pause PLC 18: Counter Trigger Signal 19: Counter Reset 20: No function		1	05	×
P40	Multi-function Input Terminal (X4)			1	06	×
P41	Multi-function Input Terminal (X5)			1	07	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P42	Multi-function Input Terminal (X6)	21: RESET command (NC) 22: Control source: External Terminal 23: Control source: Keypad 24: Control source: Communication 25: Parameter Lock (Write disable, Read is always 0) 26: PID Disable (NO.) 27: PID Disable (NC) 28: Second Source for Frequency Command 29: Forward (contact is open)/ Reverse (contact is close) 30: One-Shot PLC Run 31: Index input signal 32: Counter Incremented by Drive Output Frequency	Hz	1	08	×
P43	Analog Output Signal AFM	00: Output frequency 01: Output current 02: PID feedback signal 03: Output power		1	00	√
P44	Analog Output Gain AFM	00 to 200 %	%	1	100%	√
P45	Multi-Function Output Terminal Y1 (Photocoupler output)	00: AC Drive Operational 01: Maximum Output Frequency Attained 02: Zero Speed 03: Over-Torque Detection 04: Base -Block (B.B) Indication 05: Low Voltage Indication		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P46	Programmable relay function selection	06: AC Drive Operation Mode 07: Fault Indication 08: Desired Frequency Attained 09: PLC Program Running 10: PLC Program Step Completed 11: PLC Program Completed 12: PLC Operation Paused 13: Top Count Value Attained 14: Preliminary Counter Value Attained 15: Warning (PID feedback loss, communication error) 16: Below the Desired Frequency 17: PID supervision 18: Over Voltage supervision 19: Over Heat supervision 20: Over Current stall supervision 21: Over Voltage stall supervision 22: Forward command 23: Reverse command 24: Zero Speed (Includes Drive Stop)		1	07	×
P47	Desired Frequency Attained	0.00 to 400.0Hz	Hz	0.1	0.00Hz	×
P48	Adjust Bias of External Input Frequency	0.00 to 100.0%	%	0.1	0.0%	√
P49	Potentiometer Bias Polarity	00: Positive Bias 01: Negative Bias		1	00	√
P50	Potentiometer Frequency Gain	0.10 to 200.0%	%	0.1	100.0%	√
P51	Potentiometer Reverse Motion Enable	00: Reverse Motion Disabled in negative bias 01: Reverse Motion Enabled in negative bias		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P52	Motor Rated Current	30.0%～ 120.0% rated output current	A	0.1	According to request	√
P53	Motor No-Load Current	00%FLA to 99%FLA	A	0.1	0.4*P52	√
P54	Torque Compensation	00 to 10		1	00	√
P55	Slip Compensation	0.00 to 10.00		0.01	0.00	√
P56	Reserved				-	×
P57	AC Drive Rated Current Display (unit: 0.1A)				-	×
P58	Electronic Thermal Overload Relay	00: Standard Motor (self cool motor) 01: Inverter Motor (auxiliary cool fan on motor) 02: Inactive		1	02	×
P59	Electronic Thermal Motor Overload	30 to 300 sec	s	1	60s	√
P60	Over-Torque Detection Mode	00: Over-Torque Detection Disable 01: Enabled during constant speed operation until the allowable time fordetection elapses. 02: Enabled during constant speed operation and halted after detection.		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P60	Over-Torque Detection Mode	03: Enabled during acceleration until the allowable time for detection elapses. 04: Enabled during acceleration and halted after detection.		1	00	×
P61	Over-Torque Detection Level	30 to 200%	%	1	150%	×
P62	Over-Torque Detection Time	0.0 to 10.0 seconds	s	1	0.1s	×
P63	Loss of ACI	00: Decelerate to 0 Hz 01: Stop immediately and display "EF" 02: Continue operation by last frequency command		1	00	×
P64	User Defined Function for Display	00: Display AC drive output Frequency (Hz) 01: Display User-defined output Frequency (H*P65) 02: Output Voltage (E) 03: DC Bus Voltage (u) 04: PV (i) 05: Display the value of internal counter (c) 06: Display the setting frequency (F) 07: Display the parameter setting (P) 08: Reserved 09: Output Current (A) 10: Display program operation (0.xxx), Fwd, or Rev		1	06	√
P65	Coefficient K	0.01 to 160.0		0.01	1.00	√

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P66	Communication Frequency	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	√
P67	Skip Frequency 1	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	×
P68	Skip Frequency 2	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	×
P69	Skip Frequency 3	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	×
P70	Skip Frequency Band	0.10 to 20.00 Hz	Hz	0.1	0.00Hz	×
P71	PWM Carrier Frequency	01 to 15KHz	KHz	1	15KHz	×
P72	Auto Restart Attempts after Fault	00 to 10		1	00	×
P73	Present Fault Record	00: No fault occurred 01: Over-current (oc) 02: Over-voltage (ov) 03: Overheat (oH) 04: Overload (oL) 05: Overload 1 (oL1) 06: External Fault (EF) 07: CPU failure 1 (CF1) 08: CPU failure 2 (CF2) 09: Hardware Protection Failure (HPF) 10: Over-current during acceleration (oca) 11: Over-current during deceleration (ocd)		1	00	×
P74	Second Most Recent Fault Record			1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P75	Third Most Recent Fault Record	12: Over-current during steady state operation (ocn) 13: Ground fault or fuse failure (GFF) 14: Low Voltage (not record) 15: 3 Phase Input Power Loss 16: EPROM failure (CF3) 17: External interrupt allo wance(bb) 18: Overload (oL2) 19: Auto Adjustable accel/decel failure (CFA) 20: CPU self detection failure (codE)		1	00	×
P76	Parameter Lock and Configuration	00: All parameters can be set/read 01: All parameters are read-only 02-08: Reserved 09: Resets all parameters to 50Hz factory defaults 10: Resets all parameters to 60Hz factory defaults		1	00	×
P77	Time for Auto Reset the Restart Times in Abnormality	0.1 to 6000.0s	s	0.1	60.0s	×
P78	PLC Operation Mode	00: Disable PLC operation 01: Execute one program cycle 02: Continuously execute program cycles 03: Execute one program cycle step by step 04: Continuously execute one program cycle step by step		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P79	PLC FWD/REV Motion	00 to 127		1	00	×
P80	Reserved				–	×
P81	Time Duration of 1st Step Speed	00 to 9999 sec	s	1	00s	×
P82	Time Duration of 2nd Step Speed	00 to 9999 sec	s	1	00s	×
P83	Time Duration of 3rd Step Speed	00 to 9999 sec	s	1	00s	×
P84	Time Duration of 4th Step Speed	00 to 9999 sec	s	1	00s	×
P85	Time Duration of 5th Step Speed	00 to 9999 sec	s	1	00s	×
P86	Time Duration of 6th Step Speed	00 to 9999 sec	s	1	00s	×
P87	Time Duration of 7th Step Speed	00 to 9999 sec	s	1	00s	×
P88	Communication Address	01 to 254		1	01	×
P89	Transmission Speed	00: 4800 bps 01: 9600 bps 02: 19200 bps 03: 38400 bps		1	01	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P90	Transmission Fault Treatment /Stop mode selection	00: Warn and Continue Operating 01: Warn and RAMP to Stop 02: Warn and COAST to Stop 03: Keep Operation without Warning		1	03	×
P91	Time Out Detection	0.0: Disable 0.1 to 120.0 sec	s	0.1	0.0s	×
P92	Communication data format selection	00: MODBUS ASCII mode, <7,N,2> 01: MODBUS ASCII mode, <7,E,1> 02: MODBUS ASCII mode, <7,O,1> 03: MODBUS RTU mode, <8,N,2> 04: MODBUS RTU mode, <8,E,1> 05: MODBUS RTU mode, <8,O,1>		1	00	×
P93	Accel 1 to Accel 2 Frequency Transition	0.01 to 400.0Hz 0.00: Disable	Hz	0.1	0.00Hz	×
P94	Decel 1 to Decel 2 Frequency Transition	0.01 to 400.0Hz 0.00: Disable	Hz	0.1	0.00Hz	×
P95	Auto Energy Saving	00: Disable auto energy saving 01: Enable auto energy saving		1	00	×
P96	Counter Countdown Complete	00 to 9999		1	00	×
P97	Preset counter countdown	00 to 9999		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P98	Total Time Count from Power On (D)				–	×
P99	Total Time Count from Power On (M)				–	×
P100	Software Version				–	×
P101	Auto Adjustable Accel/Decel	00: Linear Accel/Decel 01: Auto Accel, Linear Decel 02: Linear Accel, Auto Decel 03: Auto Accel/Decel 04: Linear Accel/Decel Stall Prevention during Deceleration		1	00	×
P102	Auto Voltage Regulation (AVR)	00: AVR function enabled 01: AVR function disabled 02: AVR function disabled when stops 03: AVR function disabled when decel		1	00	×
P103	Auto tune Motor Parameters	00: Disable 01: Auto tune for R1 02: Auto tune for R1 + No Load testing		1	00	×
P104	R1 value	00 to 6553 mΩ	mΩ	1	00mΩ	×
P105	Control Mode	00: V/F Control 01: Vector Control		1	00	×
P106	Rated Slip	0.00 to 10.00 Hz	Hz	0.1	3.00Hz	×
P107	Vector Voltage Filter	5 to 9999		1	10	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P108	Vector Slip Compensation Filter	25 to 9999		1	50	×
P109	Selection for Zero Speed Control	00: No output 01: Control by DC voltage		1	00	×
P110	Voltage of Zero Speed Control	0.0 to 20.0 %	%	0.1	5.0%	×
P111	Decel S-curve	00 to 07		1	00	×
P112	External Terminal Scanning Time	01 to 20		1	01	×
P113	Restart Method after Fault	00: None speed search 01: Continue operation after fault speed search from speed reference 02: Continue operation after fault speed search from Minimum speed		1	01	×
P114	Cooling Fan Control	00: Fan Off when the drive stop after 1 Min. 01: AC Drive Runs and Fan On, AC Drive Stops and Fan Off 02: Always Run 03: Reserved		1	02	×
P115	PID Set Point Selection	00: Disable (No PID) 01: Keypad 02: AVI (external 0-10V) 03: ACI (external 4-20mA) 04: PID set point		1	00	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P116	PID Feedback Terminal Selection	00: Input positive PID feedback, PV from AVI (0 to 10V) 01: Input negative PID feedback, PV from AVI (0 to 10V) 02: Input positive PID feedback, PV from ACI(4 to 20mA) 03: Input negative PID feedback, PV from ACI(4 to 20mA)		1	00	×
P117	Proportional Gain (P)	0.0 to 10.0		0.1	1.0	×
P118	Integral Time (I)	0.01 to 100.0 sec	s	0.01	1.00s	×
P119	Differential Time (D)	0.00 to 1.00 sec	s	0.01	0.00s	×
P120	Integration's Upper Bound Frequency	00 to 100 %	%	1	100%	×
P121	PID One-Time Delay	0.0 to 2.5 sec	s	0.1	0.0s	×
P122	PID Frequency Output Command Limit	00 to 110 %	%	1	100%	×
P123	Feedback Signal Detection Time	0.0: Disable 0.1 to 3600 sec	s	0.1	60.0s	×
P124	Feedback Signal Fault Treatment	00: Warningand RAMP to stop 01: Warningand keep operating		1	00	×
P125	Source of PID Set Point	0.00 to 400.0Hz	Hz	0.1	0.00Hz	×
P126	PID Offset Level	1.0 to 50.0 %	%	0.1	10.0%	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P127	Detection Time of PID Offset	0.1 to 300.0 sec	s	0.1	5.0s	×
P128	Minimum Reference Value	0.0 to 10.0 V	V	0.1	0.0V	×
P129	Maximum Reference Value	0.0 to 10.0 V	V	0.1	10.0V	×
P130	Invert Reference Signal AVI (0-10V)	00: Not inverted 01: Inverted		1	00	×
P131	Minimum Reference Value (4-20mA)	0.0 to 20.0mA	mA	0.1	4.0mA	×
P132	Maximum Reference Value (4-20mA)	0.0 to 20.0mA	mA	0.1	20.0mA	×
P133	Invert Reference Signal (4-20mA)	00: Not inverted 01: Inverted		1	00	×
P134	Analog Input Delay Filter for Set Point	00 to 9999		1	50	×
P135	Analog Input Delay Filter for Feedback Signal	00 to 9999		1	5	×
P136	Sleep Period	0.0 to 6550.0 sec	s	0.1	0.0s	×
P137	Sleep Frequency	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	×
P138	Wake Up Frequency	0.00 to 400.0 Hz	Hz	0.1	0.00Hz	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P139	Treatment for Counter Attained	00: Continue operation 01: Stop Immediately and display E.F		1	00	×
P140	External Up/Down Selection	00: Fixed Mode (keypad) 01: By Accelor Decel Time		1	00	×
P141	Save Frequency Set Point	00: Not Save 01: Save		1	01	×
P142	Second Source of Frequency Command	00: Keypad Up/Down 01: AVI (0-10V) 02: ACI (4-20mA) 03: Communication 04: Keypad potentiometer		1	00	×
P143	Software Braking Level	220V: 370-450 V 380V: 450-900 Vdc	V	0.1	380.0V 760.0V	×
P144	Total operation time (Day)				–	×
P145	Total operation time (Minutes)				–	×
P146	Line start Lockout	00: Disable 01: Enable		1	00	×
P147	Decimal Number of Accel /Decel Time	00: One decimal 01: Two decimals		1	00	×
P148	Number of Motor Poles	02 to 20		1	04	×
P149	Gear Ratio for Simple Index Function	04～1000		1	200	×

Parameter	Explanation	Settings	Unit	Min. Unit	Default Setting	Factory Setting
P150	Index Angle for Simple Index Function	00.0 to 360.0		0.1	180.0	×
P151	Deceleration Time for Simple Index Function	0.00 to 100.00 sec	s	0.1	0.00s	×
P152	Skip Frequency Width	0.00 to 400.0Hz	Hz	0.1	0.00Hz	×
P153	Bias Frequency Width	0.00 to 400.0Hz	Hz	0.1	0.00Hz	×
P154	Reserved				–	×
P155	Compensation Coefficient for Motor Instability	0.0: Disable 0.1 to 5.0		0.1	0.0	√
P156	Communication Response Delay Time	00～200		1	00	√
P157	Communication Mode Selection	0: Reserved 1: Modbus		1	01	√

6.2 Description of Parameters Settings

P 00	Source of Frequency Command		Factory Setting	00
	Settings	00	Master Frequency determined by digital keypad. (▲/▼)	
		01	Master frequency determined by 0 to +10 V input	
		02	Master frequency determined by 4 to 20mA input	
		03	Master frequency determined by RS-485 Communication port	
		04	Master frequency determined by potentiometer on digital keypad.	

P 01	Source of Operation Command		Factory Setting	00
	Settings	00	Operation instructions determined by the Digital Keypad. (RUN/STOP)	
		01	Operation instructions determined by the External Control Terminals. Keypad STOP key is effective.	
		02	Operation instructions determined by the External Control Terminals. Keypad STOP key is not effective.	
		03	Operation instructions determined by the RS-485 communication port. Keypad STOP key is effective.	
		04	Operation instructions determined by the RS-485 communication port. Keypad STOP key is not effective.	

- Refer to P38 to P42 for more details.

P 02	Source of Operation Command		Factory Setting	00
	Settings	00	Ramp to stop	
		01	Coast to stop	

- This parameter determines how the motor is stopped when the AC drive receives a valid stop command. As shown in Fig6-1.
  00 Ramp: The AC drive decelerates the motor to Minimum Output Frequency (P08) and then stops according to the deceleration time set in P11 or P13.
  01 Coast: The AC drive will stop the output instantly, and the motor will coast to stop.

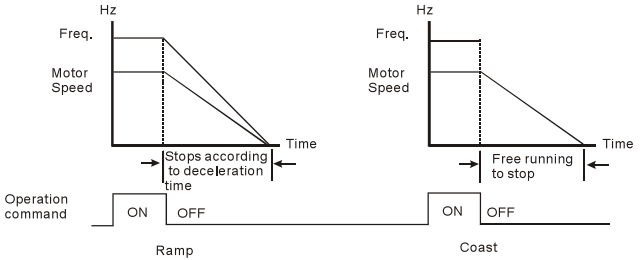


Fig.6-1

TIP

- The mode for motor stop. Usually determined by the characteristics of load or mechanical stops.
  1. Mechanical stop. The motor must stop immediately. Avoid material waste or people safety .It is recommended to set ramp stop. The deceleration time determined by the actual sites.
  2. Mechanical stop. It is recommended to set coast stop If the motor run without load or the load with big inertia. E.g. Fan . Mixer .

P 03	Maximum Output Frequency		Factory Setting	50.00
	Settings	50.00 to 400.0 Hz		

- This parameter determines the AC drive's Maximum Output Frequency. All the AC drive analog inputs (0 to +10V, 4 to 20mA) are scaled to correspond to the output frequency range.

P 04	Maximum Voltage Frequency (Base Frequency)		Factory Setting	50.00
	Settings	10.00 to 400.0Hz		

- This parameter should be set according to the rated frequency as indicated in the motor nameplate. P04 and P03 determine the volts per hertz ratio.

P 05	Maximum Output Voltage (Vmax)		Factory Setting	220/440
	Settings	220V series	0.1 to 255.0V	
		380V series	0.1 to 510.0V	

- This parameter determines the Maximum Output Voltage of the AC drive. The Maximum Output Voltage setting must be smaller than or equal to the rated voltage of the motor as indicated on the motor nameplate. Setting of P05 must be equal to or greater than setting of Mid-Point Voltage (P07).

P 06	Mid-Point Frequency		Factory Setting	1.50
	Settings	0.10 to 400.0Hz		

- The parameter sets the Mid-Point Frequency of V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point frequency can be determined. Setting of this parameter must be equal to or greater than Minimum Output Frequency (P08) and equal to or less than Maximum Voltage Frequency (P04).

P 07	Mid-Point Voltage		Factory Setting	10/20
	Settings	220V series	0.1 to 255.0V	
		380V series	0.1 to 510.0V	

- The parameter sets the Mid-Point Voltage of any V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point Frequency can be determined. Setting of this parameter must be equal to or greater than Minimum Output Voltage (P09) and equal to or less than Maximum Output Voltage (P05).

P 08	Minimum Output Frequency		Factory Setting	1.50
	Settings	0.10 to 20.00Hz		

- The parameter sets the Minimum Output Frequency of the AC drive. Setting of this parameter must be equal to or less than Mid-Point Frequency (P06).

P 09	Minimum Output Voltage		Factory Setting	10/20
	Settings	220V series	0.1 to 255.0V	
		380V series	0.1 to 510.0V	

- This parameter sets the Minimum Output Voltage of the AC drive. Setting of this parameter must be equal to or less than Mid-Point Voltage (P07).

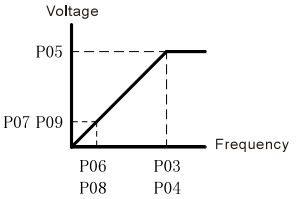


Fig.6-2 Standard V/F Curve

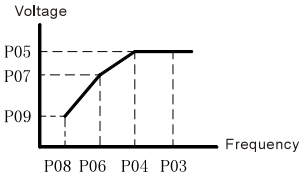
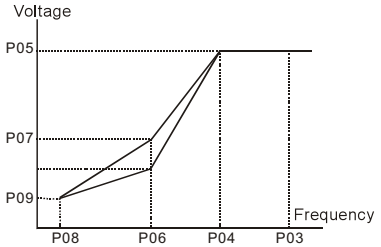


Fig.6-3 Custom V/F Curve



Fan/Pump V/F Curve

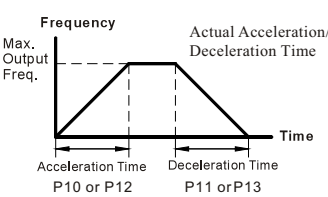
Commonly used V/F setting ,There have the following 3 settings. See the below sheet 6-1.

Application	P03	P04	P05	P06	P07	P08	P09
General Purpose	50.00	50.00	220.0	1.30	12.0	1.30	12.0
Fans and Pumps	50.00	50.00	220.0	25.00	50.0	1.30	10.0
High Starting Torque	50.00	50.00	220.0	2.20	23.0	1.30	14.0

P 10	Acceleration Time 1	Factory Setting	10.0
P 11	Deceleration Time 1	Factory Setting	10.0
P 12	Acceleration Time 2	Factory Setting	10.0
P 13	Deceleration Time 2	Factory Setting	10.0
	Settings 0.01 to 600.0 sec		

- P10. This parameter is used to determine the time required for the AC drive to ramp from 0 Hz to its Maximum Output Frequency (P03). The rate is linear unless the S-Curve (P14) is "Enabled".
- P11. This parameter is used to determine the time required for the AC drive to decelerate from the Maximum Output Frequency (P03) down to 0 Hz. The rate is linear unless the SCurve (P14) is "Enabled".
- P12 and P13: Provide an additional Accel/Decel time although Time 1 is the default. A Multi-Function input terminal must be programmed to select Accel/ or Decel/ Time 2 and the terminal must be closed to select Accel/Decel Time 2 (See P38 to P42).

In the below diagram, suppose the Maximum Output Frequency is 50 Hz (Master Freq), Minimum Output Frequency (start-up) is 1.5 Hz, and accel/decel time 1 is 10 seconds. The actual time for the AC drive to accelerate from start-up to 50 Hz is 9.7 seconds (deceleration time is also 9.7 seconds), can be determined by the formula.



$$\text{Actual Acceleration/ Deceleration Time} = \frac{\text{Acceleration/Deceleration Time x (Master Freq.-Min.Output Freq.)}}{\text{Max. Output Freq.}}$$

Fig.6-4 Acceleration/Deceleration Time

P 14	Acceleration S-Curve	Factory Setting	00
	Settings 00 to 07		

- This parameter is used whenever the motor load needs to be accelerated or decelerated smoothly. The desired accel/decel effect is selectable from 0 to 7, in which the larger the number, the greater the effect achieved. If the default value of P111 Deceleration S Curve is unchanged ("0"), then P14 sets both acceleration and deceleration S-Curves. If P111 is set to any value other than "0", then P14 will set the acceleration S-Curve and P111 will set the deceleration S-Curve.

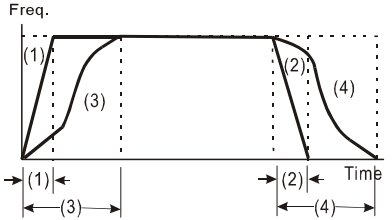


Fig.6-5 Acceleration/Deceleration characteristics
(1),(2)Disabling S curve (3),(4)enabling S curve

P 15	Jog Accel / Decel Time	Factory Setting	1.0 sec
	Settings 0.01 to 600.0 sec		

- This parameter sets the acceleration or deceleration time for Jog operation.

P 16	Jog Frequency	Factory Setting	6.00Hz
	Settings 0.00 to 400.0 Hz		

- When the JOG function is activated, the AC drive will accelerate from Minimum Output Frequency (P08) to Jog Frequency (P16). Drive must be in "stop" status for the operator to activate the JOG function. Likewise, during Jog operation, other commands cannot be accepted through the keypad but FORWARD, REVERSE and STOP. The JOG function can be remotely activated when the Jog terminal is closed, and if the Jog terminal opens, the AC drive will decelerate from Jog Frequency to zero. The accel / decel time is entered as Jog Accel/ Decel Time (P15). Multi-function Input terminals (X1-X5) can also be used to initiate the JOG operation if so programmed.

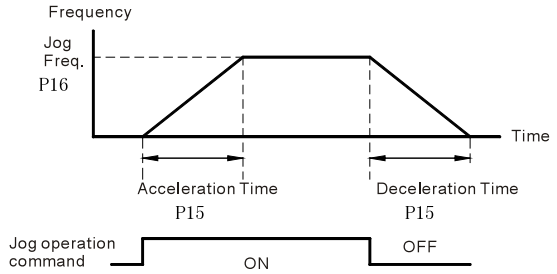


Fig.6-6 Jog Operation and Acceleration/Deceleration Time

P 17	1st step speed output frequency	Factory Setting	0.00Hz
P 18	2nd step speed output frequency	Factory Setting	0.00Hz
P 19	3rd step speed output frequency	Factory Setting	0.00Hz
P 20	4th step speed output frequency	Factory Setting	0.00Hz
P 21	5th step speed output frequency	Factory Setting	0.00Hz
P 22	6th step speed output frequency	Factory Setting	0.00Hz
P 23	7th step speed output frequency	Factory Setting	0.00Hz
	Settings 0.00 to 400.0Hz		

- Multi-Function Input Terminals (refer to P39 to P42) are used to select Multi-Step speeds. The desired speed frequencies are entered in P17 to P23. When the associated multifunction input terminal is closed, drive will run at one of these specific frequencies.
- Multi-step speeds (P17 to P23), P78, P79, and P81 to P87; are used for multi-step motion control, which is executed in an orderly manner, similar to a PLC program.

P 24	Reverse Operation Inhibition	Factory Setting	00
	Settings 00 Enable REV operation		
	01 Disable REV operation		

- This parameter is used to disable motor rotation in reverse.

P 25	Over-Voltage Stall Prevention		Factory Setting	390/780
	Settings	00	Disable	
		220V series	330-450Vdc	
		380V series	660-900Vdc	

- During deceleration, the DC bus voltage may exceed its maximum allowable value due to motor regeneration. When this function is enabled, the AC drive will stop decelerating, and maintain a constant output frequency to prevent from over-voltage tripping. Drive will resume deceleration when the voltage drops below the setting for P25.

TIP

- In applications where inertia is low, over-voltage during deceleration would not occur. When inertia is high, the AC drive will automatically extend the deceleration period. If a faster stop is needed, then a dynamic brake resistor should be used.

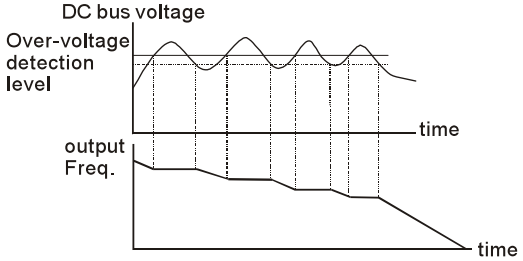


Fig.6-7 Over-voltage Stall Prevention

P 26	Over-Current Stall Prevention during Acceleration	Factory Setting	150%
	Settings	20 to 200%	
		00 disable	

- A setting of 100% is equal to the Rated Output Current of the drive. Under certain conditions, the AC drive output current may increase abruptly, and exceed the value specified by P26. This is commonly caused by rapid acceleration or excessive load on the motor. When this function is enabled, the AC drive will stop accelerating and maintain a constant output frequency. Drive will resume accelerating only after the current drops below the setting for P26.

P 27	Over-Current Stall Prevention during Operation	Factory Setting	150%
	Settings	20 to 200%	
		00 disable	

- During a steady-state operation with the motor load rapidly increasing, the AC drive output current may exceed the limit specified in P27. When this occurs, the output frequency will decrease to maintain a constant motor speed. The drive will accelerate to the steady-state output frequency only when the output current drops below the setting for P27.

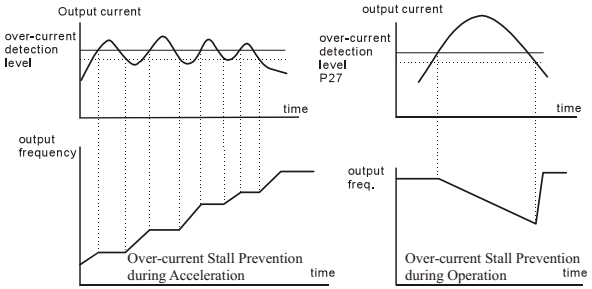


Fig.6-8 Over-current Stall Prevention during Acceleration

P 28	DC Braking Current Level	Factory Setting	00
	Settings	00 to 100%	

- This parameter determines the amount of DC Braking Current applied to the motor during starting and stopping. When setting the DC Braking Current, please note that 100% corresponds to the rated current of the AC drive. It is recommended to start with a low DC Braking Current level and then increase it until proper holding torque has been attained.

P 29	DC Braking Time during Start-up	Factory Setting	0.0
	Settings 0.0 to 5.0 sec		

- This parameter determines the duration for the DC Braking Current applied during starting. DC Braking is applied until the Minimum Frequency is reached.

P 30	DC Braking Time during Stopping	Factory Setting	0.0
	Settings 0.0 to 25.0 sec		

- This parameter determines the duration for the DC Braking voltage to be applied during stopping. If stopping with DC Braking is desired, then P02 must be set to Ramp to Stop (0.0).

P 31	Start-Point for DC Braking	Factory Setting	0.0
	Settings 0.00 to 60.00Hz		

- This parameter sets the frequency at which the DC Braking will begin during deceleration. DC braking start frequency will start from th e lowest frequency when the setting is less than the Minimum output frqunency (P08)

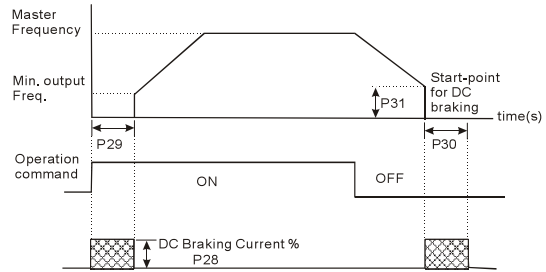


Fig.6-9 DC Braking fuctron

TIP

- DC Braking during starting is used for loads that may move before the AC drive starts, such as hoists and cranes. These loads may also be moving in the wrong direction. Under such circumstances, the DC Braking can be used to hold the load in position before applying a forward motion.
- DC Braking during stopping is used to stop faster than the ramp-to-stop or to hold a stopped load in position. A dynamic brake resistor may be needed in order to stop loads of high inertia.e.g.winding machine, cutting machine.

P 32	Momentary Power Loss Operation Selection		Factory Setting	00
	Settings	00	Operation stops after momentary power loss	
		01	Operation continues after momentary power loss Speed search starts with the Master Frequency reference value	
		02	Operation continues after momentary power loss Speed search starts with the min frequency	

P 33	Maximum Allowable Power Loss Time	Factory Setting	2.0 sec
	Settings 0.3 to 5.0 sec		

- After a power loss, the AC drive will resume operation only if the power loss duration is shorter than the time defined by P33. If the Maximum Allowable Power Loss Time is exceeded, the AC drive output is then turned off.

P 34	Base-Block Time for Speed Search	Factory Setting	0.5 sec
	Settings 0.3 to 5.0 sec		

- When a momentary power loss is detected, the AC drive will stop its output and will wait during a specified time interval called Base Block (entered in P34) before resuming operation. Setting of this parameter

should make the residual output voltage due to regeneration almost zero, before the drive resumes operation.

- This parameter also determines the search time when performing external Base-Block and Fault Reset (P72).

P 35	Maximum Current Level for Speed Search	Factory Setting	150
	Settings	30 to 200%	

- Following a power failure, the AC drive will start its speed search operation only if the output current is greater than the value determined by P35. When the output current is less than that of P35, the AC drive output frequency is at a "speed synchronization point" and will accelerate or decelerate back to the operating frequency at which it was running prior to the power failure.

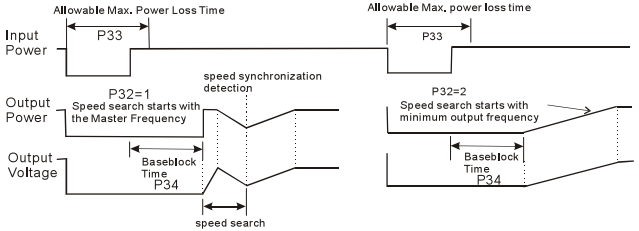


Fig.6-10 Momentary Power Loss Operation Function

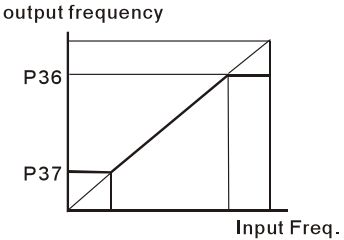
P 36	Upper Bound of Output Frequency	Factory Setting	400
	Settings	0.10 Hz to 400.0 Hz	

- The Upper/Lower Bounds help prevent operation error and machine damage. If the Upper Bound of Output Frequency is 50Hz and the

Maximum Output Frequency is 60Hz, the Maximum Output Frequency will be limited to 50Hz. Setting of this parameter must be equal to or greater than the Lower Bound of Output Frequency (P37).

P 37	Lower Bound of Output Frequency	Factory Setting	400
	Settings	0.00 Hz to 400.0 Hz	

- Setting of this parameter must be equal to or less than the Upper Bound of Output Frequency.
  If the Lower Bound of Output Frequency is 10Hz, and the Minimum Output Frequency (P08) is set at 1.0Hz, then any command frequency between 1-10Hz will generate a 10Hz output from the drive.



P 38	Multi-function Input Terminal (X1,X2)		Factory Setting	00
	Settings	00	X1: FWD/STOP, X2: REV/STOP	
		01	X1: RUN/STOP, X2: REV/FWD	
		02	X1, X2, X3: 3-wire operation control mode	

00: Two Wire operation 1, See the sheet 6-2 and Pig 6-11.
01: Two Wire operation 2, See the sheet 6-2 and Pig 6-11.

Sheet 6-2 Two wire command operation sheet

Switch status		Two Wire operation 1	Two Wire operation 2
K1	K2	Operation Command 1	Operation Command 2
OFF	OFF	RUN	STOP
ON	OFF	FWD	FWD
OFF	ON	REV	STOP
ON	ON	STOP	REV

● SWITCH ON is on . SWITCH OFF is OFF.

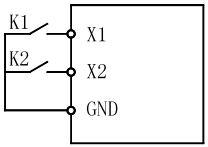


Fig.6-11 Two wire control 1/2

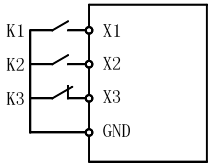


Fig.6-12 Three wire control

02: Three Wire control

See Pig 6-12 . X3 is three wire operation control stop terminal

K1————FWD

K2————REV

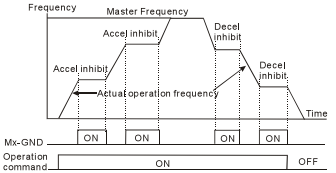
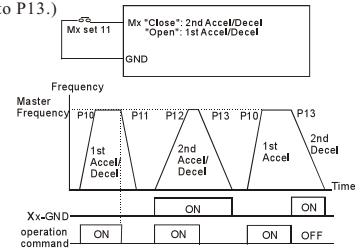
K3————STOP

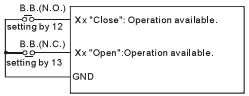
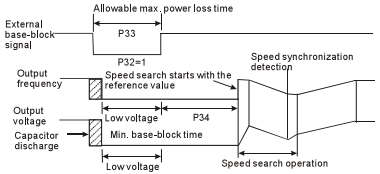
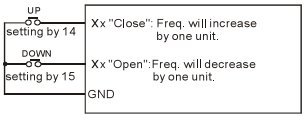
● When the "2" setting is selected for P38. The value is P39 will be ignored .

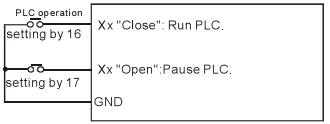
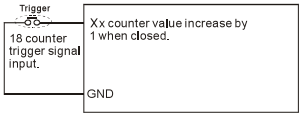
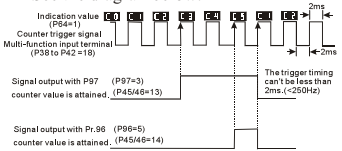
P 39	Multi-function Input Terminal (X3)	Factory Setting	05
P 40	Multi-function Input Terminal (X4)	Factory Setting	06
P 41	Multi-function Input Terminal (X5)	Factory Setting	07
P 42	Multi-function Input Terminal (X6)	Factory Setting	08
	Settings	00 to 32	

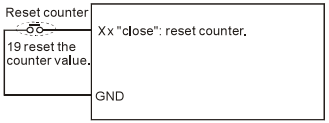
Settings	Function	Description
00	No Function	
01	Output OFF (N.O.) (enabled when running)	When it is set to 01 or 02, AC drive output will stop immediately. If there is start signal after stopping, the output will start from the minimum frequency.
02	Output OFF (N.C.) (enabled when running)	
03	External Fault (N.O.)	Parameter values 3 and 4 program Multi-Function Input Terminals: X1, X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) to be External Fault (E.F.) inputs. Note: When an External Fault input signal is received, the AC drive output will turn off, drive will display "E.F." on Digital Keypad, and the motor will coast. Normal operation can resume after the External Fault is cleared and the AC drive is reset.
04	External Fault (N.C.)	
05	External Reset	When an External Fault input signal is received. E.g. the drive will display EF ,OH ,OC .OV ect. The External Reset has the same function as the Reset key on the Digital keypad. It will reset the drive after a fault.
06	Multi-Step Speed Command 1	These three inputs select up to seven multi-step speeds defined by P17 to P23 as shown in the following diagram. It can reach to multi-step speeds if main speed connect to jog. P78 to P87 can also control output speed by programming the AC drive's internal PLC function. The terminal control for Multi-step speed . Refer to Sheet 6-3.
07	Multi-Step Speed Command 2	

<table>
<tr><th>Settings</th><th>Function</th><th>Description</th></tr>
<tr><td>08</td><td>Multi-Step Speed Command 3</td><td>
<table>
<tr><th>Multi-Step Speed Command 3</th><th>Multi-Step Speed Command 2</th><th>Multi-Step Speed Command 1</th><th>Selection for Multi-Step</th></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>Zero Multi-step speed. The running frequency can be set by the main master frequency .</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>1st Multi-step speed. The running frequency can be set by P17.</td></tr>
<tr><td>OFF</td><td>ON</td><td>OFF</td><td>2nd Multi-step speed. The running frequency can be set by P18.</td></tr>
<tr><td>OFF</td><td>ON</td><td>ON</td><td>3rd Multi-step speed. The running frequency can be set by P19.</td></tr>
<tr><td>ON</td><td>OFF</td><td>OFF</td><td>4th Multi-step speed. The running frequency can be set by P20.</td></tr>
<tr><td>ON</td><td>OFF</td><td>ON</td><td>5th Multi-step speed. The running frequency can be set by P21.</td></tr>
<tr><td>ON</td><td>ON</td><td>OFF</td><td>6th Multi-step speed. The running frequency can be set by P22.</td></tr>
<tr><td>ON</td><td>ON</td><td>ON</td><td>7th Multi-step speed. The running frequency can be set by P 23.</td></tr>
</table>
Note: Off stands for the Multi-step input terminal and COM switch on.
On Stands for the Multi-step input terminal and COM switch off .
</td></tr>
</table>

Settings	Function	Description
09	Jog Operation	Jog operation will run when the inverter stop completely . Can change the direction when jog operation run . and the key STOP on the keypads is available .The motor will stop according to the deceleration time when the external terminal switch off .
10	Accel/Decel Speed Inhibit	Parameter value 10 programs Multi-Function Input Terminal: X1,X2 (P38), X3 (P39),X4 (P40), X5 (P41) or X6 (P42) for Accel/Decel Inhibit. After receiving this command, the AC Drive stops accelerating or decelerating and maintains a constant speed. 
11	First or Second Accel/Decel Time Selection	Parameter value 11 programs a Multi-Function Input Terminal: X1,X2 (P38), X3 (P39),X4 (P40), X5 (P41) or X6 (P42) for selecting the First or Second Accel/Decel time. (Refer to P10 to P13.) 

Settings	Function	Description
12	External Base Block (N.O.) (Normally Open Contact Input)	Parameter values 12, 13 program Multi-Function Input Terminals: X1,X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) for external Base Block control. Value 12 is for normally open (N.O.) input, and value 13 is for a N.C. input.  Note: When a Base-Block signal is received, the AC drive will stop all output and the motor will coast. When base block control is deactivated, the AC drive will start its speed search function and synchronize with the motor speed, and then accelerate to the Master Frequency. 
13	External Base Block (N.C.) (Normally Close Contact Input)	
14	Increase Master Frequency	Parameter values 14, 15 program the Multi-Function Input Terminals: X1,X2(P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) to incrementally increase/ decrease the Master Frequency each time an input is received. 
15	Decrease Master Frequency	

Settings	Function	Description
16	Run PLC Program	Parameter value 16 programs Multi-Function Input Terminal: X1,X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) to enable the AC drive internal PLC program. Parameter value 17 programs an input terminal to pause the PLC program.  Note: P17 to P23, P78, P79, P81 to P87 define the PLC program. Another related function is "30 One-Shot PLC Run". It can be set to use a not-latched contact as the run signal.
17	Pause PLC Program	
18	Counter Trigger Signal	Parameter value 18 programs Multi-Function Input Terminal: X1,X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) to increase the AC drive's internal counter. When an input is received, the counter is increased by 1.  Note: The Counter Trigger input can be connected to an external Pulse Signal Generator when counting a process step or unit of material. See the diagram below. 

Settings	Function	Description
19	Counter Reset	Parameter value 19 programs Multi-Function Input Terminal: X1, X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) to reset the counter. 
20	No Function	Enter value (20) to disable any Multi-Function Input Terminal: X1, X2 (P38), X3 (P39), X4 (P40), X5 (P41) or X6 (P42) Note: Purpose of this function is to isolate unused Multi-Function Input Terminals. Any unused terminals should be programmed to 20 to insure they have no effect on drive operation.
21	RESET Command (N.C)	
22	Control source: External Terminal	Enter values 22, 23, or 24 to set the control source to be the external terminals, keypad or communication respectively. This setting is used to create functions for manual/auto, and remote/near-end control. When these three functions are used at the same time, the priority is 22-I/O > 23-Keypad >24-Communication.
23	Control source: Keypad	
24	Control source: Communication	
25	Parameter Lock (Write disable, Read is always 0)	This function will disable the write function and all the content of read are 0. The application is for customer having a key to control the operator to modify parameters or modify the parameter by improper use.
26	PID Disable (N.O.)	This function pause the PID control. It is commonly used for manual operation or function testing, and to recover the PID function when the system is normal.
27	PID Disable (N.C.)	

Settings	Function	Description
28	Second Source for Frequency Command	This function is used with P142 to select a different frequency source for control.
29	Forward (contact is open) / Reverse (contact is close)	This function has top priority to set the direction for running (If "P24 inhibit REV function" is not set). No mater what the present direction of run is, the contact N.O. is forward and the contact N.C. is reverse, once this function is set. The requirement for setting direction is P24 >setting 29 of P39-P42 > P38.
30	One-Shot PLC Run	
31	Index Input Signal	This function is used with parameters P149 to P151. The position where AC drive stops will be regarded as the zero position and it will move to the angle that P150 sets.
32	Virtual Timer Input	This function is for counting at the speed of the output frequency.

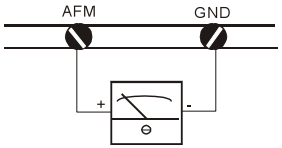
Note: The settings 00~32 in P39 to P42 can be used to set multi-function terminals (X3-X6) but the settings cannot be used repeatedly at the same time (besides settings 20).

P 43	Analog Output Signal AFM			Factory Setting	00
	Settings	00	Analog Frequency	0 to Maximum Output Frequency	
		01	Analog Current	0 to 250% of the rated AC drive current	
		02	Feedback Signal	0 to 100%	
		03	Output Power	0 to 100% of the rated output frequency	

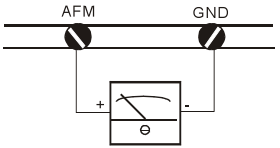
- This parameter selects if the Output Frequency, Current, PID feedback or Output Power will be the output signal on the AFM terminal (0 to 10VDC).

P 44	AFM Analog Output Gain	Factory Setting	100
	Settings 00 to 200%		

- This parameter sets the voltage range of the analog output signal on output terminal AFM.



Analog Frequency Meter



Analog Current Meter

P 45	Multi-function Output Terminal Y1 (Photocoupler output)	Factory Setting	00
P 46	Multi-function Output Terminal Y2 (Relay output)	Factory Setting	07
	Settings 00 to 24		

Settings	Function	Description
00	AC Drive Operational	Terminal output is activated when there is power output from drive.
01	Maximum Output Frequency Attained	Terminal output is activated when the AC drive attains Maximum Output Frequency.
02	Zero speed	Terminal output is activated when Command Frequency is lower than the Minimum Output Frequency.
03	Over-Torque detection	Terminal output is activated when over-torque is detected. Parameter P61 determines the Over-Torque detection level.
04	Base-Block (B.B.) Indication	Terminal output is activated when the AC drive output is shut-off by the external Base-Block.

Settings	Function	Description
05	Low-Voltage Indication	Terminal output is activated when low voltage is detected.
06	AC Drive Operation Mode	Terminal output is activated when the operation of AC Drive is controlled by External Control Terminals.
07	Fault Indication	Terminal output is activated when certain faults occur (oc,ov, oH, oL, oL1, EF, cF3, HPF, ocA, ocd, ocn, GF).
08	Desired Frequency attained	Terminal output is activated when the desired frequency (P47) is attained.
09	PLC Program Running	Terminal output is activated when the PLC program is running.
10	PLC Program Step Completed	Terminal output is activated for 0.5 sec. when each multistep speed is attained.
11	PLC Program Completed	Terminal output is activated for 0.5 sec. when the PLC program cycle has completed.
12	PLC Operation Paused	Terminal output is activated when PLC operation is paused.
13	Top Count Value Attained	Terminal output is activated when the terminal will switch on when the counter is equal to the setting of parameter P96
14	Preliminary Counter Value Attained	Terminal output is activated when the terminal will switch on when the counter is equal to the setting of parameter P97
15	Warning (PID feedback loss, communication error)	The contact will be "close" when PID feedback loss or communication is error.
16	Below the Desired Frequency	The contact will be "close" when output frequency is less than desired frequency P47.

Settings	Function	Description
17	PID supervision	The contact will be "close" when PID offset exceeds the setting of P126 and P127.
18	Over Voltage supervision	The contact will be "close" before over voltage. It will be activated at 370Vdc in 220V series and at 740Vdc in 380 series.
19	Over Heat supervision	The contact will be "close" before 90℃.
20	Over Current stall supervision	The contact will be "close" before exceeding the setting of P26/P27.
21	Over Voltage stall supervision	The contact will be "close" before exceeding the setting of P25.
22	Forward command	The contact will be "close" with forward command.
23	Reverse command	The contact will be "close" with reverse command.
24	Zero Speed (Includes Drive Stop)	The contact will be "close" when the setting frequency is less than min. frequency or drive stop.

P 47	Desired Frequency Attained		Factory Setting	00
	Settings	0.00 to 400.0 Hz		

- This parameter allows monitoring a certain frequency and then activates one of the Multifunction output terminals (P45 or P46 set to 8) when that frequency is achieved.

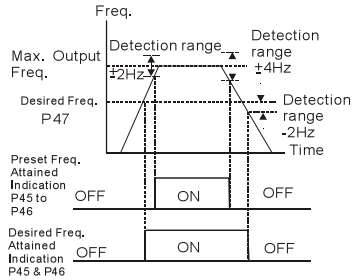


Fig.6-13 Desired Freq. Attained & Preset Freq. Attained

P 48	Adjust Bias of External Input Frequency		Factory Setting	0.0
	Settings	0.00 to 100.0%		

- This parameter provides a frequency offset when the source of frequency command is the analog input.

P 49	Potentiometer Bias Polarity		Factory Setting	00
	Settings	00	Positive Bias	
		01	Negative Bias	

- This parameter sets the potentiometer Bias Frequency to be positive or negative.

P 50	Potentiometer Frequency Gain		Factory Setting	100%
	Settings	0.10 to 200.0%		

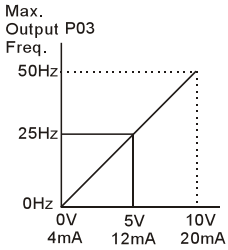
- This parameter sets the ratio of analog input vs frequency output.

P 51	Potentiometer Reverse Motion Enable		Factory Setting	00
	Settings	00	Reverse Motion Disabled in negative bias	
		01	Reverse Motion Enabled in negative bias	

- P48 to P51 are used when the source of frequency command is the analog signal (0 to +10V DC or 4 to 20mADC). Refer to the following examples.

Example 1:

Set P00=01 to command frequency with the potentiometer on keypad or P00=02 (4 to 20mA current signal) potentiometer/current signal of external terminal.



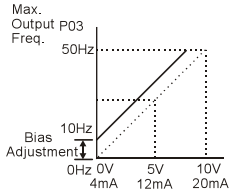
Factory Settings

P03=50Hz	Max. output Freq.
P48=0.0%	bias adjustment
P49=0	bias polarity
P50=100%	pot. freq. gain
P51=0	REV disable in negative bias

Fig.6-14 External analog signal control 1

Example 2:

A Bias Adjustment (20% of 50Hz) determines the Output Frequency to be 10 Hz with the potentiometer set at 0V as shown. Notice that the entire V/F is transposed accordingly. An analog input voltage 0-10V (or current 4-20mA) would set frequency as 0-50Hz. Once the Maximum Output Frequency is reached any further increase on the potentiometer will not increase output frequency (If you want to use the range of 50Hz, please refer to the example 3).



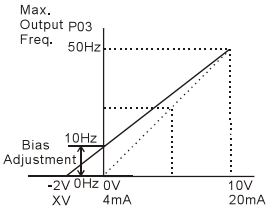
Factory Settings

P03=50Hz	Max. output Freq.
P48=20%	bias adjustment
P49=0	bias polarity
P50=100%	pot. freq. gain
P51=0	REV disable in negative bias

Fig.6-15 External analog signal control 2

Example 3:

The whole scale of the potentiometer may be used as desired. In addition to the signals 0 to 10V and 4 to 20mA, other popular voltage signals include 0 to 5V, 20 to 4mA or that under 10V.



Factory Settings

P03 = 50Hz	Max. output Freq.
P48 = 25%	bias adjustment
P49 = 0	bias polarity
P50 = 80%	pot. Freq. gain
P51 = 0	REV motion disable in negative bias

$P50 = \frac{10V}{12.5V} \times 100\% = 80\%$

Negative bias:

$\frac{50\text{-}10Hz}{10V} = \frac{10\text{-}0Hz}{V}$

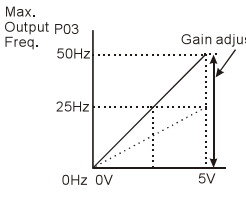
$V = \frac{100}{40} = 2.5V$

$P48 = \frac{2.5}{10} \times 100\% = 25\%$

Fig.6-16 External analog signal control 3

Example 4:

This example shows how to use Gain to set a potentiometer range of 0 to 5 Volts for 0-50 Hz. As an option, you also could set P03 =100Hz.



Factory Settings

P03=50Hz	Max. output Freq.
P48=0.0%	bias adjustment
P49=0	bias polarity
P50=200%	pot. freq. gain
P51=0	REV motion disable in negative bias

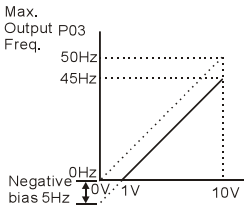
Calculation of gain

$P50 = (\frac{10V}{5V}) \times 100\% = 200\%$

Fig.6-17 External analog signal control 4

Example 5:

In this example, a 5 Hz (10% of 50 Hz) negative bias is used. This setting is used to provide a noise margin (1V in this example) in noisy environments. Note that the top frequency is reduced to 45 Hz.



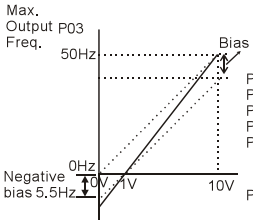
Factory Settings

P03=50Hz	Max. output Freq.
P48=10.0%	bias adjustment
P49=1	bias polarity
P50=100%	pot. freq. gain
P51=0	REV. motion disable in negative bias

Fig.6-18 External analog signal control 5

Example 6:

This example also uses negative bias and includes a potentiometer frequency gain to allow the AC drive to reach the Maximum Output Frequency.



Factory Settings

P03=50Hz	Max. output Freq.
P48=10.0%	bias adjustment
P49=1	bias polarity
P50=111%	pot. freq. gain
P51=0	REV. motion disable in negative bias

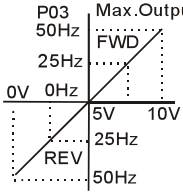
Calculation of gain

$P50=(\frac{10V}{9V})X100\%=111\%$

Fig.6-19 External analog signal control 6

Example 7:

In this example, the potentiometer is programmed to run a motor in forward or reverse direction. The motor will idle when the potentiometer is set at the scale mid-point. Please note that this adjustment will disable the external FWD and REV controls.



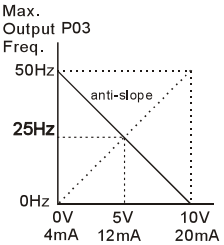
Factory Settings

P03=50Hz	Max. output Freq.
P48=50%	bias adjustment
P49=1	bias polarity
P50=200%	pot. freq. gain
P51=1	REV motion disable in negative bias

Fig.6-20 External analog signal control 7

Example 8:

This example shows how to set up the "anti-slope", which is an inversely proportional variation of frequency to the input analog signal, required for some applications in process control. A sensor will generate a large signal (such as 20mA or 10V) and the AC Drive will slow or stop.



Factory Settings

P03=50Hz	Max. output Freq.
P48=100%	bias adjustment
P49=1	bias polarity
P50=100%	pot. freq. gain
P51=1	REV. motion enable in negative bias

Fig.6-21 External analog signal control 8

P 52	Motor Rated Current	Factory Setting	FLA
	Settings 30.0% FLA to 120.0% FLA		

- Factory setting is the AC drive rated current. When setting this parameter, just input the motor rated current value without any calculation.
- Use the following criteria to determine the setting of this parameter: no-load current < rated current of motor < rated current of AC drive. You can use this parameter to limit the output current to the motor as to prevent overheat.

P 53	Motor No-Load Current	Factory Setting	0.4*P52
	Settings 00%FLA to 99%FLA		

- The rated current of the AC drive means 100%. Setting of this parameter affects the slip compensation. The setting value must be smaller than the motor rated current setting in P52. (this parameter displays the value of actual current.)

P 54	Torque Compensation	Factory Setting	00
	Settings 00 to 10		

- This parameter forces the AC drive to increase its voltage output during start-up in order to obtain a higher initial starting torque.

P 55	Slip Compensation	Factory Setting	00
	Settings 0.00 to 10.00		

- This parameter can be used to compensate motor slip. Although no linear, When the output current of the AC drive is greater than the motor no-load current (P53), the AC drive will adjust its output frequency according to this parameter.

P 56	Reserved	Factory Setting	--
P 57	Rated Current Display of the AC motor drive	Factory Setting	--
	Settings Read Only		

- P57 displays the rated current of the AC motor drive. By reading this parameter the user can check if the AC motor drive is correct.

P 58	Electronic Thermal Overload Relay Selection		Factory Setting	02
	Settings	00	Standard Motor (self cool motor)	
		01	Inverter Motor (auxiliary cool fan on motor)	
		02	Inactive	

- This function is used to limit the output power of the AC drive when powering a "self-cooled motor" at low speed.

P 59	Electronic Thermal Motor Overload	Factory Setting	60
	Settings 30 to 300sec		

- The parameter determines the time required to activate the I^2t electronic thermal motor overload protection. The graph below shows I^2t curves at 150% output power for 1 minute.

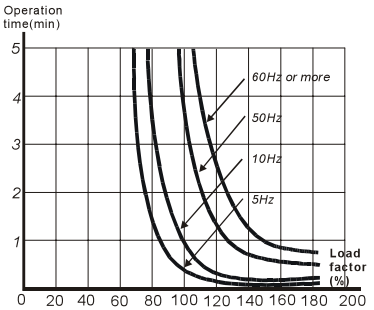


Fig.6-22 I^2t Protection action

P 60	Over-Torque Detection Mode		Factory Setting	00
	Settings	00	Over-Torque detection disabled.	
		01	Enabled during constant speed operation until the allowable time for detection (P62) elapses.	
		02	Enabled during constant speed operation and halted after detection.	
		03	Enabled during acceleration until the allowable time for detection (P62)elapses.	
		04	Enabled during acceleration and halted after detection.	

P 61	Over-Torque Detection Level		Factory Setting	150%
	Settings	30 to 200%		

- A setting of 100% is proportional to the Rated Output Current of the drive. This parameter sets the Over-Torque Detection level in 1% increments. (The AC drive rated current is equal to 100%.)

P 62	Over-Torque Detection Time		Factory Setting	0.1sec
	Settings	0.0 to 10.0sec		

- This is the duration for over-torque detection. When the output current is larger than the overtorque detection level (P61), an over-torque condition exists and the detection time (P62) is timed-out. Any of the multi-function output terminals set to indicate over-torque, will then close. (Please refer to P45 and P46)

P 63	Loss of ACI (4-20mA)		Factory Setting	00
	Settings	00	Decelerate to 0 Hz	
		01	Stop immediately and display "EF"	
		02	Continue operation by last frequency command	

P 64	User Defined Function for Display		Factory Setting	00
	Settings	00	Displays AC drive output frequency (Hz)	
		01	Display User-defined output Frequency (H*P65)	
		02	Output Voltage (E)	
		03	DC Bus Voltage(u)	
		04	PV (i)	
		05	Displays the value of the internal counter (c)	
		06	Displays the setting Frequency (F)	
		07	Displays the parameter setting (P)	
		08	Reserved	
		09	Output Current (A)	
		10	Display program operation (0. xxx), Fwd, or Rev	

- The parameter can be set to display the user-defined value. (where v = H x P65)

P 65	Coefficient K		Factory Setting	1.00
	Settings	0.01 to 160.0		

- The coefficient K determines the multiplying factor for the user-defin ed unit.
  The display value is calculated as follows:
  Display value = output frequency × K
- The display window is only capable of showing four digits, yet you could use P65 to create larger numbers. The display windows uses decimal points to signify numbers up to three digits as illustrated in next page:
  If it display "9999". the actual value is 9999.If it display "9999.". the actual value is the display value ×10=99990.If it display "999.9". the actual value is the display value ×100=999900.

P 66	Communication Frequency		Factory Setting	0.00
	Settings	0.00 to 400.0 Hz		

- This parameter defines the Master Frequency when the AC drive is controlled by the communication interface.

P 67	Skip Frequency 1	Factory Setting	0.00
P 68	Skip Frequency 2	Factory Setting	0.00
P 69	Skip Frequency 3	Factory Setting	0.00
	Settings	0.00 to 400.0 Hz	

- These three parameters determine the three Skip Frequencies that in conjunction with P70, Skip Frequency Band, will cause the AC drive to skip operating in each frequency band. Note: P67 > P68 > P69.

P 70	Skip Frequency Band	Factory Setting	0.00
	Settings	0.00 to 20.00 Hz	

- This parameter determines the frequency band for a given Skip Frequency. Half of the Skip Frequency Band is above the Skip Frequency and the other half is below. Programming this parameter to 0.1 disables all skip frequencies.

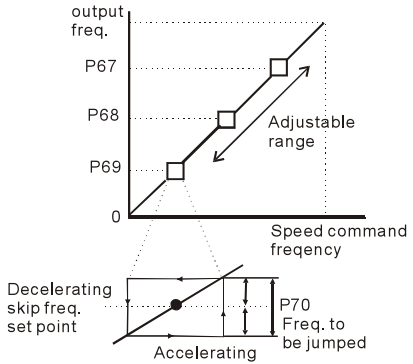


Fig.6-23 Skip frequency setting

P 71	PWM Carrier Frequency	Factory Setting	15
	Settings	01 to 15 (1KHz to 15KHz;vector control 1KHz~9KHz)	

Note: 1-9kHz in sensorless vector control mode

- The parameter defines the carrier frequency of the PWM (Pulse-Width Modulated) output.

Carrier Frequency	Acoustic Noise	Electromagnetic Noise, Leakage Current	Heat Dissipation	Interference
1KHz ↕ 15KHz	Significant ↕ Minimal	Minimal ↕ Significant	Minimal ↕ Significant	Minimal ↕ Significant

- From the above table, we see that the carrier frequency of PWM output has a significant influence on the electromagnetic noise, heat dissipation of the AC drive, and the acoustic noise to the motor.

P 72	Auto Restart Attempts After Fault	Factory Setting	00
	Settings	00 to 10	

- When this parameter is enabled (set different to zero), the AC Drive will restart/reset automatically up to 10 times after the occurrence of certain type of faults (over-current OC, over-voltage OV). If enabled, the AC drive will restart on "speed search", which begins at Master Frequency. Setting this parameter to 0 will disable this operation. To set the fault recovery time after a fault, please see base-block time for speed search (P34).

P 73	Present Fault Record		Factory Setting	00
P 74	Second Most Recent Fault Record		Factory Setting	00
P 75	Third Most Recent Fault Record		Factory Setting	00
	Settings	00	no fault occurred	
		01	Over-current (oc)	
		02	Over-voltage (ov)	
		03	Overheat (oH)	
		04	Overload (oL)	
		05	Overload 1 (oL1)	
		06	External Fault (EF)	
		07	CPU failure 1 (CF1)	
		08	CPU failure 3 (CF3)	
		09	Hardware Protection Failure (HPF)	
		10	Over-current during acceleration (OCA)	
		11	Over-current during deceleration (OCd)	
		12	Over-current during steady state operation (OCn)	
		13	Ground fault or fuse failure (GFF)	
		14	Low voltage (not record)	
		15	3 Phase Input Power Loss	
		16	CPU Failure (CF2)	
		17	External Base-Block (bb)	
		18	Overload 2 (oL2)	
		19	Auto Adjustable accel/decel failure (cFA)	
		20	Software protection code (codE)	

P 76	Parameter Lock and Configuration		Factory Setting	00
	Settings	00	All parameters can be set/read	
		01	All parameters are read-only	
		02-08	Reserved	
		09	Resets all parameters to 50Hz factory defaults	
		10	Resets all parameters to 60Hz factory defaults	

- This parameter allows the user to reset the drive to factory settings. Can set parameter to 01 or 08 to avoid person change the parameter setting by disoperation, when action abnormal by parameter fault or change. Can set the parameter to 09(factory setting) then adjust again.

TIP

- When P76 set to 08.key board locked. All parameter can't amend.
  Need unlock the keyboard if want amend parameter.
  Ways below;
  1. Outage of inverter till no display.
  2. Hold "ENTER" key then supply power. After 30 seconds and see P00 then let go.
  3. Set P76 parameter to 00.

P 77	Time for Auto Reset the Restart Times after Fault	Factory Setting	60.0
	Settings	0.1 to 6000.0 sec	

- If there is no fault in the period of this setting, it will reset the rest restart times that used after fault to the setting of restart times.

P 78	PLC Operation Mode		Factory Setting	00
	Settings	00	Disable PLC operation	
		01	Execute one program cycle	
		02	Continuously execute program cycles	
		03	Execute one program cycle step by step (separated by "STOP")	
		04	Continuously execute program cycles step by step (separated by "STOP")	

- The parameter application can used to control the running process of small machine. Food Processing Machine, washing equipment. And can replace the control line of traditional relay .switch and timer There are lots of setting while use this function. And can't make any mistake. Please see below sample carefully:

Example 1: Execute one cycle of the PLC program. Its relative parameter settings are:

- P17~P23: 1st to 7th step speed (sets the frequency for each step speed)
- P38~P42: Multi-function input terminals (program one multi-function terminal for PLC auto operation (16)).
- P45~P46: Multi-Function Output Terminals: program a Multi-Function Output Terminal for PLC operation indication (09), one cycle in PLC auto mode (10) or PLC operation fulfillment attainment (11).
- P78: PLC mode.
- P79: Direction of operation for Master Frequency and 1st to 7th step speeds.
- P81 to P87: operation time setting of Master Frequency and 1st to 7th step speeds.

Note: The following diagram shows one complete PLC cycle. To restart the cycle, turn the PLC Program input off and then back on.

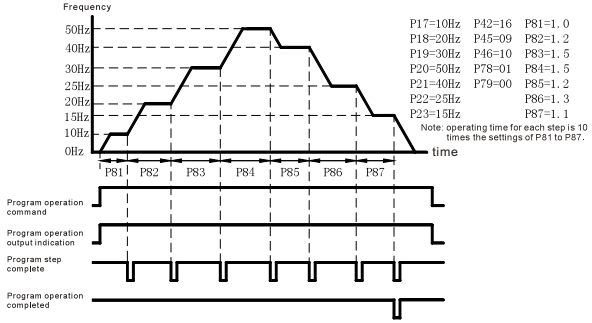


Fig. 6-24 Execute one cycle through the PLC program

Example 2: Continuously executes program cycles:
The diagram below shows the PLC program stepping through each speed and then automatically starting again. To stop the PLC program, either pause or stop the program.

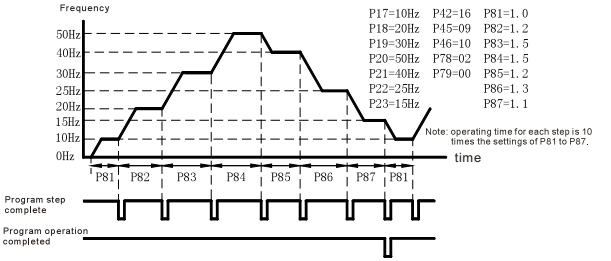


Fig. 6-25 Continuously executes program cycles

Example 3: Execute one cycle step by step:
This example shows how the PLC function can perform one cycle at a time, within a complete cycle. Each step will use the accel/decel times in P10 to P13. It should be noted that the time interval for each step may be shorter than expected due to the time required for acceleration and deceleration.

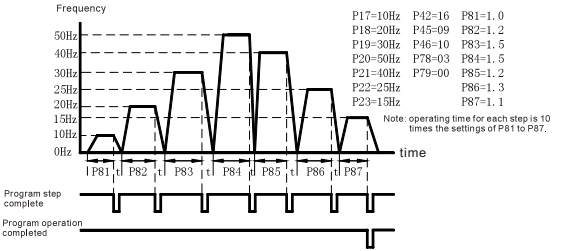


Fig. 6-26 Execute one cycle step by step

Example 4: Continuously executes program cycles step by step:
In this explanation, the PLC program runs continuously step by step. Also shown are examples of steps in the reserve direction.

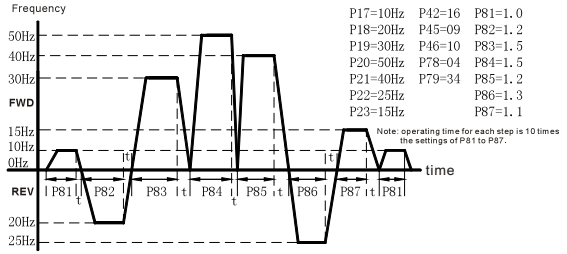


Fig. 6-27 Continuously executes program cycles step by step

Example 5: Execute one cycle through the PLC program:
In this example, the PLC program runs continuously. It should be noted that the time interval for each step may be shorter than expected due to the time required for acceleration and deceleration.

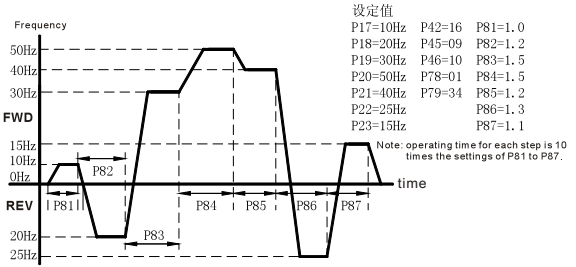


Fig. 6-28 Execute one cycle through the PLC program

TIP

- Automatic operation instruction and point start operation instruction is a single instruction, and no need operation instruction coordinate. It will start work when received automatic operation instruction,
- While working, don't accept any input instruction. Inverter will execute each step except auto stop, bb or fault. Don't set two jump frequency range overlap or nested set.

P 79	PLC Forward/Reverse Motion	Factory Setting	00
	Settings	00 to 127	

- This parameter determines the direction of motion for the multi-speed P17 to P23 and Master Frequency. The original direction of Master Frequency will become invalid.

Note: A 7-bit binary number is used to program the forward/reverse motion for each of the 8 speed steps (including Master Frequency). The binary notation for the 7-bit number must be translated into decimal notation and then entered in P79.

Example:

Bit	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	6	5	4	3	2	1	0
	0	1	0	0	0	1	0

0 = Forward 1 = Reverse

- Forward motion of P17 multi-speed1
- Reverse motion of P18 multi-speed2
- Forward motion of P19 multi-speed3
- Forward motion of P20 multi-speed4
- Forward motion of P21 multi-speed5
- Reverse motion of P22 multi-speed6
- Forward motion of P23 multi-speed7

$0x2^6+1x2^5+0x2^4+0x2^3+0x2^2+1x2^1+0x2^0$

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

P79=34

P 80	Reserve	Factory Setting	--
	Settings none		

P 81	Time Duration of 1st Step Speed	Factory Setting	00
P 82	Time Duration of 2nd Step Speed	Factory Setting	00
P 83	Time Duration of 3rd Step Speed	Factory Setting	00
P 84	Time Duration of 4th Step Speed	Factory Setting	00
P 85	Time Duration of 5th Step Speed	Factory Setting	00
P 86	Time Duration of 6th Step Speed	Factory Setting	00
P 87	Time Duration of 7th Step Speed	Factory Setting	00
	Settings 00 to 9999 second		

- P81 to P87 input the duration of each Multi-step speed operation defined by P17 to P23.

TIP

- when the parameter set to 00 (0 sec), the corresponding step operation will be skipped. Although supply 7 duration .User can reduce duration to 5 or 3 when necessary, Just set the no need duration parameter to 00(0 sec).

P 88	Communication Address	Factory Setting	01
	Settings 01 to 254		

- This parameter sets the AC drive address identification when using the RS-485 serial port for communication.

P 89	Transmission Speed (Baud rate)		Factory Setting	01
	Settings	00	4800 bps	
		01	9600 bps	
		02	19200 bps	
		03	38400 bps	

- Set and amend the inverter inside parameter and control inverter running, detect inverter status. This parameter sets the transmission speed of computer and inverter.

- This parameter sets the transmission speed for communication on the RS485 serial port.

P 90	Transmission Fault Treatment/Stop mode selection		Factory Setting	03
	Settings	00	Warn and Continue Operating	
		01	Warn and RAMP to Stop	
		02	Warn and COAST to Stop	
		03	Keep Operation without Warning	

P 91	Time Out Detection	Factory Setting	0.0
	Settings 0.1 to 120.0 sec		
	0.0 disable		

- Start timing when received the first valid data. If overtime still hasn't received the second data .it will show "CE10" .can 'RESET' or External terminals reset.

P 92	Communication Protocol		Factory Setting	00
	Settings	00	Modbus ASCII mode, <7,N,2>	
		01	Modbus ASCII mode, <7,E,1>	
		02	Modbus ASCII mode, <7,O,1>	
		03	Modbus RTU mode, <8,N,2>	
		04	Modbus RTU mode, <8,E,1>	
		05	Modbus RTU mode, <8,O,1>	

- Each AC drive has a pre-assigned communication address specified by P88. The master controller communicates with each AC drive according to its particular address. Detail way please see appendix.

P 93	Accel 1 to Accel 2 Frequency Transition	Factory Setting	0.00
P 94	Decel 1 to Decel 2 Frequency Transition	Factory Setting	0.00
	Settings 0.0: disable		
	0.1 to 400.0 Hz		

- These functions are used to change acceleration or deceleration depending on attained frequency and not by closing contacts on the external terminals. The priority of this parameter is higher than the time of Accel/Decel 1 and Accel/Decel 2.

P 95	Auto energy-saving		Factory Setting	00
	Settings	01	Disable auto energy-saving operation	
		02	Enable auto energy-saving operation	

- When this function is enabled, the AC drive operates at full voltage during speed changes. At the constant speed periods, drive calculates the optimal output voltage value for the load and may get it reduced up to 30% below the Maximum Output Voltage.

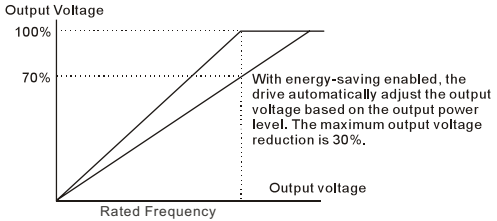


Fig. 6-29 Energy saving run output

P 96	Count Down Completion		Factory Setting	00
	Settings	00 to 9999		

- This parameter defines the top count value for the ZVF200-M internal counter. Please also see P45 and P46 (setting 13). Counting is incremented when the Multi-Function Input Terminal X1 or X2, makes a low-to-high transition. Upon completion of the count, either Multi-Function Output Terminal (XO1) or the Multi-Function Relay Contact (RA, RB) will close.

P 97	Preset Count Down Completion		Factory Setting	00
	Settings	00 to 9999		

- When count value start at c01 and reached the parameter set. The selected multi function output terminal will close. Reliminary count could be used to initiate an external event before the terminal count is reached. Before stop can choose this as output signal let the inverter low move till stop. See Fig. 6-30.

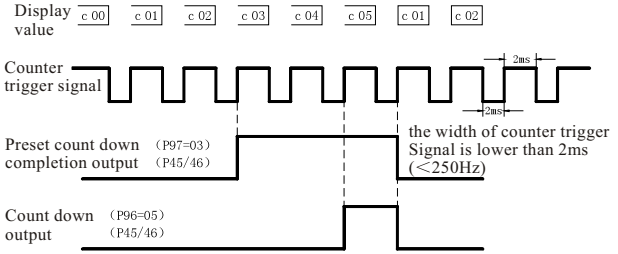


Fig. 6-30 Count Down Completion

P 98	Total Time Count from Power On (Days)		Factory Setting	--
	Settings	00 to 65535 days		

P 99	Total Time Count from Power On (Minutes)		Factory Setting	--
	Settings	00 to 1440 minutes		

- This parameter shows the inverter Cumulative time. It will not return to zero while Restore production value.

P 100	Software Version	Factory Setting	--

- This parameter shows the software version for the AC motor drive.

P 101	Auto Acceleration/Deceleration		Factory Setting	00
	Settings	00	Linear acceleration/deceleration	
		01	Auto acceleration, linear deceleration	
		02	Linear acceleration, auto deceleration	
		03	Auto acceleration/deceleration	
		04	Linear Accel/Decel Stall Prevention during Deceleration	

- When this parameter is set to 03, the AC drive will accel/decel in the fastest and smoothest possible way by automatically adjusting the accel /decel time.
- This parameter provides five modes to choose:

00 Linear acceleration and deceleration (operation by P10, P11, or P12, P13 acceleration/deceleration time)

01 Automatic acceleration, linear deceleration (Operation by automatic acceleration, P11 or P13 deceleration time).

02 Linear acceleration and automatic deceleration (Operation by automatic deceleration time, P10 or P12 acceleration time).

03 Automatic acceleration, deceleration (Operation by AC drive auto adjustable control)

04 If this parameter is set to 04, Accel/Decel time will be equal to or more than parameter P10~P13.

- This parameter should not be used when a brake unit is installed.

P 102	Auto Voltage Regulation (AVR)		Factory Setting	00
	Settings	00	AVR function enabled	
		01	AVR function disabled	
		02	AVR function disabled when stop	
		03	AVR function disabled for deceleration	

- Usually Motor rated voltage are AC220V/380V.50HZ/60HZ, 220V inverter input voltage AC180V-264V, 50HZ/60HZ.So if inverter don't have Auto Voltage Regulation function, if inverter power is AC260V, the voltage to motor also will be AC260V, the motor is running exceed

12~20% Auto Voltage Regulation% rated voltage. Motor temperature will rise, insulating ability damage. Torque output unstable. The life-span of the motor will accelerate shorten and cause loss.

- When input voltage exceed motor's rated voltage. The inverter's AVR function can automatic stable the input voltage. For example: V/F curve set as AC220V/50HZ. When the input power is between AV220V-264V. the voltages will auto stable to AC220V/50HZ then supply to motor, When input voltage between AC180V-210V, the motor voltage will proportional to input power
- When we found motor deceleration stop, close AVR will short deceleration time. With auto Acceleration/Deceleration function. The deceleration of motor will be much faster

P 103	Auto Tune Motor parameters		Factory Setting	00
	Settings	00	Disable	
		01	Auto tune for R1	
		02	Auto tune for R1 + No Load testing	

- For Auto Tune, set P103 to 01 or 02 and press the RUN key. When it is set to 02, motor should have no load.

P 104	R1 Value		Factory Setting	00
	Settings	00 to 65535m Ω		

- As an option to Auto Tune, this parameter inputs the motor resistance.

P 105	Control mode		Factory Setting	00
	Settings	00	V/F Control	
		01	Sensor-less Vector Control	

P 106	Rated Slip		Factory Setting	3.0
	Settings	0.00 to 10.00 Hz		

● Example of Slip calculation:
The rated speed of 4 poles/3φ/ 60Hz/ 220V on the nameplate is 1710 RPM. The rated slip is then: 60-(1710/(120/P))=3Hz. (being P the number of poles)

P 107	Vector Voltage Filter		Factory Setting	10
	Settings	5 to 9999		

P 108	Vector Slip Compensation Filter		Factory Setting	50
	Settings	25 to 9999		

● This parameter sets the low-pass filter in vector control.
Example: P107 = 10 × 2ms =20ms, P108 = 50 × 2 ms =100ms.

P 109	Selection for Zero Speed Control			Factory Setting	00
	Settings	00	No output		
		01	Control by DC voltage		

● This parameter is used to select the control method at zero speed. If set to 01, the voltage in P110 is used for holding torque.

P 110	Voltage of Zero Speed Control		Factory Setting	5.0
	Settings	0.0 to 20.0 % of Max. output voltage (P05)		

● This parameter should be used in conjunction with P109.
Example: if P05 = 100 and this parameter is set to 20.0, the level of output voltage is 100×20.0% = 20.

P 111	Deceleration S Curve		Factory Setting	00
	Settings	00 to 07		

● When this parameter is set differently to zero, it selects a deceleration S-curve and overrides P14. Otherwise, P14 sets the deceleration S-curve.

Note: From the diagram shown below, the original setting accel/decel time will be for reference when the function of the S-curve is enabled. The actual accel/decel time will be determined based on the S-curve selected (1 to 7).

P 112	External Terminal Scanning Time		Factory Setting	01
	Settings	01 to 20		

● This function screens the signal on I/O terminals for CPU malfunctions due to external transients. A setting of 02, makes the scanning time to be 2 × 2 = 4 msec. Set P77 to 02 before changing settings in P112.

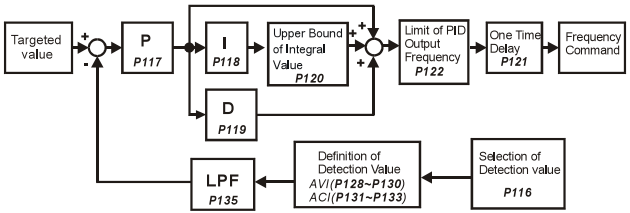
P 113	Restart Method after Fault (oc, ov, BB)			Factory Setting	01
	Settings	00	None speed search		
		01	Continue operation after fault speed search from speed reference		
		02	Continue operation after fault speed search from Minimum speed		

● This parameter is used to select the restart method after certain faults. eg: over current over voltage and BB.

P 114	Cooling Fan Control			Factory Setting	02
	Settings	00	Fan Off when the drive stop after 1 Min		
		01	AC Drive Runs and Fan On, AC Drive Stops and Fan Off		
		02	Always Run		
		03	Reserved		

● This parameter is used to select the fan's working method.

P 115	PID Set Point Selection			Factory Setting	00
	Settings	00	Disable		
		01	Keypad (based on Pr.00 setting)		
		02	AVI (external 0-10V)		
		03	ACI (external 4-20mA)		
		04	PID set point (P125)		



P 116	PID Set Point Selection		Factory Setting	00
	Settings	00	Input positive PID feedback, PV from AVI (0 to 10V)	
		01	Input negative PID feedback, PV from AVI (0 to 10V)	
		02	Input positive PID feedback, PV from ACI (4 to 20mA)	
		03	Input negative PID feedback, PV from ACI (4 to 20mA)	

- Select an input terminal to be the PID feedback. Please verify the PID feedback position is different from the Frequency Set Point position. Negative feedback = positive targeted value - detective value. Positive feedback = negative targeted value + detective value.

P 117	Proportional Gain (P)	Factory Setting	1.0
	Settings	0.1 to 10.0	

- This parameter determines the feedback loop Gain. If the gain is large, the response will be strong and immediate (If the gain is too large, vibration may occur). If the gain is small, the response will be weak and slow. When I=0.0 and D=0.0, it is only used for proportional control.

P 118	Integral Time (I)	Factory Setting	1.00
	Settings	0.01 to 100.00 sec	
		0.00 disable	

- This parameter determines the speed of response for the PID feedback

loop. If the integral time is long, the response will be slow. If the integral time is short, the response will be quick. Be careful not to set (I) too small, since a rapid response may cause oscillation in the PID loop.

P 119	Differential Time (D)	Factory Setting	0.00
	Settings	0.00 to 1.00 sec	

- This parameter determines the damping effect for the PID feedback loop. If the differential time is long, any oscillation will quickly subside. If the differential time is short, the oscillation will subside slowly.

P 120	Integration's Upper Bound Frequency	Factory Setting	100%
	Settings	00 to 100 %	

- This parameter determines the integration's upper frequency limit while operating in the PID feedback loop. (Limit = P03 × P120). During a fast Integration response, it is possible for the frequency to surpass a reasonable point. This parameter will help limit this frequency spike.

P 121	One-Time Delay	Factory Setting	0.0
	Settings	0.0 disable	
		0.0 ~2.5s	

- The PID delay output can show down system shock.
- PI Control: When controlled by P action only, deviations cannot be eliminated entirely. To eliminate residual deviations, the P + I control is generally utilized. If PI is used, it could eliminate the deviation caused by set-point changes and external interferences. However, if the I-action is excessively powerful, it will delay the response to the variation. The P-action could solely be used on a loading system that possesses integral components.
- PD Control: when a deviation occurs, the system immediately generates some operational load that is greater than the single load generated by the D-action in order to restrain the increment of the deviation. If the

deviation is small, the effectiveness of the P-action decreases as well. In some cases, control systems include integral component loads, which are controlled by the P action only, and sometimes, if the integral component is functioning, the whole system will be vibrating. In such cases, a PD control could be used to lower the Paction's vibration and to stabilize the system. In other words, this control is good for use if the loads have no braking functions over the process.

- PID Control: Uses the I-action to eliminate the deviation and the D-action to restrain the vibration, and combine with the P action to construct the PID control. The PID control method normally determines a control process with no deviations, high accuracy and very stable.

P 122	PID Frequency Output Command limit		Factory Setting	100
	Settings	00 to 110 %		

- This parameter sets a limit of the PID Command frequency. If this parameter is set to 20%, then the maximum output frequency for the PID operation will be (20%×P03).

P 123	Feedback Signal Detection Time		Factory Setting	60.0
	Settings	0.0:disable		
		0.1～3600s		

- This parameter defines the detection time for the loss of a feedback analog signal. The drive will follow the operating procedure programmed in P124 if the feedback signal is lost for more than the time set in P123.

P 124	Feedback Signal Fault Treatment			Factory Setting	00
	Settings	00	Warning and RAMP to stop		
		01	Warning and keep operating		

- This parameter selects the operation of the drive upon a loss of the PID feedback signal.

P 125	Source of PID Set point		Factory Setting	0.00
	Settings	0.00 to 400.0Hz		

- This parameter is used in conjunction with P115 (04) to input a set point in Hz.

P 126	PID Offset Level		Factory Setting	10.0
	Settings	1.0 to 50.0 %		

- This parameter is used to set the offset between set point and feedback.

P 127	Detection Time of PID Offset		Factory Setting	5.0
	Settings	0.1 to 300.0 sec		

- This parameter is used to set the detection time of PID offset.

P 128	Minimum Reference Value		Factory Setting	0.0
	Settings	0.0 to 10.0 V		

- This parameter is used to set the AVI input voltage that corresponds to minimum frequency.

P 129	Maximum Reference Value		Factory Setting	10.0
	Settings	0.0 to 10.0 V		

- This parameter is used to set the AVI input voltage that corresponds to maximum frequency.

P 130	Invert Reference Signal AVI (0-10V)			Factory Setting	00
	Settings	00	Not Inverted		
		01	Inverted		

- If this parameter is set to 01, the reference signal is inverted: 0V corresponds to 50Hz in P128 and 10V corresponds to 0Hz in P129.

P 131	Minimum Reference Value (0-20mA)	Factory Setting	4.0
	Settings 0.0 to 20.0mA		

- This parameter is used to set the ACI input frequency that corresponds to minimum frequency.

P 132	Maximum Reference Value (0-20mA)	Factory Setting	20.0
	Settings 0.0 to 20.0mA		

- This parameter is used to set the ACI input frequency that corresponds to maximum frequency.

P 133	Inverts Reference Signal (0-20mA)		Factory Setting	00
	Settings	00	Not Inverted	
		01	Inverted	

- If this parameter is set to 01, 4mA corresponds to 0Hz in P132, and 0mA corresponds to 50Hz in P131.
- The main purpose for P128-P133 is to allow changes in the output frequency when setting the analog frequency or PID feedback control per the feedback sensor. For example, if the feedback sensor inputs 4mA-20mA but the output frequency from drive that user needs is 5mA -18mA, then user could set P131 to 5mA and P132 to 18mA.

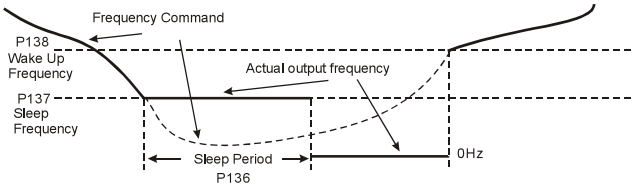
P 134	Analog Input Delay Filter for Set Point	Factory Setting	50
	Settings 00 to 9999		
P 135	Analog Input Delay Filter for Feedback Signal	Factory Setting	5
	Settings 00 to 9999		

- These two parameters are used to set the analog input delay filter in set point or feedback signal.

P 136	Sleep Period	Factory Setting	0.0
	Settings 0.0 to 6550.0 sec		

P 137	Sleep Frequency	Factory Setting	0.00
	Settings 0.00 to 400.0 Hz		
P 138	Wake Up Frequency	Factory Setting	0.00
	Settings 0.00 to 400.0 Hz		

- These parameters determine the sleep functions of the AC drive. If the command frequency falls below the sleep frequency, for the specified time in P136, then drive output is turned off until the command frequency rises above P138. Please see the below diagram.



P 139	Treatment for Counter Attained		Factory Setting	00
	Settings	00	Continue Operation	
		01	Stop Immediately and display E.F.	

- This parameter sets the procedure for the AC drive to follow once the internal counter attains the setting value in P96.

P 140	External Up/Down Selection		Factory Setting	00
	Settings	00	Fixed Mode (keypad)	
		01	By Accel or Decel Time	
		02	Reserved	

- This parameter is used to change the Master Frequency externally with the Multifuction Input Terminals. If any two parameters in the group P39-P42 are set to 14 and 15, and P140 is set to 01, the up/down frequency operation is initiated as the contact closes and according to the time of acceleration/deceleration.

P 141	Save Frequency Set Point		Factory Setting	01
	Settings	00	Not Save	
		01	Save	

- This parameter is used to save the frequency setting before powering off.

P 142	Second Source of Frequency Command		Factory Setting	00
	Settings	00	Keypad Up/Down	
		01	AVI (0-10V)	
		02	ACI (4-20mA)	
		03	RS485	
		04	Keypad Potentiometer	

- This parameter changes the source for frequency command by using any Multifunction Input (P39-P42, setting= 28).

P 143	Software Braking Level		Factory setting	380/760
220V series 380V series	Settings	370 to 450 Vdc		
		450 to 900 Vdc		

- This parameter sets the level for the dynamic braking to operate. The setting value must be higher than the steady-state DC BUS Voltage to prevent the braking transistor from having a 100% duty. At 100% duty the transistor and resistor will most likely fail.

P 144	Accumulative Motor Operation Day		Factory Setting	--
	Settings	00-65535 Days		
P 145	Accumulative Motor Operation Time (Min.)		Factory Setting	--
	Settings	00-1440 Minutes		

- These parameters display accumulative time of motor operation. They will not reset to zero due to parameter reset to factory and will not re-calculate if the 65535 days limit is exceeded.

P 146	Line Start Lockout		Factory Setting	00
	Settings	00	Disable	
		01	Enable	

- When Line Start Lockout is disabled (also known as Auto-Start), the drive will start when powered-up with run commands applied. To start in Line Start Lockout mode, the AC drive must see the run command go from stop to run after power up. When enabled, the AC drive will not start when powered up if run commands were applied.

P 147	Decimal Number of Accel/ Decel Time		Factory Setting	00
	Settings	00	One Decimal	
		01	Two Decimals	

- It sets the number of decimals in the accel/decel time. It can be used for Acceleration / Deceleration Time 1, Acceleration/ Deceleration Time 2 and JOG Acceleration / Deceleration Time.

P 148	Number of Motor Poles		Factory Setting	04
	Settings	02 to 20		
P 149	Gear Ratio for Simple Index Function		Factory Setting	200
	Settings	04 to 1000		
P 150	Index Angle for Simple Index Function		Factory Setting	180.0
	Settings	00.0 to 360.0		
P 151	Deceleration Time for Simple Index Function		Factory Setting	0.00
	Settings	0.00 Disable		
		0.01 to 100.00 sec		

- This parameter should be used with P 39-P42 (setting 31).

Example:

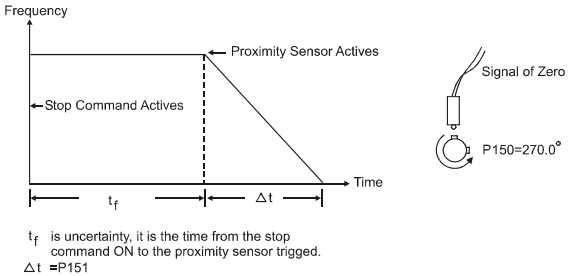


Fig.6-33 Simple Index Function Diagram

P 152	Skip Frequency	Factory Setting	0.00
	Settings 0.00 to 400.00Hz		
P 153	Bias Frequency Width	Factory Setting	0.00
	Settings 0.00 to 400.00Hz		

- Frequency of △ top point Fup= master frequency F+ P152 +P153.
- Frequency of △ down point Fdown= master frequency F -P152- P153.

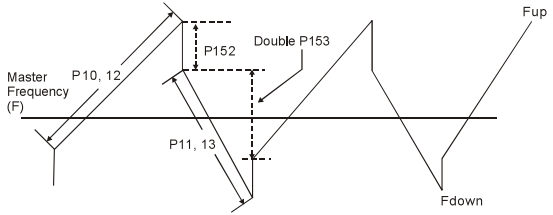


Fig.6-34 Bias Frequency Action Diagram

P 154	Reserved		Factory Setting	--
P 155	Compensation Coefficient for Motor Instability		Factory Setting	0.0
	Settings	00	Disable	
		01	0.1 to 5.0s	

- This parameter is used to improve a condition of unstable current in any specific area. For higher frequencies, you can adjust this parameter to 0.0, and increase the setting value in P155 for 30HP and above (a setting of 2.0 is recommended).

P 156	Communication Response Delay Time		Factory Setting	0.00
	Settings 0 to 200 (×500 μ s)			
P 157	Communication Mode Selection		Factory Setting	01
	Settings	00	Reserved	
		01	Modbus	

- This parameter is to select the communication mode, 0 is the existed Delta ASCII communication mode, whereas 1 is to select MODBUS mode.

Chapter 7
Common Fault & Anomalies and Solutions

7.1 Fault Code Information

7.1.1 Common Problems and Solutions

Fault Name	Fault Descriptions	Corrective Actions
oc	The AC drive detects an abnormal increase in current.	1. Check whether the motors horsepower corresponds to the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the Acceleration time (P10,P12). 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after short-circuit being removed, it should be sent back to manufacturer.
ou	The AC drive detects that the DC bus voltage has exceeded its maximum allowable value.	1. Check whether the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the decel time or add an optional brake resistor. 4. Check whether the required braking power is within the specified limits.
oH	The AC drive temperature sensor detects excessive heat.	1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed.

Fault Name	Fault Descriptions	Corrective Actions
oH	The AC drive temperature sensor detects excessive heat.	3. Remove any foreign objects on the heat sinks and check for possible dirty heat sink fins. 4. Provide enough spacing for adequate ventilation.
Lu	The AC drive detects that the DC bus voltage has fallen below its minimum value.	Check whether the input voltage falls within the rated AC drive's input voltage.
oL	The AC drive detects excessive drive output current. Note: The AC drive can withstand up to 150% of the rated current for a maximum of 60 seconds.	1. Check whether the motor is overloaded. 2. Reduce torque compensation setting as set in P54. 3. Increase the AC drive's output capacity.
oL1	Internal electronic overload trip	1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Increase motor capacity. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current P52.
oL2	Motor overload. Check the parameter settings (P60 to P62)	1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting.
bb	When external terminal (X3-X6) set this function, Inverter output is turn off	Disable this connection and the AC drive will begin to work again. it delete the singal source,"bb"will remove soon.

Fault Name	Fault Descriptions	Corrective Actions
ocA	Over-current during acceleration: 1. Short-circuit at motor output. 2. Torque boost too high. 3. Acceleration time too short. 4. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Decrease the torque boost setting in P54. 3. Increase the acceleration time. 4. Replace with the AC drive with one that has a higher output capacity (next HP size).
ocd	Over-current during deceleration: 1. Short-circuit at motor output. 2. Deceleration time too short. 3. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Increase the deceleration time. 3. Replace with the AC drive with one that has a higher output capacity (next HP size).
ocn	Over-current during steady state operation: 1. Short-circuit at motor output. 2. Sudden increase in motor loading. 3. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Check for possible motor stall. 3. Replace with the AC drive with one that has a higher output capacity (next HP size).
cF1	Internal memory IC can not be programmed.	Check whether the input voltage falls within the rated AC drive input voltage then Switch the AC drive back on.
cF2	Internal memory IC can not be read.	1. Check the connections between the main control board and the power board. 2. Reset drive to factory defaults.
EF	The external terminal EF-GND goes from OFF to ON.	When external terminal EF-GND is closed, the output will be turned off (under N.O. E.F.).
cFA	Auto accel/decel failure	Don't use the function of auto acceleration/deceleration.

Fault Name	Fault Descriptions	Corrective Actions
GFF	Ground fault : The AC drive output is abnormal. When the output terminal is grounded (short circuit current is 50% more than the AC drive rated current), the AC drive power module may be damaged. The short circuit protection is provided for AC drive protection, not user protection.	Ground fault : 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation at the output line.
cE1	Communication Error Please refer to P92.	1. Check the connection between the AC drive and computer for loose wires. 2. Check if the communication protocol is properly set.
bb	External Base Block. AC drive output is turned off.	1. When the external input terminal (baseblock) is active, the AC drive output will be turned off. 2. Disable this connection and the AC drive will begin to work again.
HPF	OC hardware error	Return to the factory.
HPF.	CC (current clamp)	
HP.F	OV hardware error	
HP.F.	GFF hardware error	
cF3	OV or LV	
cF3.	Current sensor error	
cF.3	U-phase error	Return to the factory.
cF.3.	W-phase error	

Fault Name	Fault Descriptions	Corrective Actions
PHL	Phase Loss	Check input phase wiring for loose contacts.
codE	Software protection failure	Return to the factory.
FbE	PID feedback signal error	1. Check parameter settings (P116) and AVI/ACI wiring. 2. Check for possible fault between system response time and the PID feedback signal detection time (P123)

7.2 Anomalies and Solutions

Anomalies	Possible reason	Solutions
No display when the power is ON	1.Power grid voltage below 2.DC accessory power supply 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.

Anomalies	Possible reason	Solutions
Motor reverses	Error phase sequence of motor wiring.	Swap random two phases of the output terminals U, V and W.
Motor acceleration /deceleration fails	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 replacean inverter with higher power level.
Motor's speed fluctuation 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

Target of Inspection	Check Content	Inspection cycle	Inspection Method	Criteria	Measuring Instrument
Operating ambient	● Ambient ● temperature Humidity, dust, corrosive gas, oil mist and etc.	Daily	● Thermometer; test; ● Nose Inspection ● Visual Inspection	● ambient temperature between -10 to 40 ℃ no-condensing; ● Humidity between 20 to 90% no dew or special odo	● Thermometer ● Hygrometer
Inverter	● Vibration ● Heat ● Noise	Daily	● Touch the housing; ● Hearing check	● Stable vibration ● Normal temperature ● No abnormal noise	
Motor	● Vibration ● Heat ● Noise	Daily	● Touch the housing; ● Hearing check	● Stable vibration ● Normal temperature ● No abnormal noise	

Target of Inspection	Check Content	Inspection cycle	Inspection Method	Criteria	Measuring Instrument
Electric Parameter	● Input voltage ● Output voltage ● Output current	Daily	● Meter test	● Each electric Parameter is within the rated value.	● Moving-iron voltmeter; ● Rectifier voltmeter; ● Clamp meter

WARNING

- Make sure that only professional technician will perform maintenance, inspection and parts replacement.
- Wait at least 10 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

Target or Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criterias
Main Circuit	Overall	● Check if there is any loose connector or terminal. ● Check if there is any device burnt.	Regular	Visual	● No loose connector or loose terminal. ● No burnt device
	● Main power Module	● Check if it is damaged or not.	Regular	Visual	● No sign of damage..
	Filter capacitor	● Check if there is any leakage. ● Check if there is any expansion	Regular	Visual	● No leakage; ● No inflation.
	Relay	● Check if there is any abnormal sound of actuation. ● Check if dust has been cleaned.	Regular	Visual hearing check	● Normal sound; ● Clean.
Main Circuit	Resistor	● Check if there is any big crack. ● Check if the color is abnormal.	Regular	Visual	● No crack. ● Normal color.

Target or Inspection	Inspection Items	Contents of Inspection	Inspection Cycle	Inspection Method	Criterias
Main Circuit	Fan	● Check if there is any abnormal noise or vibration.	Regular	Visual hearing check	● 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	Nose or visual inspection	● No odor and discoloring; ● No crack, smooth surface.
Keyboard	LED	● Check if the LED display is normal.	Regular	Visual	● Normal and clear
	Connecting cable	● 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 duri ng 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℃ rise in temperature may lead to reduction of capacitor's service life by half(as shown in Fig.8-1).if there is any electrolytic leakage of safety valve emission. Just replace it at once, the standard replacement age for electrolytic capacitor is 4~5 years

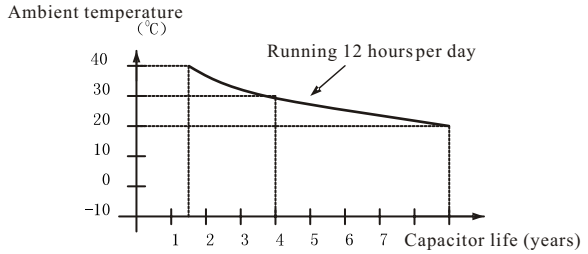


Fig. 8-1 Capacitor Life Curve

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

- Ambient Temperature: 30℃ 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 time:

CAUTION

- DO not keep the inverter in a place with high temperature, humidity, heavy dust, and metal shavings, corrosive gas and vibration, and ensure 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 a year and the recharging period should be at least 5 hours.
- DO raise the voltage gradually by using a voltage regular or 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.

Chapter 9
Outline & Mounting Dimension

9.1 Inverter Outline Dimensions& Mounting Dimensions

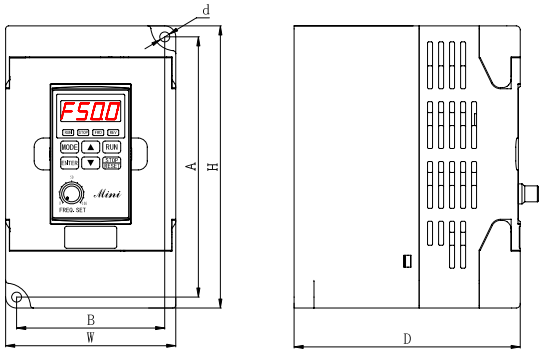


Fig.9-1 Inverter Model Outline Dimensional Drawings

Inverter Models	Power (KW)	SIZE(MM)						Figure	Gross Weight
		H	W	A	B	D	d		
ZVF200-M0004T2/S2	0.4	141.5	85	130.5	74	113	Φ5	Fig.9-1	
ZVF200-M0007T2/S2	0.75								
ZVF200-M0015T2/S2	1.5	151	100	140	89.5	116.5	Φ5	Fig.9-1	
ZVF200-M0022T2/S2	2.2								
ZVF200-M0007T4	0.75								
ZVF200-M0015T4	1.5								
ZVF200-M0022T4	2.2								

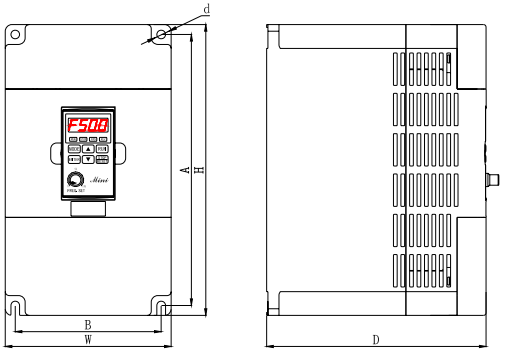


Fig.9-2 Inverter Model Outline Dimensional Drawings

Inverter Models	Power (KW)	SIZE(MM)						Figure	Gross Weight
		H	W	A	B	D	d		
ZVF200-M0037T4/T2	3.7	220	125	205	110	166.5	Φ6.5	Fig.9-2	
ZVF200-M0055T4/T2	5.5								
ZVF200-M0075T4	7.5								

9.2 Operation Panel Outline Dimension and Mounting Hole Dimension

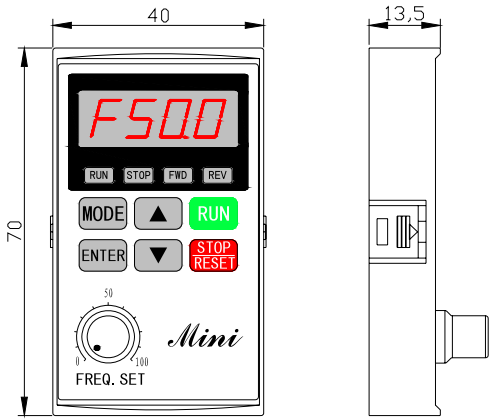


Fig.9-3 ZR06 Operation Panel Dimension

TIP

- 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 time 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 1 Optional Parts

All the following optional parts can be ordered 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.

Appendix 1-1 Recommended Brake Assembly Matching Specifications

Inverter		Braking unit		Braking resistor		
voltage	Motor(kw)	Model	quantity	Recommended Resistance value	Resistor specification	Quantity
220V	0.4	Built-in		80W200Ω	80W200Ω	1
	0.75	Built-in		80W200Ω	80W200Ω	1
	1.5	Built-in		160W100Ω	160W100Ω	1
	2.2	Built-in		300W70Ω	300W70Ω	1
	3.7	Built-in		400W40Ω	400W40Ω	1
	5.5	Built-in		500W30Ω	500W30Ω	1
380V	0.75	Built-in		80W750Ω	80W750Ω	1
	1.5	Built-in		160W400Ω	160W400Ω	1
	2.2	Built-in		300W250Ω	300W250Ω	1
	3.7	Built-in		400W150Ω	400W150Ω	1
	5.5	Built-in		600W150Ω	600W150Ω	1
	7.5	Built-in		800W75Ω	800W75Ω	1


TIP

- This series product have built-in braking. Can connect external braking resistor.
- When install braking resistor. please consider the safety of ambient environment.

2.Remote-operated adapter and extended cable

There are two selections available for remote operation on the inverter ZVF200 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. Installation Procedure Proceed in accordance with the methods described in Clause 3.2.2 in this manual.

3. Serial Communication (COM)

The standard machine type of the inverter ZVF200-M series does have RS232 and RS485 communication function. 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 ZVF200-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 centre of this company or its agents if it is needed.

Appendix 2: EMI Prevention

Table 1:Inverter system EMI Prevention:

The electromagnetic environment is very complicated in industrial occasions. Besides, the inverter's working principle also decides that EMI exists in the inverter itself. So it is very important to solve EMC problems effectively to ensure reliable running of the system in such a comprehensive condition. In this chapter, we give a research on EMC and provide corresponding solutions to EMC, in hope of being helpful to you to solve practical problems.

(1) EMI Types and propagation mode

Type	Propagation mode
Conducted interference A	①.Common-base impedance coupling ②.Common source impedance coupling
Radiated interference B	①.Near field coupling ②.Far field coupling
Inductive interference C	①.Electric coupling ②.Magnetic field induction

(2) Inverter System EMC Solutions

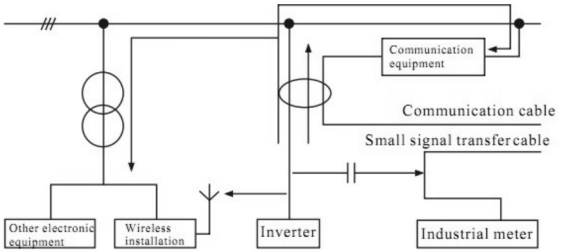
Power supply input cable

①The distortion of power grid waveform caused by superimposed higher harmonic current arisen out of nonlinear rectifier circuit to source impedance may lead to interference over other electrical equipment under the same power grid. This kind of interference is named type A interference.

②The power current and higher harmonic current brings in alternating electromagnetic field around the circuit cable, which results in electric field coupling and magnetic flux inductive coupling to the nearer parallel cable such as the communication cable, small signal transmission cable

and etc. This kind of interference is named type C① or C② interference.

③Due to antenna effect of the cable's shielding layer, interference may be produced over external wireless installation. This kind of interference is named type B① interference.

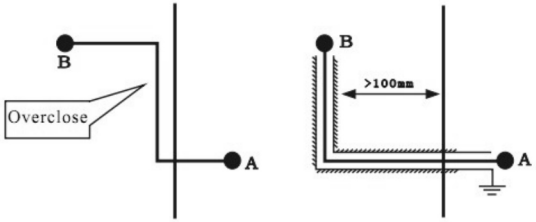


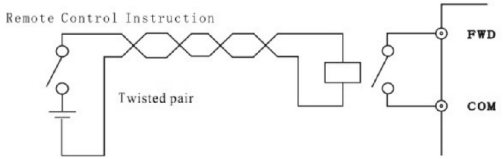
Propagation Diagram of Input Cable's Interference over External Equipment

Solutions:

① This type of interference can be suppressed by installing an EMI power supply filter or isolation transformer in the power supply input side.

② This type of interference can be suppressed through well ordered wiring or shielding. For example, the signal cable may adopt shielded wire and the shielding layer shall be firmly grounded to reduce magnetic flux inductive coupling and electric field coupling. The signal cable should be at least 100mm away from the power cable. If the signal wire and the power cable intersect, please intersect orthogonally. Generally speaking, it is not advisory to use an overlong signal wire. If the operation instruction is far from the inverter, then it is recommended to use an intermediate relay to have a control over it, as shown in the figure below.

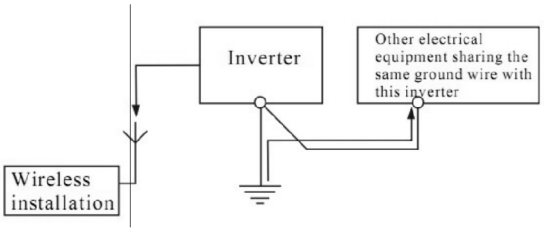




③ This type of interference can be suppressed by a good earth ground of the cable's shielding layer or by installing a wireless noise filter (i.e., a ferrite bead).

Inverter Body

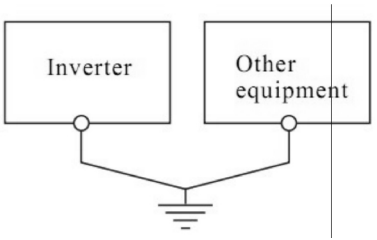
1. The leakage of high frequency electromagnetic field (EMF) produced by the high speed switch of the power elements inside the inverter through the inverter's metal slit can result in radiated interference over external wireless installation. This kind of interference is named type B① interference.
2. When other electrical equipment (including other inverters) share the same ground with this inverter, then type A ① interference will be produced over other equipment if the ground wire impedance is high at this time.



Propagation Diagram of Inverter Body's Interference over External Equipment

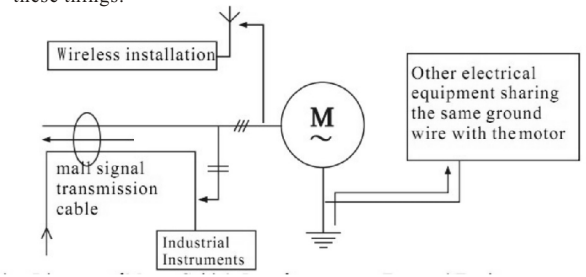
Solutions

1. Type B interference can be suppressed by a good earth ground of the inverter housing or by installing the inverter in a well-shielded metal cabinet. Generally radiated interference produced by the inverter body has less influence on the external equipment.
2. It is recommended that other equipment had better connect to the ground through an independent ground wire and share the same or different point beyond the earth electrode with the inverter, as shown in the figure below.



Motor Cable

1. The electromagnetic field (EMF) caused by fundamental current has weaker effect on electric field coupling and magnetic flux inductive coupling of the parallel cable. While the EMF produced by the higher harmonic current has stronger effect on electric field coupling.
2. Radiated interference.
3. Due to the existence of distributed capacity, there is high frequency earth leakage current and inter phase leakage current in the cable, which may lead to malfunction of some leakage protection devices such as circuit breaker, relay and other equipment. DO attach importance to these things.

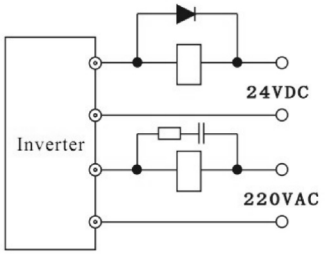


Propagation Diagram of Motor Cable's Interference over External Equipment

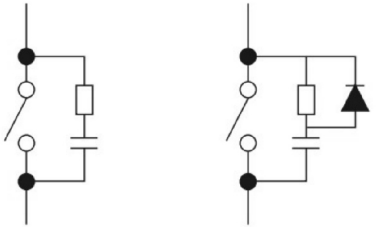
Solutions

1. The basic solutions are the same with the defense of electromagnetic countermeasures of a power cable.
2. Install an output wireless noise filter and keep the sensitive equipment away from the motor cable; or the motor cable adopts a well grounded shielded cable and insert this cable in a metal pipe.
3. Use an insensitive leakage protection breaker for the inverter system only; reduce carrier frequency of the inverter; or use an AC (output) reactor to solve this kind of problems. Relay, contactor and other electromechanical elements: Instantaneous current and voltage surge

will be caused by the close and open of the switch devices such as relay, contactor and etc, which may result in discharging radiation and conductive surge noise. This instantaneous noise must be prevented when designing the peripheral circuit of the inverter, as shown in the figure below



As for a 24VDC controlled relay a shunt winding continuous current diode should be inserted at both ends of the coil and pay attention to the polarity of diode. As for a 220V AC controlled contactor; an over-voltage suppressor should be mounted at both ends of the coil (i.e., RC network). Also, the protection of switch contact can not be ignored. This can be realized by forming a shunt winding RC or RCD buffered network, as shown in the figure below



Attached Table II: Conventional Symbols Explanation

NO.	NAME	Figure symbol	NO.	NAME	Figure symbol
1	AC motor		2	Frequency meter	
3	Power meter		4	Signal light	
5	Ammeter or Galvanometer		6	voltmeter	
7	Main circuit terminal		8	Control loop terminal	
9	contactor		10	Circuit breaker	
11	Thermal relay		12	Relay coil	
13	Reactor		14	Operational amplifier	
15	Diode		16	Electronic optocoupler	
17	switch		18	DC power supply	
19	Non-polar capacitor		20	Polar capacitor	
21	Triode(type NPN)		22	Triode(type PNP)	
23	Discharge tube		24	Piezo-resistor	
25	resistor		26	potentiometer	

Appendix 3 RS485 Communication Protocol

ZVF200-M Series inverter use the popular MODBUS communication protocol under RS485 communication control .It must set the inverter address . communication baud rate. Data format by manual , and these parameters couldn't be modified .

Modbus communication use two codes : ASCII (American standard code for information Interchange) and RTU (Remote Terminal Unit). ASCII data to be transferred will be converted into the corresponding ASCII and then transmitted, while the RTU data sucked directly, not through the conversion.

Code Meaning:

ASCII mode:

Each 8-bit data is the combination of two ASCII characters. For example, 0x1F, ASCII shown ad "1F" , are made up of "1" (31Hex), "F" (46Hex) ,The ASCII code 0-9,A-F are as bellows.

Character	'0'	'1'	'2'	'3'	'4'	'5'	'6'	'7'
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H
Character	'8'	'9'	'A'	'B'	'C'	'D'	'E'	'F'
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

RTU mode:

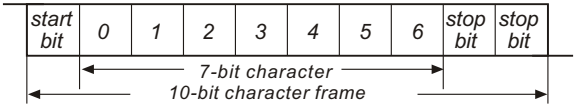
Each 8-bit data is the combination of two 4-bit hexadecimal characters.

For example, 0X1F RTU stand for '1FH '。

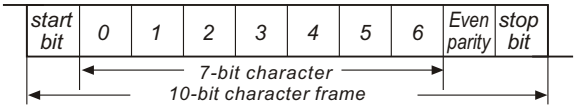
2. Data Format

2.1 10-bit character frame (For 7-bit character):

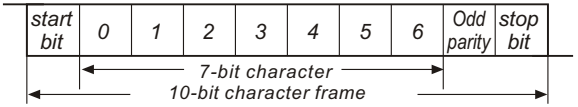
(7.N.2 : P.92=0)



(7.E.1: P92=1)

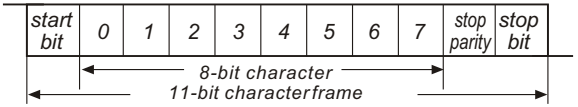


(7.O.1:P92=2)

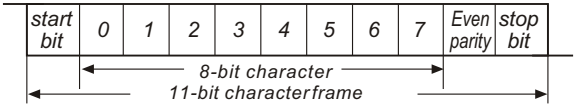


11-bit character frame (For 8-bit character):

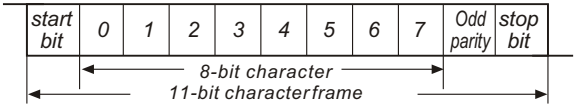
(8.N.2:P92=3)



(8.E.1:P92=4)



(8.O.1:P92=5)



3. Communication Protocol

3.1 Communication Data Frame:

STX	ADR1	ARD0	CMD1	CMD0	0	1	·····	N-1	N	ETX	CHK1	CHK0
02H	Address		CMD		Data characters					03H	Check sum	

ASCII mode:

STX	Start character:(3AH)
ADR 1	Communication address: 8-bit address consists of 2 ASC Ⅱ codes
ADR 0	
CMD 1	
CMD 0	
DATA(n-1)	Contents of data: n × 8-bit data consist of 2n ASC Ⅱ codes, n≦25 maximum of 50 ASC Ⅱ codes
……	
DATA 0	
LRC CHK 1	LRC check sum: 8-bit check sum consists of 2 ASC Ⅱ codes
LRC CHK 0	
END 1	END characters: END 1 = CR (0DH), END 0=LF(0AH)
END 0	

RTU mode:

START	A silent interval of more than 10 ms
ADR	Communication address: 8-bit address
CMD	Command code: 8-bit command
DATA(n-1)	Contents of data: n×8-bit data, n<=25
.....	
DATA 0	
CRC CHK Low	CRC check sum: 16-bit check sum consists of 2 8-bit characters
CRC CHK High	
END	A silent interval of more than 10 ms

ADR (Communication Address)
Valid communication addresses are in the range of 0 to 254. An address equals to 0 means a broadcast to all AC drives (AMD) in the network. In this case, the AMD will not reply to the master device.
For example, communication to AMD with address 16 decimal:
ASCII mode: (ADR 1, ADR 0)='1'
'0' =>'1'=31H, '0'=30H
RTU mode: (ADR)=10H

Function (Function code) and DATA (data characters)
The format of data characters depends on the function code. The available function codes are described as follows:
03H: read data from register
06H: write single data to register
10H: write multiple data to registers
Command code: 03H, read N words. The maximum value of N is 12.
For example, reading continuous 2 words from starting address 2102H of AMD with address 01H.

ASCII mode:
Command message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Starting data address	'2'
	'1'
	'0'
	'2'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC CHK 1	'D'
LRC CHK 0	'7'
END 1	'CR'
END 0	'LF'

Response message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Number of data (count by byte)	'0'
	'4'
Content of starting data address 2102H	'1'
	'7'
	'7'
	'0'
Content of data address 2103H	'0'
	'0'
	'0'
	'0'
LRC CHK 1	'7'
LRC CHK 0	'1'
END 1	CR
END 0	LF

RTU mode:

Command message:

ADR	01H
CMD	03H
Starting data address	21H
	02H
Number of data (count by word)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

Response message:

ADR	01H
CMD	03H
Number of data (count by byte)	04H
Content of data address 2102H	17H
	70H
Content of data address 2103H	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

Command code: 06H, write 1 word. For example, writing 6000(1770H) to address 0100H of AMD with address 01H.

ASCII mode:

Command message:

STX	':'
ADR 1 ADR 0	'0' '1'
CMD 1 CMD 0	'0' '6'
Data address	'0' '1' '0' '0'
Data content	'1' '7' '7' '0'
LRC CHK 1 LRC CHK 0	'7' '1'
END 1 END 0	CR LF

Response message:

STX	':'
ADR 1 ADR 0	'0' '1'
CMD 1 CMD 0	'0' '6'
Data address	'0' '1' '0' '0'
Data content	'1' '7' '7' '0'
LRC CHK 1 LRC CHK 0	'7' '1'
END 1 END 0	CR LF

RTU mode:

Command message:

ADR	01H
CMD	06H
Data address	01H 00H
Data content	17H 70H
CRC CHK Low CRC CHK High	86H 22H

Response message:

ADR	01H
CMD	06H
Data address	01H 00H
Data content	17H 70H
CRC CHK Low CRC CHK High	86H 22H

Command code: 10H, write multiple data to registers

For example, set the multi-step speed, P17=50.00 (1388 H), P18=40.00 (0FA0H). AC drive address is 01H.

ASCII Mode:

Command message:

STX	':'
ADR1 ADR0	'0' '1'
CMD1 CMD0	'1' '0'
Starting data address	'0' '0' '1' '1'
Number of data (count by word)	'0' '0' '0' '2'
Number of data (count by byte)	'0' '4'
The first Data content	'1' '3' '8' '8'
The Second Data Content	'0' 'F' 'A' '0'
LRC Check	'8' 'E'
END	CR LF

Response message:

STX	':'
ADR1 ADR0	'0' '1'
CMD1 CMD0	'1' '0'
Starting data address	'0' '0' '1' '1'
Number of data (count by word)	'0' '0' '0' '2'
LRC Check	'D' 'C'
END	CR LF

RTU Mode:

Command message

ADR	01H
CMD	10H
Starting data address	00H
	11H
Number of data (count by word)	00H
	02H
Number of data (count by byte)	04H
The first data content	13H
	88H
The second data content	0FH
	A0H
CRC CHK Low	B2H
CRC CHK High	49H

Response message:

ADR	01H
CMD	10H
Starting data address	00H
	11H
Number of data (count by word)	00H
	02H
CRC CHK Low	11H
CRC CHK High	CDH

3.5 CHK (check sum)

ASCII mode:

LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, the values of the bytes from ADR1 to last data character then calculating the hexadecimal representation of the 2's-complement negation of the sum. For example, reading 1 word from address 0401H of the AC drive with address 01H.

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Starting data address	'0'
	'4'
	'0'
	'1'
Number of data	'0'
	'0'
	'0'
	'1'
LRC CHK 1	'F'
LRC CHK 0	'6'
END 1	CR
END 0	LF

01H+03H+04H+01H+00H+01H=0AH, the 2's-complement negation of 0AH is F6H.

RTU mode:

ADR	01H
CMD	03H
Starting address	21H
	02H
Number of data (count by word)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

CRC (Cyclical Redundancy Check) is calculated by the following steps:

Step 1: Load a 16-bit register (called CRC register) with FFFFH.

Step 2: Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.

Step 3: Shift the CRC register one bit to the right with MSB zero filling. Extract and examine the LSB.

Step 4: If the LSB of CRC register is 0, repeat step 3, else Exclusive or the CRC register with the polynomial value A001H.

Step 5: Repeat step 3 and 4 until eight shifts have been performed. When this is done, a complete 8-bit byte will have been processed.

Step 6: Repeat steps 2 to 5 for the next 8-bit byte of the command message. Continue doing this until all bytes have been processed. The final contents of the CRC register is the CRC value.

When transmitting the CRC value in the message, the upper and lower bytes of the CRC value must be swapped, i.e. the lower order byte will be transmitted first.

The following is an example of CRC generation using C language. The function takes two arguments:

Unsigned char* data ←a pointer to the message

buffer Unsigned char length ←the quantity of bytes in the message

buffer The function returns the CRC value as a type of unsigned integer.


```
Unsigned int crc_chk(unsigned char* data, unsigned char length){  int j;
 unsigned int reg_crc=0xFFFF;
 while(length--){
  reg_crc ^= *data++;
  for(j=0;j\<8;j++){
   if(reg_crc & 0x01){/* LSB(b0)=1 */
    reg_crc=(reg_crc>>1) ^ 0xA001;
   }else{
    reg_crc=reg_crc >>1;
   }
  }
 }
 return reg_crc;
}
```

3.6 Address list:

The contents of available addresses are shown as below:

Content	Address	Functions	
AC drive Parameters	00nnH	nn means parameter number, For example: The address of P100 is 0064H .	
Command Read /Write	2000H	Bit0~1	00: No function
			01: Stop
			10: Run
			11: Jog +Run
		Bit2~3	Remain
		Bit4~5	00: No function
			01: FWD
			10: REV
			11: Change direction

Content	Address	Functions	
Command Read /Write	2000H	Bit6~15	Reserved
	2001H	Frequency . command	
	2002H	Bit0	1:EF(NO)
		Bit1	1: Reset command
		Bit2-15	Reserved
Status monitor Read only	2100H	Error code:	
		00:No errors occurred	
		01: Over-current (oc)	
		03: Overheat (oH)	
		04: Drive overload (oL)	
		05: Motor overload1 (oL1)	
		06: External fault(EF)	
		07: CPU failure (cF1)	
		08: CPU or analogcircuit failure (cF3)	
		09: Hardware protection failure (HPF)	
		10: Current exceeds 2times rated current during accel (ocA)	
		11: Current exceeds2 times rated current during decel (ocd)	
		12: Current exceeds 2times rated current during steady state operation (ocn)	
		13: Ground Fault (GF)	
		14: Low voltage (Lv)	
		15: Reserved	
		16: CPU failure 1(cF2)	
		17: Base block	
		18: Overload (oL2)	

Content	Address	Functions	
Status monitor Read only	2100H	19: Autoaccel/decel failure (cFA)	
		20: Software protection enable(codE)	
		Status ofAC Drive	
	2101	Bit 0~4	LED status : 0:light Off ,1: Light up RUN STOP JOGFWD REV BITO 1 2 3 4
		Bit5,6,7	Reserved
		Bit8	Main freq. Controlled by communication
		Bit9	Main freq. Controlled byexternal terminal
		Bit10	Operation command controlled by communication
		Bit11	Parameters have been locked
		Bit12	0: Stop 1: Run
		Bit 13	1: Jog command
		Bit 14-15	Reserved
	2102H	Frequency command F(XXX.XX)	
	2103H	Output Frequency H (XXX.XX)	
	2104H	Output CurrentA (XXX.X)	
	2105H	DC-BUS Voltage U (XXX.X)	
	2106H	Output Voltage E (XXX.X)	
	2107H	Step number of Multi-StepSpeed Operation (step)	
	2108H	Time of PLCOperation (sec)	
	2109H	Valueof External Trigger(count)	

Additional response toerror communication .

When the inverterare wrong communicationconnection .Theinverterwill response

to the error code if the error caused .and the maximum unit (bit 7) of the command code set to 1 (Function code and 80H) and answer to the Master . The master will know there will be error .

STX	':'
Address	'0'
	'1'
Function	'8'
	'6'
Exception Code	'0'
	'2'
LRC Check	'7'
	'7'
END	CR
	LF

Address	01H
Function	86H
Exception code	02H
CRC CHK Low	C3H
CRC CHK High	A1H

Error Code	Description
01	Function code error . The inverter can identify the function code (03H, 06H,08H,10H)
02	Data address code . The data address couldn't be identified by the inverter .
03	The data content value is error . The content value for the date is too big , Not all the inverters can recognize the content value .
04	The inverter couldn't store. and the inverter couldn't deal with such command .
10	Transmission timeout .

Inverter User's Warranty Bill

User's Details

Inverter Model		Tel	
Add.		Pos code	
Contact Person		Department	

Name of Distributor		The date of Purchase	
Inverter Model		Serial Number	
Equipment Name		Motor Power	
The date of Installation		The date of begin use	

Records of repair

Fault :
Solution:
The date of repair: The name of repair workers:

TIP

- The user should keep this warranty bill .