

# POPE

VARIABLE FREQUENCY CONTROLLERS



## VP600 Series

High Performance Vector AC Drive

## Manual





# Preface

Thanks for choosing the Pope VP600 series high performance general purpose AC drive.

VP600 series AC drives are multi-function general vector type inverters designed for high performance and low noise, . Suitable for open and close loop sensor or sensorless vector control.

Easy operation with self-learning of motor static and dynamic characteristics.

VP600 series AC drives are compact and designed for easy installation with efficient heat dissipation.

Several expansion cards are available to suit most applications.

This manual provides information of model selection, installation, parameter setting, field fault diagnosis and daily maintenance for users in this manual, please carefully read this manual prior to connecting power.

## **Application of this manual:**

This manual is applicable for VP600 series AC drive, Version : 2016.V1.0

### **Attention:**

Ensure power is isolated and locked out prior to installation and connection.

Electronic components inside AC drive are especially sensitive to static electricity, do not touch the drive and do not touch the main circuit board.

After power has been cut, if the indicator is still illuminated, dangerously high voltage may be present until the indicator goes out, always check with a suitable multimeter

- ◆ Ensure Earth wires are connected to the drive earth  terminal.
- ◆ Never connect the input power supply to the output terminals U,V,W of AC drive.

# INDEX

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<b>Chapter 1 Safety and Warnings</b>	- - - - - 1-
<b>Chapter 2 Product Brief Introduction</b>	- - - - - 6-
<b>Chapter 3 Installation</b>	- - - - - 12-
<b>Chapter 4 Operation and Display</b>	- - - - - 22-
<b>Chapter 5 Function &amp; Parameter Table</b>	- - - - - 27-
<b>Chapter 6 Description of Function Codes</b>	- - - - - 64-
Group F00: Standard Function Parameters	- - - - - 64-
Group F01: Start-stop Control Parameters	- - - - - 74-
Group F02: Motor 1 Parameters	- - - - - 78-
Group F03: Vector Control Parameters	- - - - - 81-
Group F04: V/F Control Parameters	- - - - - 85-
Group F05: Input Terminals	- - - - - 90-
Group F06: Output Terminals	- - - - - 101-
Group F07: Keypad And Display	- - - - - 107-
Group F08: Auxiliary Functions	- - - - - 111-
Group F09: Fault and Protection	- - - - - 123-
Group F10: Process Control PID Function	- - - - - 132-
Group F11: Swing Frequency, Fixed Length and Count	- - - - - 138-
Group F12: Simple PLC Function And Multi-speed control	- - - - - 140-
Group F13: Communication Parameters	- - - - - 144-
Group F15: Motor 2 Parameters	- - - - - 146-

# INDEX

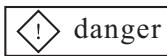
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<b>Chapter 7 Common Faults and Solutions</b>	- - - - -	147-
<b>Chapter 8 Warranty Agreement</b>	- - - - -	154-
<b>Appendix A Serial Communications</b>	- - - - -	155-
<b>Appendix B External Dimension</b>	- - - - -	165-
<b>Appendix C Accessories Selection</b>	- - - - -	169-
<b>Appendix D Using Introduction of I/O extension card</b>	- - - - -	172-
<b>Appendix E Using Introduction of PG card</b>	- - - - -	173-

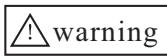
# Chapter 1 Safety and Warnings

## Definition of Safety:

In this manual, safety precautions will be presented as following two categories:



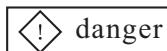
Dangers caused by operations beyond requirements may lead to serious injury, and even death.



Dangers caused by operations beyond requirements may lead to moderate damages or minor injuries, as well equipment damages.

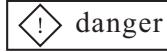
## 1.1 Safety Matters

### I . Before installing:



Please do not use damaged drives or components.

### II. In installation:



Install the VFD on metal or other non-flammable materials

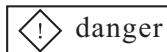


★ More than two AC drives can be placed in a same cabinet.

(refer to Installation Guide in Chapter 3) heat dissipation needs to be taken into account to ensure the cabinet does not over heat.

★ Ensure screws and wires do not fall into the drive as it may cause short circuits and damage the VFD. drive!

### III. Wiring



★ Always use licenced Electricians to install the unit so as to minimize the possibility of damage or electric shock.

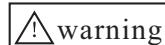
★ Ensure supply is isolated prior to installation work

★ Supply cables should be protected by a suitably sized circuit breaker.



- ★ The supply power line cannot be connected to output end, U, V, W, or it will damage AC drive!
- ★ Please ensure that correctly rated EMC shielded power cables and cable glands are installed and in accordance with local standards.
- ★ Brake resistor cannot be connected directly to the two ends of DC bus (+) and terminal(-)

#### IV. Before power on

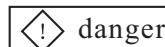


- ★ Checks
  - The supply voltage is in accordance to the nominal voltage of drive data plate.
  - Ensure there is no short circuit on the motor output side prior to connection.
  - Line input and Motor output cables are connected to the correct terminals.
  - Ensure all connections are tight.
- ★ The drive covers are securely fitted before applying power to reduce the risk of an electric shock!



- ★ Ensure all peripheral equipment has been connected correctly as per the circuits provided in this manual.

#### V. After power on

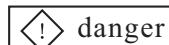


- ★ Do not remove covers when power is applied to the AC Drive.
- ★ Do not touch AC drive terminals or auxiliary terminals, or electric shock may occur!
- ★ After applying power, test the condition of the external electrical circuit.
- ★ Do not touch U, V and W terminals of the AC Drive.



- ★ Be aware, if you initiate the parameter identification process the motor will be rotated for a short period, ensure it is safe for the motor to run!
- ★ Changing the manufacturer parameters of AC drive may damage the equipment. Changes should only be done by trained personnel.

## VI. In service

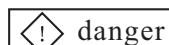


- ★ If you enable the auto-restart function ensure that the driven equipment is well guarded and has warnings labels to warn personal that it may start automatically!
- ★ Do not touch rotating cooling fans or vents .
- ★ Use qualified person to install or carry out work to avoid personal injury and damage to the equipment!



- ★ Ensure adequate protection is provided to protect against objects falling into the AC Drive, or damage to the equipment may occur!
- ★ Do not use mains power input to start/stop the VFD, always use keypad or control circuit terminals.

## VII. Maintenance:



- ★ Ensure equipment is isolated before starting repairs or maintenance on equipment or electric shock may occur.
- ★ Maintenance and/or repairs should only be carried out when power has been removed and the charge light is out, the stored electric charge in capacitors may cause electric shock!
- ★ Only trained personnel should carry out repairs and maintenance on the AC Drive.

## 1.2 Notifications:

### I . Motor Insulation Test

For new and existing installations it is recommended to test the motor circuit insulation prior to connecting to the AC Drive using a 1000V Insulation Tester for 415V motors or 500V for 240V applications (ensure the motor cables are not connected to the AC drive). Measurements should be greater than  $1M\Omega$ .

### II . Motor Thermal Protection.

Confirm the current rating of AC drive is larger than that of motor. Ensure the correct motor parameter values are entered into the AC drive for motor protection, or install an thermal protection relay to protect the motor.

### III. Power Frequency Operation

This AC drive can provide 0~600Hz output frequency. For operation over 50Hz, please consider the suitability of driven mechanical devices at higher speeds.

### IV Motor Heating and Noise.

The output voltage of AC drives are PWM producing waveforms with harmonic distortion, that may slightly affect the motor's temperature rise, vibration, and noise.

### V. Power Factor Correction.

Do not install power factor correction capacitors or active harmonic filters on the AC drive output. Do not connect lightning surge protection to the output of the AC drive.

### VI. Contactors on Supply and Output.

Do not use a supply or output contactor or switching device to start/stop the AC drive. Always use the keypad or the control circuit terminals for start/stop operations. If the AC drive is required to be de-energised, please allow at least one hour before re-energising, as frequent charge-discharge operations may reduce the service life of the AC drive's capacitors. If a contactor and/or switching element are installed between the AC drive and the motor, please ensure that the AC drive output is off prior to changing state of the contactor or switching element. Operation of contactor or switch element while AC drive output is active may cause damage to the AC drive modules.

### VII. Voltages outside nominal voltage values

VP600 series AC drive operating voltage range are stated in this manual. Connection to voltages above or below this stated range will cause damage to components inside the AC drive. The AC drive may be operated with a suitable voltage correction transformer connected on the supply side.

### VIII. Connection of Single Phase Supply.

For VP600 series AC drives that are marked for connection to three phase supply, do not connect single phase supply or it will cause damage to the AC drive.

### IX. Lightning impulse protection

Lightning strike surge protection is installed in this series of AC drives. For areas with frequent lightning strikes, users should install a lightning surge protection device on the supply of the AC drive.

#### **X. Elevation and Derating**

For installations above 1000m elevation, the rarefied air reduces the ability of the AC Drive to dissipate heat. Contact your AC drive supplier to determine the appropriate sizing/derating required.

#### **XI. Special Usage**

If the user needs to connect the AC drive differently to the suggested wiring diagrams provided in this manual, please consult the supplier of the AC drive.

#### **XII. Warning - Disposal of AC drives.**

Incineration of electrolytic capacitors may cause them to explode and plastic components will generate poisonous gas, please dispose them as industrial waste.

#### **XIII. About adaptive motor**

1. The Standard adaptive motor is based on a 3phase four pole squirrel-cage asynchronous induction motor. If it is not above-mentioned motor select an AC drive based on the motor rated current. Not suitable for use with 1phase, DC or permanent magnet motors.

2. The cooling fan of non variable frequency motor and rotor spindle are coaxially connected, at lower speeds the fan cooling effect is reduced and damage to the motor may occur. For low speed high torque applications a motor with a separately powered cooling fan is recommended.

3. The AC drive has preprogrammed standard motor parameters, these parameter should be checked against the actual motor values and amended to reflect the characteristics, failure to do so may result in reduced performance and the AC drive motor protection systems may be compromised.

4. A short circuit in motor or associated cables will cause the AC drive to trip. Before conducting insulation short-circuit testing of motor and cable, ensure incoming power has been removed and motor cables are disconnected from the AC drive motor terminals.

## Chapter 2 Brief Product Introduction

### 2.1 Initial inspection · Storage

These products have been manufactured strict quality standards and undergone thorough testing prior to despatch and packed to minimise possible damage during transport. Severe impact in transit can cause damage to the product.

Upon receiving the product, please undertake the following inspections immediately :

- Inspection before unpacking

Check that there are no signs of damage to the packaging after receiving the goods, that may have occurred during transportation.

- Inspection after unpacking

Check the AC Drive housing for signs of mechanical damage. Check whether the specifications and models on nameplate are in accord with your requirements, and whether the service manual and other accessories are all present and undamaged. If you find any damage or discrepancies, please contact your supplier.

- Storage

Before installation, if the AC Drive is not being installed at the time of purchase, return it to the original packaging and store in accordance with the conditions listed below, failure to do so may void warranty conditions:

1. Placed in a dry, dust free environment
2. Storage temperature -20°C to +65°C.
3. Relative humidity 0% to 95%, without moisture condensation.
4. Avoid storage in areas where corrosive gases and liquids are present.
5. We recommend not storing the AC Drive directly on the ground.

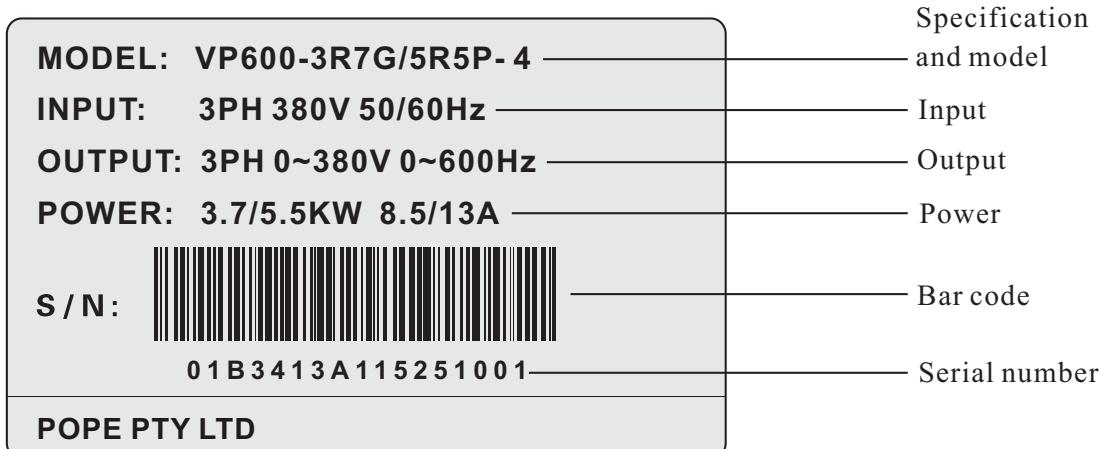
- Transportation

During transportation, the AC drive shall be maintained in accord with following conditions:

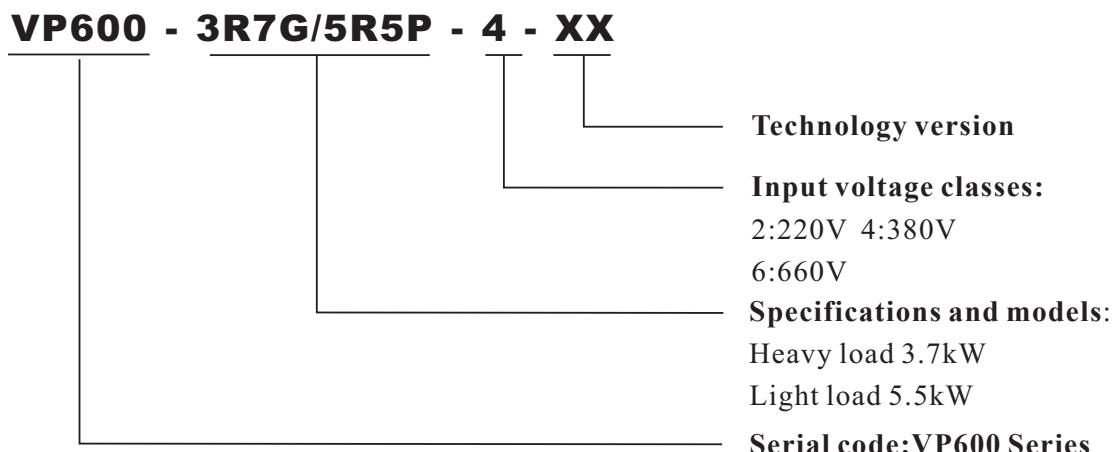
1. The temperature shall be kept from -25°C to +70°C.
2. Relative humidity shall be kept from 5% to 95%, without moisture condensation
3. Barometric pressure must be maintained from 70kPa to 106kPa.

## 2.2 AC drive nameplate and specifications:

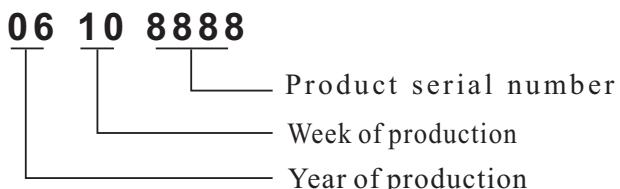
- AC drive nameplate:



- Specifications and models:



- Production code:



### 2.3 Specifications and models of AC drives

Models	Rated power (kW)	Rated input current (A)	Rated output current (A)	Adaptive motor (KW)
Input 1PH 220V±15% 47Hz 63Hz				
VP600-0R4G-2	0.55	5.4	4.0	0.55
VP600-0R7G-2	0.75	8.2	5.0	0.75
VP600-1R5G-2	1.5	14.0	7.0	1.5
VP600-2R2G-2	2.2	23	10.0	2.2

Models	Rated power (kW)	Rated input current (A)	Rated output current (A)	Adaptive motor (KW)
Input 3PH 220V±15% 47Hz 63Hz				
VP600-0R5G-2	0.55	3.8	3.2	0.55
VP600-0R7G-2	0.75	4.9	4.1	0.75
VP600-1R5G-2	1.5	8.4	7.0	1.5
VP600-2R2G-2	2.2	11.5	10.0	2.2
VP600-3R7G-2	3.7	18	15	3.7
VP600-5R5G-2	5.5	24	23	5.5
VP600-7R5G-2	7.5	37	31	7.5
VP600-011G-2	11	52	45	11
VP600-015G-2	15	68	58	15
VP600-018G-2	18	84	71	18
VP600-022G-2	22	94	85	22
VP600-030G-2	30	120	115	30
VP600-037G-2	37	160	145	37
VP600-045G-2	45	198	180	45
VP600-055G-2	55	237	215	55
VP600-075G-2	75	317	283	75

Models	Rated power (kW)	Rated input current (A)	Rated output current (A)	Adaptive motor (KW)
Input 3PH 380V±15% 47Hz 63Hz				
VP600-0R7G/1R5P-4	0.75/1.5	3.4/5.0	2.5/3.7	0.75/1.5
VP600-1R5G/2R2P-4	1.5/2.2	5.0/5.8	3.7/5.0	1.5/2.2
VP600-2R2G/3R7P-4	2.2/3.7	5.8/10.5	5.0/8.5	2.2/3.7
VP600-3R7G/5R5P-4	3.7/5.5	10.5/14.6	8.5/13	3.7/5.5
VP600-5R5G/7R5P-4	5.5/7.5	14.6/20.5	13/18	5.5/7.5
VP600-7R5G/011P-4	7.5/11	20.5/26	18/24	7.5/11
VP600-011G/015P-4	11/15	26/35	24/30	11/15
VP600-015G/018P-4	15/18.5	35/38.5	30/37	15/18.5
VP600-018G/022P-4	18.5/22	38.5/46.5	37/46	18.5/22
VP600-022G/030P-4	22/30	46.5/62	46/58	22/30
VP600-030G/037P-4	30/37	62/76	58/75	30/37
VP600-037G/045P-4	37/45	76/92	75/90	37/45
VP600-045G/055P-4	45/55	92/113	90/110	45/55
VP600-055G/075P-4	55/75	113/157	110/150	55/75
VP600-075G/093P-4	75/93	157/180	150/170	75/93
VP600-093G/110P-4	93/110	180/214	170/210	93/110
VP600-110G/132P-4	110/132	214/256	210/250	110/132
VP600-132G/160P-4	132/160	256/307	250/300	132/160
VP600-160G/200P-4	160/200	307/385	300/380	160/200
VP600-200G/220P-4	200/220	385/430	380/430	200/220
VP600-220G/250P-4	220/250	430/468	430/465	220/250
VP600-250G/280P-4	250/280	468/525	465/520	250/280
VP600-280G/315P-4	280/315	525/590	520/585	280/315
VP600-315G/350P-4	315/350	590/665	585/650	315/350
VP600-350G/400P-4	350/400	665/785	650/754	350/400
VP600-400G/500P-4	400/500	785/965	754/930	400/500
VP600-500G/630P-4	500/630	965/1210	930/1180	500/630
VP600-630G/710P-4	630/710	1210/1465	1180/1430	630/710

## 2.4 Technical Features

	Technical Features	Description	
Input	Input voltage range	1AC 220V±15%, 3AC 220V±15%,3AC 380V±15%, 3AC 660V±10%	
	Input frequency range	47~63Hz	
	Power factor	≥95%	
Control performance	Control mode	V/F control, non-PG vector control(SVC) PG vector control (FVC)	
	V/F control	Line, multiple point , square V/F curve, V/F separation	
	Operation command mode	Keypad control, Terminal control, Serial communication control	
	Frequency Reference Source	Digital, analog, pulse frequency, serial communication, multi-step speed, simple PLC, and PID The different modes and a combination of multi-modes are available for selection.	
	Overload capacity	G type: 150% rated current 60s,180% rated current 3s P type: 120% rated current 60s, 150% rated current 3s	
	Start torque	G type: 0.5Hz/150%(SVC), 0Hz/180%(FVC) P type: 0.5Hz/100%	
	Speed adjusting range	1:100(SVC)	1:1000(FVC)
	Speed control accuracy	±0.5%(SVC)	±0.02% (FVC)
	Carrier frequency	0.5 to 16.0kHz;automatically adjust carrier frequency according to the load characteristics	
	Frequency resolution	Digital setting:0.01Hz. Analog setting:maximum frequency x 0.025%	
	Torque boost	Automatic torque boost; manual torque boost 0.1~30%	
	Acceleration and deceleration mode	Line or S-curve, 4 types of acceleration/deceleration time with the range of 0.0~6500.0 s	
	DC brake	Supports starting and stopping DC brake;	
	Jogging Control	Jog frequency range:0.0Hz~50.00Hz; Jog Acc/Dec time:0~6500.0s	
	Simple PLC & multi -step speed operation	Built-in PLC or control terminal,16 step speeds can be set	
	Built-in PID	Built-in PID control to easily implement the close loop control for the process parameters (such as pressure, temperature, flow, etc.)	
	Automatic voltage regulation(AVR)	Automatically maintain a constant output voltage when the voltage of electricity grid changes	
	Common DC bus	Common DC bus function: multiple inverters can use a common DC bus	
	Traverse control	Traverse control function:multiple triangular pulse frequency control	
	Fixed length control	Setting length control	
	Timing control	Setting time range:0~6500min	
Terminals	Input terminals	<ul style="list-style-type: none"> <li>● 6 programmable digital inputs, it can be extended by 4 digital inputs, one of which supports high speed pulse input;</li> <li>● 1 analog voltage input 0~10VDC;</li> <li>● 2 voltage input 0~10VDC or current input 0~20mA</li> </ul>	
	Output terminals	<ul style="list-style-type: none"> <li>● 1 open collector output ,it can be extended by 1 high speed pulse output ;</li> <li>● 2 relay outputs ;</li> <li>● 2 analog output: voltage output 0~10VDC or current output 0~20mA</li> </ul>	
Human machine interface	LED Display	Can display setting frequency, output frequency, output voltage, output current, etc.	
Enviornment & Protection class	Protection class	IP20	
	Humidity & temperature	90%RH or less (no-condensation),-10 °C~40 °C . Derating will be required if the ambient temperature exceeds 40 °C	
	Vibration	Under 20Hz 9.8m/s(1G),Over 20Hz5.88m/s(0.6G)	
	Store environment	≤1000M,indoor(no corrosive gas and liquid)	
	Store temperature	-20 °C~60 °C	
	Cooling Mode	Forced air-cooling	

## 2.5 All components schematic diagram of AC drive

The following diagram shows components for the below 15KW plastic shell AC drive

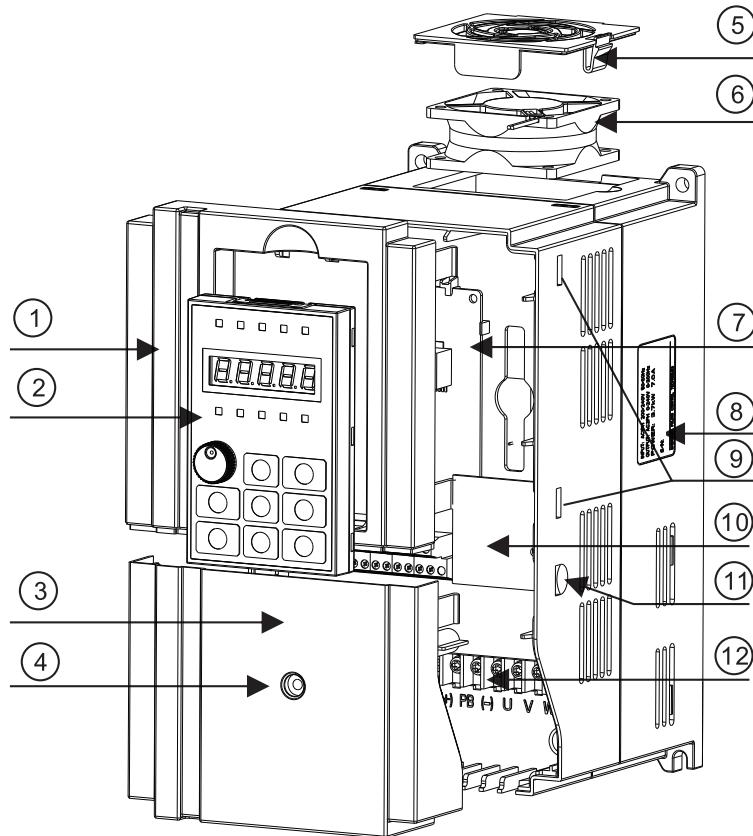


Figure 2-2 Schematic diagram of product structure

No.	Name	Description
(1)	Pre-cover	Used to install display keyboard and protect components
(2)	Keyboard	Used to amend and check inverter parameters, operation and other functions
(3)	Tail-hood	
(4)	Retaining screw of tail-hood	Used to fix tail-hood, loosen this screw when disassembling
(5)	Snap joint of fan	Used to fix fan, convenient to disassembly
(6)	Cooling fan	Internal heat dissipation of inverter
(7)	Control board	CPU board of inverter
(8)	Nameplate	
(9)	Snap joint of pre-cover	Used to fix pre-cover, total four on both left and right
(10)	Expansion board	Built-in multifunctional expansion board
(11)	Snap joint of tail-hood	Used to fix tail-hood, one on both left and right
(12)	Main terminal	

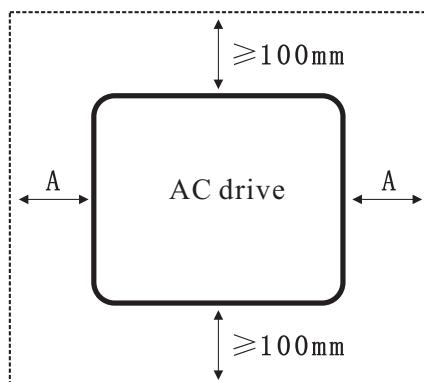
# Chapter3 Installation

## 3. 1 Installation

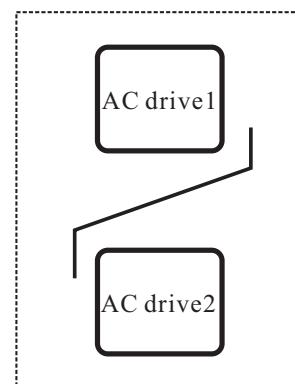
### 1. Installation environment:

- 1) Environment temperature: Surrounding environmental temperature has a great impact on lifetime of AC drive, and the operational ambient temperature should not exceed rated temperature range of  $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$ . ( for applications above  $40^{\circ}\text{C}$  contact your supplier for de-rating)
- 2) The AC drive should not be installed on flammable surfaces. Ensure there is enough space around the AC drive to dissipate the heat it generates. The AC drive is to be mounted in an upright position.
- 3) Installation on vibrating surfaces should be avoided (vibration should not exceed 0. 6G).
- 4) Avoid installation in
  - direct sun light, condensation or moist surroundings, or under dripping water.
  - areas where there are corrosive, flammable and explosive gases.
  - where there are oil contaminations, dirt and metal dust.

### 2. Installation guide:



Explanation: When rating of AC drive  $\leq 22\text{kW}$  dimension A is not applicable.  
When rating of AC drive  $>22\text{KW}$ , dimension A should be greater than 50mm.



Explanation: When AC drives are installed above each other a thermal insulation plate should be fitted as shown above.

Figure 3-1 Installation diagram of AC drive

The focus of mechanical installation is the problem of heat dissipation, consideration should be made to the following points:

- 1) Install vertically, for heat diffusion upward. If there are a number of drives inside a cabinet, side by side installation is recommended.

When they are being installed above each other, a thermal insulation plate in as shown in diagram 3-1

- 2) Refer to diagram 3-1 for drive spacing to ensure adequate heat dissipation.

When multiple drives are installed in a single cabinet, total heat calculations should be made taking in account all heat generating equipment to determine if additional cooling is required to ensure internal temperatures do not exceed ambient temperature rating.

- 3) Do not mount the unit on flammable materials.

- 4) For those application were metal dust may be present we recommend the use of an IP5X cabinet with external cooling installed.

### 3. 2 Electrical installation

1.Specification list of main circuit and electrical connection parameters :

Voltage (V)	AC drive power (kW)	Adaptive motor (kW)	Inverter input side (RST)		Recommend wiring size			
			Air switch model	Contactor model	Power line (input line /output line)	DC reactor	Braking circuit	Control signal line (external connection line)
220	0.55	0.55	DZ20-100(16A)	CJ20-16	1.5	4	1.5	0.5 1 0.75
	0.75	0.75			2.5		2.5	
	1.5	1.5						
	2.2	2.2	DZ20-100(32A)	CJ20-40	4	6	4	
380	3.7	3.7	DZ20-100(16A)	CJ20-16	1.5	4	1.5	0.5 1 0.75
	0.75	0.75			2.5		2.5	
	1.5	1.5						
	2.2	2.2						
	3.7	3.7						
	5.5	5.5	DZ20-100(32A)	CJ20-40	4	6		4
	7.5	7.5			6			
	11	11			8	8		
	15	15			10			
	18.5	18.5	DZ20-100(50A)	CJ20-63	16	16		6
	22	22			25			
	30	30			35	25*2(50)		
	37	37			50			
	45	45	DZ20-100(100A)	CJ20-100	70	50*2(95)		8
	55	55			100			
	75	75			120			
	93	93	DZ20-400(250A)	CJ20-250	140	70*2(150)		16
	110	110			160			
	132	132			180			
	160	160	DZ20-400(400A)	CJ20-400	200	50*2(95)		25
	187	187			220			
	200	200			240			
	220	220	DZ20-630(600A)	CJ40-500	260	70*2(150)		16*2(35)
	250	250			280			
	280	280	DZ20-630(630A)	CJ40-800	300	120*2(240)		25*2(50)
	315	315	DZ20-1250(700A)		320			
	400	400	DZ20-1250(1000A)	CJ40-1000	340	150*2(300)	150*2(300)	35*2(70)
	500	500	DZ20-1250(1250A)		360	185*2(370)	185*2(370)	50*2(100)

**2. Peripheral device wiring diagram:**

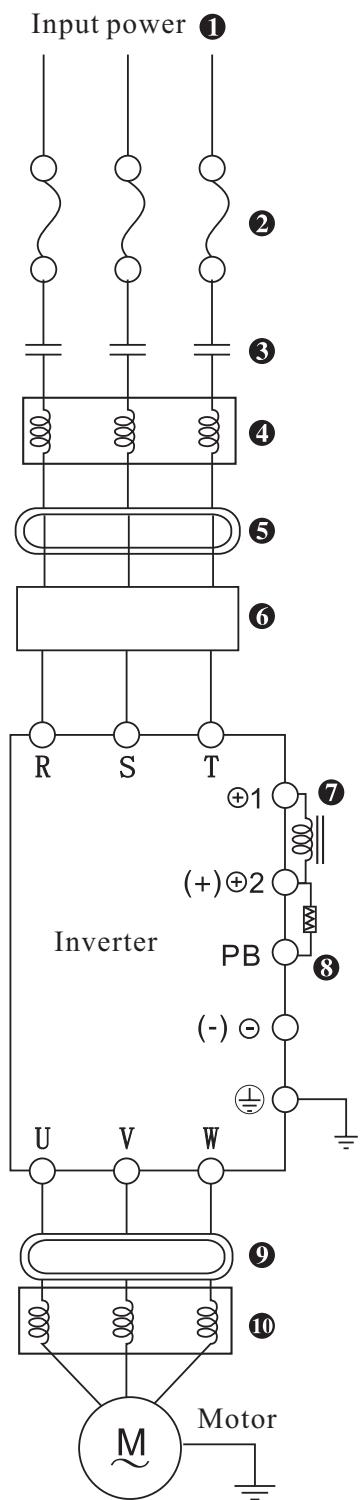
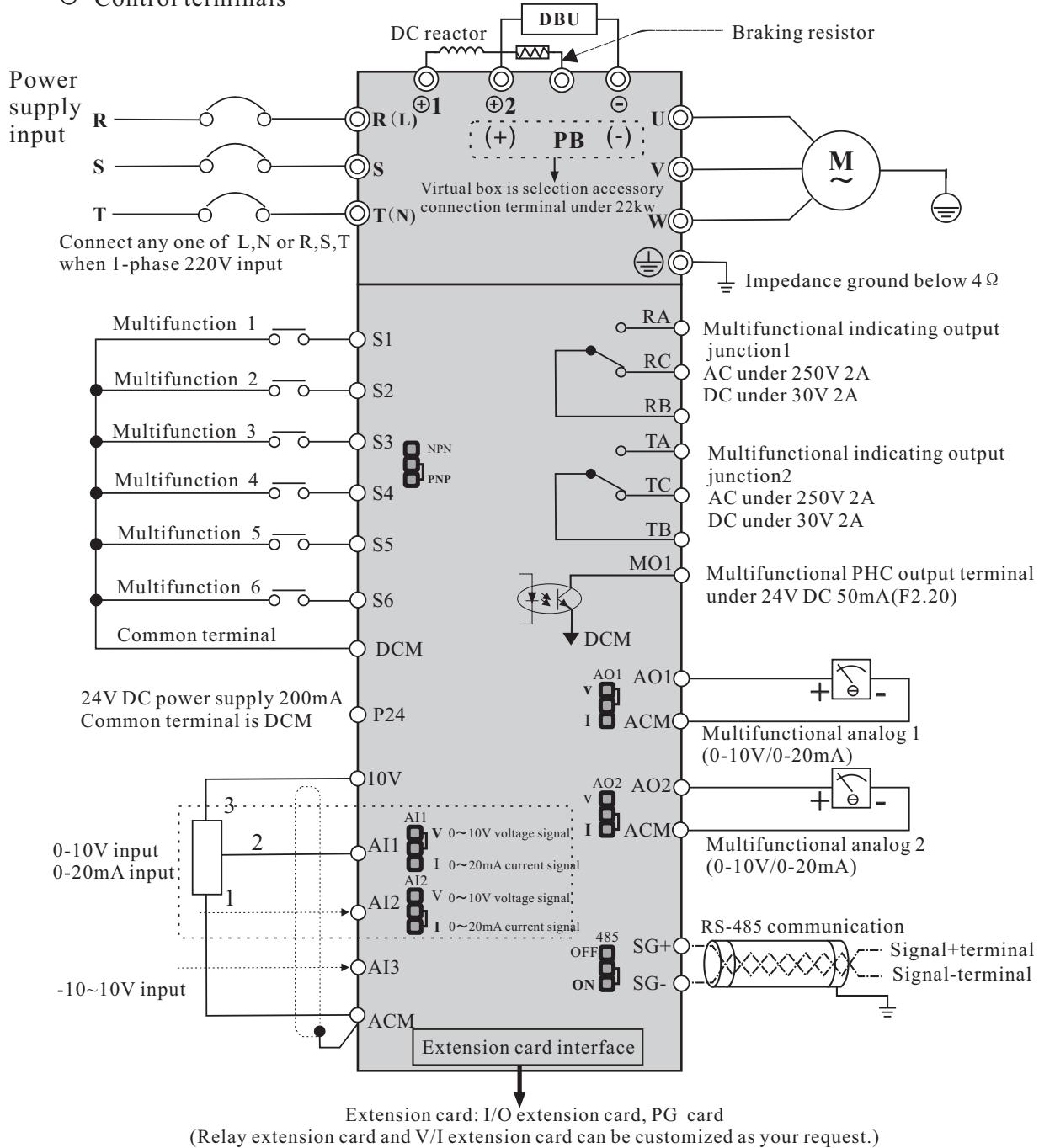


Figure 3-2  
Peripheral device wiring diagram

## Basic wiring diagram

◎ Main power terminals

○ Control terminals



Notes: The general type AC drives  $\leq 22\text{kw}$  have built-in brake unit, brake resistance (+) and PB terminal; (+) and (-) terminals are the plus or minus terminals of inverter's DC bus.

Reserved direct current reactor connection terminals  $\geq 30\text{kw}$ , +1, +2,  $\Theta$  are used to connect energy feedback unit or brake unit.

When a brake unit is used in high-power AC drives, connect the positive pole of brake unit to output terminal +2 of direct current reactor. If it is connected to +1 terminal, it will damage the brake unit.

#### 4.Jumper function declaration of main board:

AI1: Analogue input 1 voltage/current signal conversion  
 AI2: Analogue input 2 voltage/current signal conversion  
 V: 0-10VDC voltage signal input  
 I: 0-20mA analog current signal input

AO1: Analog output 1 voltage/current signal conversion  
 AO2: Analog output 1 voltage/current signal conversion  
 V: 0-10VDC voltage signal output  
 I: 4-20mA analogue current signal output

#### 5.Main circuit terminals and connection



- ★ Ensure the power is isolated before commencing any wiring. Failure to do so may result in electric shock!
- ★ Only use qualified electrical trades persons to install the equipment. Failure to do so may cause damage to the equipment and personal injuries.
- ★ Ensure a reliable Earth connection is present. Failure to do so may result in electric shock or fire!



- ★ Ensure the supply power is in accordance with the AC drive rated values or damage to the AC drive may result!
- ★ Ensure the motor is suitable for use with an AC drive. Damages to motor or AC drive protection may result!
- ★ Applying supply power to terminals U, V and W will damage the AC drive!
- ★ Brake resistors should not be connected directly to DC bus  $\oplus$  2,  $\ominus$ , or it will cause damage to the AC drive!

##### 1)Main circuit terminal description:

Main circuit wiring terminal  $\leq 22\text{kw}$

Terminal identification	Name	Function description
R、S、T(L、N)	Main power input terminal	Connect three-phase (one-phase) power supply
U、V、W	Output terminal of AC drive	Connect three phase motor
(+)、PB	Braking terminal	Connect external brake resistance
(+)、(-)	DC bus terminal	2 sets or more inverters use a common DC bus
$\ominus$	Grounding terminal	Earth grounding

Main circuit wiring terminal  $> 22\text{kw}$

Terminal identification	Name	Function description
R、S、T(L、N)	Main circuit power input terminal	Connect three-phase (one-phase) power supply
U、V、W	Output terminal of AC drive	Connect three phase motor
$\oplus 2 \ominus$	DC bus terminal	Use for connection of brake unit, energy feedback or 2 or more AC drives common DC bus
$\oplus 1 \oplus 2$	External reactor terminal	Connect external DC reactor
$\ominus$	Grounding terminal	Inverter safety grounding

## 2) Wiring warnings:

### A. Input power L,N or R,W and B phases:

The connection of inverter input side has no phase sequence requirements.

### B. DC bus $\oplus 2, \ominus$ terminals:

DC bus  $\oplus 2, \ominus$  terminals will have residual voltage present when power has been removed. Do not touch internal components until the “charge” power light is off confirming the voltage is less than 36V.

When an external brake unit is fitted to an AC drive  $\geq 30\text{KW}$ , the polarity of  $\oplus 2$  and  $\ominus$  cannot be connected inversely, it will cause damage to the AC drive, or fire may occur.

The wiring length of brake unit shall not be more than 10m, only use with EMC approved cables and appropriate glands. EMC cable screen is to be connected to earth at both ends.

Brake resistors must not be connected onto DC bus directly, it will cause damage to the AC drive or may cause a fire.

### C. Brake resistor connection terminals (+) and PB:

AC drive  $\leq 22\text{KW}$  with built-in brake unit.

Refer to the recommended value of brake resistor model selection reference. (page 167)  
Wiring distance shall be less than 5m, or it may cause damage to AC drive.

### D. AC drive output side U, V and W:

Do not connect capacitors or surge arresters to these terminals or it will affect the AC drive protection, or may cause damage.

In long motor cable runs, the effects of distributed capacitance will generate electric resonance and give rise to dielectric breakdown of motor. The generated large leakage current will cause the over current protection of the AC drive to trip. If cable length is more than 100m, an alternating current output reactor should be fitted.

### E. Earth (grounding) terminal $\ominus$ :

Terminals must have a reliable Earth connection and the resistance value of the Earth wire shall be less than  $4\Omega$ , or it will cause abnormal operation and may damage the AC drive.

Grounding terminal  $\ominus$  and Neutral (N) terminal of power supply cannot be connected.

## **6. Control circuit terminal and wiring**

1) Schematic diagram of control circuit terminals (Figure 3-4)

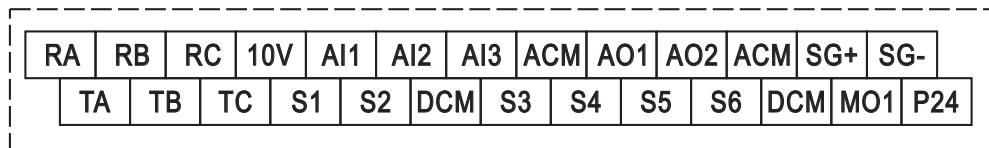


Figure 3-4: Schematic diagram of main control board terminal configuration

## 2) Control circuit terminal description:

Terminal identification	Terminal function description	
S1-DCM	Multifunctional input terminal 1	Function setting: F05.00～F05.05
S2-DCM	Multifunctional input terminal 2	
S3-DCM	Multifunctional input terminal 3	
S4-DCM	Multifunctional input terminal 4	
S5-DCM	Multifunctional input terminal 5	
S6-DCM	Multifunctional input terminal 6	
P24-DCM	Auxiliary power supply 24VDC 200mA	
10V-ACM	Input auxiliary power supply 10VDC 20mA	
AI1-ACM	Analog current input port 1: 0-10V or 0-20mA	Function setting: F05.18～F05.32
AI2-ACM	Analog current input port 2: 0-10V or 0-20mA	
AI3-ACM	Analog current input port 3: -10~10V	
AO1-ACM	Analog current output port 1: output 0-10V or 0-20mA	Function setting: F06.13～F06.20
AO2-ACM	Analog current output port 2: output 0-10V or 0-20mA	
SG+ SG-	Rs485 communication port	F13.00～F13.06
RA-RB-RC	Multifunctional connection point output, factory default is failure output	Function setting: F06.02～F06.04
TA-TB-TC	Multifunctional connection point output, factory default is output in operating	
MO1-DCM	Multifunctional collector output port of open circuit	

3) Control circuit terminal wiring explanation:

A. Analog input terminal:

As the analog signal can suffer from external interference, shielded cable is recommended with the wiring distance kept as short as possible, no more than 20m.

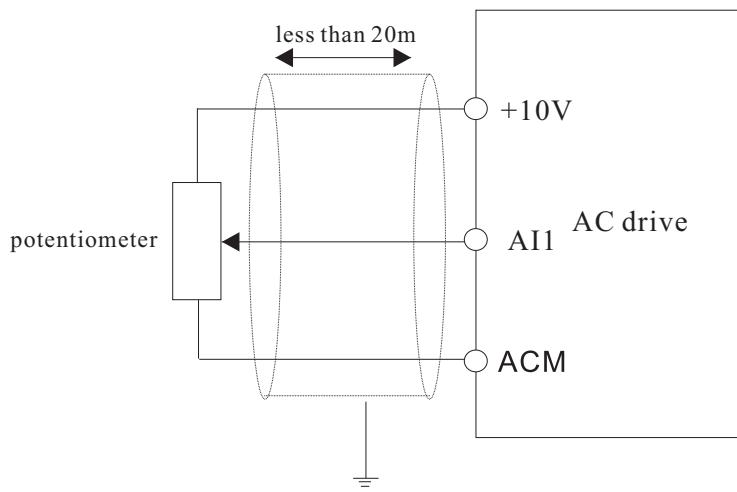


Figure 3-5 Schematic diagram of analog input terminal wiring

If the analog signal affected by severe interference, a filter condenser or ferrite core shall be installed near the analog signal source.

Refer to Figure 3-6 below:

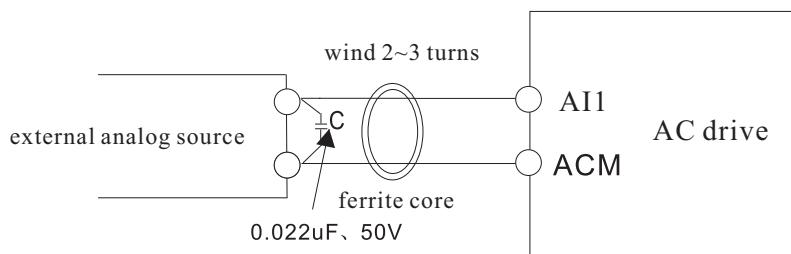


Figure 3-6 Analog input terminal with filter devices

B. Digital input terminal:

Can be affected by noise. Screened control cables should be used to minimise false operation

C. Digital output terminal:

When digital output terminals are used to drive a relay, an absorber diode shall be installed across the relay coil terminals, or it will cause damage to DC 24V power supply.

**Attention:** The polarity of absorber diode must be installed correctly, as following picture shows. Or when digital output terminals are outputted, it will cause damage to DC 24V power supply.

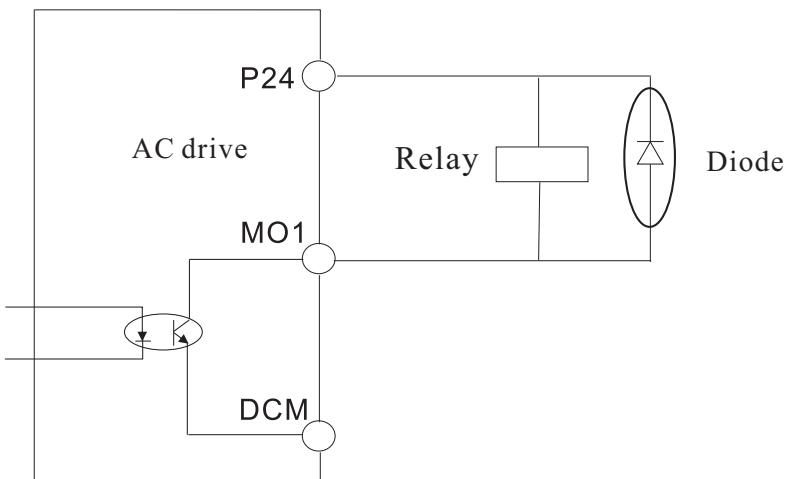


Figure 3-7 Wiring diagram of digital output terminal

## 7. Management of EMC:

### I . Effects of harmonic wave

1. High harmonic wave distortion of power supply will cause damage to inverter. Where only poor power grid quality is available, we advise an AC input reactor be installed.
2. As high harmonic wave distortion exists at the output side of AC drive, the installation of power factor correction and surge suppressors on output side may lead to electric shock, or even damage to equipment. Power factor correction or surge suppression devices cannot be installed on the output side.

### II. Electromagnetic interference and management

1. Electromagnetic interference has two categories: One is peripheral electromagnetic noise's interference on AC drive, which will give rise to false operation of the inverter itself. However this interference is usually small and the AC drive has been designed to manage the affects of this and has a strong anti-interference capability. The other one is AC drive's effect on peripheral equipment.

#### *Common handling methods:*

- A. AC drive and other electrical products should be well grounded and the ground resistance shall not more than  $4\Omega$ .
- B. Control wiring should not be run in parallel with the incoming powerline. If this cannot be avoided, run the control wiring at some distance from the power lines. When the control wiring must cross the power lines, do so at  $90^\circ$ .
- C. Where there is a high anti-interference requirement, shielded cable shall be used between AC drive and motor and a reliable earthing connection is necessary for the shielding.
- D. The control wiring of power interrupting equipment is recommended to be shielded twisted pair cable, with a reliable ground connection for the shielding layer.

2. Handling methods of interference from peripheral electromagnetic equipment on AC drive. Electromagnetic effects on inverter generally resulting from the installation of relays and electromagnetic contactors near the AC drive. If the AC drive control is affected by interference causing false operation.

Use the following methods to resolve the issue :

- A. Install surge suppressor on the devices that is causing the interference.
- B. Install filters at the signal input terminal of AC drive.
- C. The communication cables of AC drive's control signal line and detection circuit shall be shielded cable with a reliable ground connection on the shielding.

3. Techniques for mitigating interference on peripheral equipments from the electromagnetic interference of AC drive:

This electromagnetic interference can be divided into two categories: First is radiated by the AC drive and the second is radiated from the conductors between the inverter and motor. The interference causes the connecting conductors of peripheral electrical equipment to experience electromagnetic and electrostatic induction, which can lead to false operation of the equipment. Please refer to following methods to resolve these issues:

A. Instrument, receiver, sensor and other equipment for measurement, generally have weak signals. If they are placed near the AC drive or in a same control cabinet they can experience interference and operate incorrectly. So we advise to take following methods: Keep them away from interference source; The signal conductors should not be placed in parallel with power cables and is recommended to have a minimum of 150mm separation.

Always use shielded signal cable and motor power cables; Install linear filters or radio noise filters to the input and output sides of the AC drive.

B. When the effected equipment and AC drive share a same power supply and the above methods did not help to eliminate the interference, you should install linear filter or radio noise filter between AC drive and power supply.

C. Separate earth (ground) connections for peripheral equipment can help to eliminate the interference from earth (ground) conductor leakage current from the AC drive

### III. Leakage current and treatment

Leakage current has two categories when inverter is in service: One is leakage current to ground: and the other is leakage current between lines.

1. Factors that influence leakage current over the ground and solutions: Distributed capacitances exist between conductors and earth (ground). There is a direct proportional relationship between distributed capacitances and the leakage current: Decreasing the distance between AC drive and motor can reduce distributed capacitances. There is a direct proportional relationship between the carrier frequency and the leakage current. Reducing the carrier frequency can decrease leakage current but will increase the sound output of the motor. Leakage current will increase proportionally with the loop current, so when the motor power is high, the relevant leakage current also will be high. Installing an load reactor is also one available method to mitigate leakage current. Using EMC rated cables and EMC rated cable glands is another method of mitigation.

2. Factors that influence leakage current between conductors and solutions: Distributed capacitances exists between output conductors of AC drive. If the load current passing though the conductors contains high harmonics, it may induce resonance and leakage current. If you use a thermal overload relay it may cause false tripping. The solution is to decrease carrier frequency or install an output reactor. We recommend the AC drives inbuilt electronic over current protection function be used for motor protection.

# Chapter 4 Operation and Display

## 4.1 Keypad description

- Keypad explanation and functions

Keypad is located on the front of the AC drive and is divided into two parts: Display area and Control area. The Display area shows the parameter setting mode and running state information. The Control area is the communication and manual operation interface.

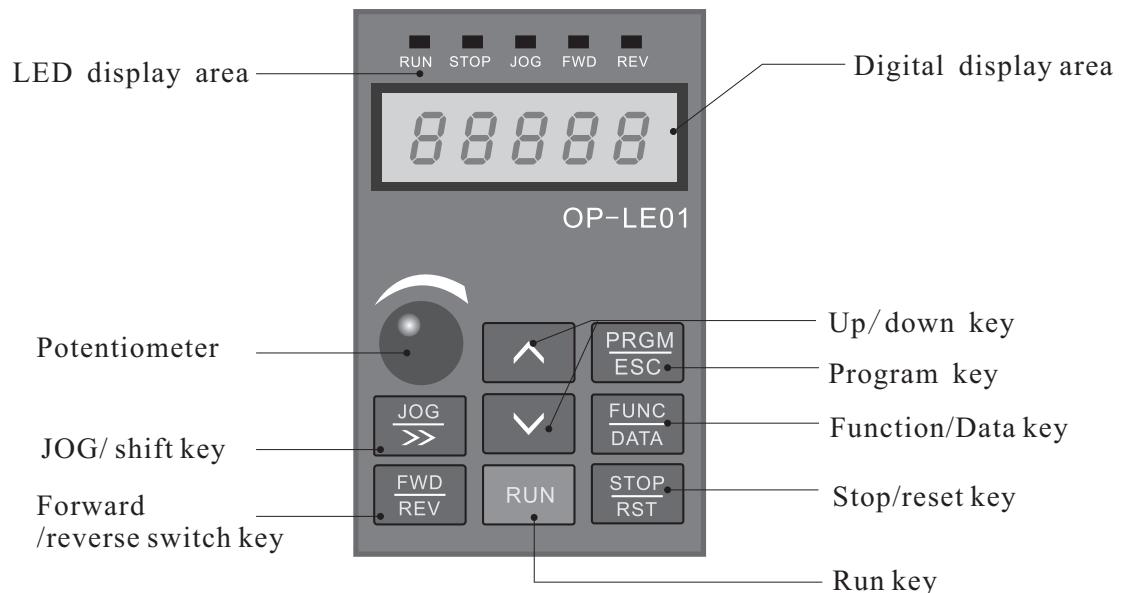


Figure 4-1 Schematic diagram of operation panel

	<b>PRGM/ESC</b> Program key: Enter first level menu or exit parameter group
	<b>FUNCTION/DATA</b> In normal operation mode, press this key to display all items relating to the status and information of the AC drive, such as frequency command, output frequency and output current; In program mode, press this key to display parameters, and press again to write modified data into the internal storage.
	<b>FORWARD/REVERSE</b> Press forward/reverse to slow down the motor to 0Hz, and acceleration in opposite direction to the set frequency.
	<b>JOG/ &gt;&gt;</b> Press this key to execute jog frequency command; In parameter operation mode, this key works as the shift key.

	<b>RUN</b> Used to start AC drive operation.(This key has no effect when the drive is set to terminal/remote run.)
	<b>STOP/RST</b> Used to stop the AC drive operation.If the AC drive has stopped due to a fault, press this key to reset the drive.
	<b>UP/DOWN</b> Used to select parameter items and modify parameters

● Digital display item and description

1. In run state (display item selection refer to parameter F07.03, F07.04)

display code	item description	operation
<i>H</i>	setting frequency	Press  key
<i>P</i>	operation frequency	Press  key
<i>C</i>	output current	Press  key
<i>d</i>	output voltage	Press  key
<i>n</i>	operation speed	Press  key
<i>t</i>	output torque	Press  key
<i>f</i>	output power	Press  key
<i>U</i>	bus voltage	Press  key
<i>A</i>	PID setting value	Press  key
<i>b</i>	PID feedback value	Press  key
<i>I</i>	input terminal state	Press  key
<i>O</i>	output terminal state	Press  key
<i>U</i>	analog AI1 value	Press  key
<i>C</i>	analog AI2 value	Press  key
<i>r</i>	analog AI3 value	Press  key
<i>N</i>	timing value	Press  key
<i>L</i>	length value	Press  key

2. In stopped state (Refer to more details of display items selection in F07. 05) :

Display code	Display items explanation	Operating instructions
H	Setting frequency	Press <b>FUNC DATA</b> key
U	bus voltage	Press <b>FUNC DATA</b> key
I	Input terminal state	Press <b>FUNC DATA</b> key
O	Output terminal state	Press <b>FUNC DATA</b> key
A	PID setting value	Press <b>FUNC DATA</b> key
U	analog AI1 value	Press <b>FUNC DATA</b> key
C	analog AI2 value	Press <b>FUNC DATA</b> key
R	analog AI3 value	Press <b>FUNC DATA</b> key
N	timing value	Press <b>FUNC DATA</b> key
L	length value	Press <b>FUNC DATA</b> key

#### 4. 2 Function code examining and modifying methods explanation:

The operation panel for VP600 series AC drives adopts a three-level menu structure for parameter setting and other operations. The three-level menus respectively are: functional parameter group (first-level menu) → function code (second-level menu) → function code setting value (third-level menu). Operational process is shown in Figure 4-2:

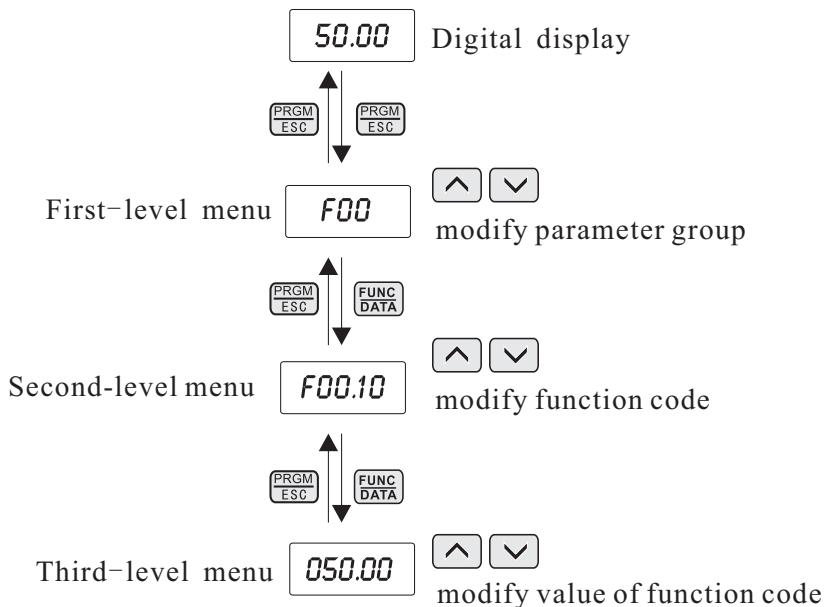
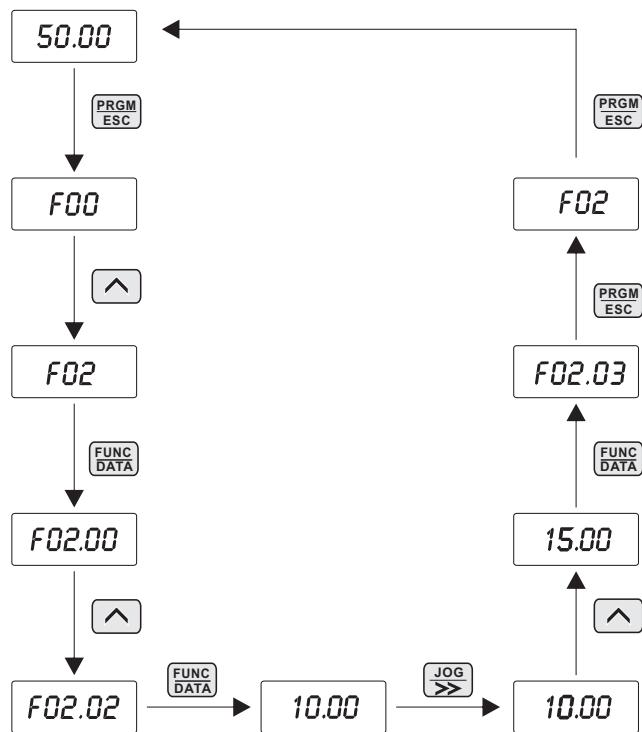


Figure 4-2 Operation flow chart of three-level menu

**Explanation:** In the third-level menu, press PRGM or DATA to return to second -level menu. The difference between them: Press DATA to store the setting parameters into internal storage, display returns to second-level menu and automatically shift to next function code; Press PRGM to return to second-level menu directly without saving parameters, and then return to function code.

For example: Change the function code F1.02 from 10.00Hz to 15.00Hz.(Bold means flash bit):



Picture 4-3 Example for parameter changing

In third-level menu, if parameter does not flash it means this code can not be changed, and the reason may be:

- 1.This parameter of function code cannot be changed,such as an actual measured parameter, or a running record parameter.
- 2.In run state, this function code can only be changed when AC Drive is stopped.

#### 4. 3 How to view status parameters :

In Stopped or Run state, The LED display can be used to display the multiple state parameters of AC drive. The function code F07.03(operating parameter.)and F07.05(stop parameter)can be used to select which parameters are displayed. Please refer to the function code F07.03~F07.05 for more explanations. Press PRGM/ESC to enter first-level menu, press UP/DOWN to cycle through parameter groups, press FUNC/DATA to enter second-level menu, press UP/DOWN to cycle the display through function code of Stopped state or Run state.

In Stopped state a total of 13 parameters are available for selection to be displayed, and respectively are: setting frequency, DC bus voltage,input terminal status,output terminal status, PID setting, analog AI1 value, analog AI2 value, analog AI3 value, timing value, length value, PLC state,load speed,input pulse frequency(kHz). Select second-level menu to display function code F07.05, then press FUNC/DATA to display the selected function code value.

In running status a total 32 status parameters are available for selection to be displayed or not, and respectively are: setting frequency, running frequency, output current, output voltage, running speed, output torque, DC bus voltage,PID setting value,PID feedback value,input terminal status, output terminal status,analog AI1 value, analog AI2 value,analog AI3 value, timing value, length value. Select second-level menu to display function code F07.03/F07.04,then press FUNC/DATA to display the selected function code value.

If AC drive was power is cut and then restored, the display will revert to the selected parameter before the power cut.

#### 4. 4 Password setting:

VP600 series AC drives provide a user password protection function. When F07.00 is set to a non-0, the value is the user password. When the third-level menu, value of function code is modified, exit the menu level for the password protection will take effect. Press PRGM/ESC again to enter function code editing state, it will display “0.0.0.0.0.”. User must enter password correctly, or he cannot get access.

To cancel the password protection function, set F07.00 to 0.

#### 4. 5 Self-learning of motor parameters (when vector control function) :

When you select vector control mode without PG, before running AC Drive, you must input nameplate parameters of the motor correctly. The VP600 series AC drives will match standard motor parameters upon the nameplate parameters. Vector control mode has a strong dependency on motor parameters. To obtain a good control performance, you shall enter the exact parameters of controlled motors.

The operating steps of motor parameters self-learning as below:

First select operation instruction channel (F00.01) as per keypad instruction. Then input following parameters according to motor's actual parameters:

- F02.01: Asynchronous motor 1 rated power;
- F02.02: Asynchronous motor 1 rated frequency;
- F02.03: Asynchronous motor 1 rated speed;
- F02.04: Asynchronous motor 1 rated voltage;
- F02.05: Asynchronous motor 1 rated current.

If motor can be separated from load totally, please select 2 in F02.37 (dynamic self-learning), and then press “RUN” on control panel, AC drives will calculate parameter automatically:

- F02.06: Asynchronous motor 1 stator resistance;
- F02.07: Asynchronous motor 1 rotor resistance;
- F02.08: Asynchronous motor 1 stator and rotor leakage inductance;
- F02.09: Asynchronous motor 1 stator and rotor mutual inductance;
- F02.10: Asynchronous motor 1 no-load current;

If motor cannot be separated from load totally, please select 1 in F02.37 (staticself-learning), and then press “RUN” on control panel.

AC drives will measure these three parameters: stator resistance, rotor resistance and leakage inductive reactance in sequence, AC Drive will not measure excluding mutual inductive reactance and no-load current of motor. Users can calculate these two parameters according to motor nameplate : rated voltage U, rated current I, rated frequency f and power factor  $\eta$ .

The computing methods of motor no-load current and motor mutual inductance are described as below, there into,  $L_s$  is motor leakage inductive reactance.

$$\text{No-load current: } I_0 = I \cdot \sqrt{1 - \eta^2}$$

$$\text{Mutual inductance calculation: } L_m = \frac{U}{2\sqrt{3}\pi f \cdot I_0} - L_s$$

$I_0$  is no-load current,  $L_m$  is mutual inductive reactance, and  $L_s$  is leakage inductive reactance.

## Chapter 5 Function & Parameter Table

The functional parameters of the VP600 series AC drives are grouped by parameter, a total of 16 groups from F00~F15. Each parameter group includes several function codes. Function codes have third-level menus, for example, “F05.08” means the 8th function code of the F05 Parameter Group.

For convenience of setting the function codes via the operation panel the parameter group number corresponds to the first-level menu, function code number corresponds to the second-level menu, and function code value corresponds third-level menu.

1. Note: contents of the function table is described as below:

First column “function code”: Parameter group set and functional code number;

Second column “name”: Full name of functional code;

Third column “setting range”: Valid set of value range for functional code;

Fourth column “factory default”: Original factory default of functional code;

Fifth column“modify” : Alteration property symbol of functional code (whether or not it is permitted to modify and modification conditions). The symbol explanations are described as below:

“※”: means the setting value of this functional code can be modified when AC drive is in stop or running state;

“●”: means the setting value of this functional code cannot be modified when AC drive is in running state;

“\*\*”: means the numerical value of this functional code is a practical detection record value, and cannot be modified;

“#”: means the numerical value of this functional code is a “factory setting”, and cannot be modified by the users.

Sixth column“No.”: Serial number of this function code in the whole function codes, as well as the store address in communication.

(AC drives makes an automatic inspection to ensure the value of modification property of all parameters are within constraints, which can help users to avoid faults in modification.)

2.“Factory default” refers to the numerical value the function code value will return to when you preform the factory reset operation; but detected function code values or recorded values will not be changed.

3. For more effective parameter protection, AC drives provide password protection for function codes. After users set password (the parameter of user password, F07.00 set to non-0), and press PRGM/ESC to enter into user parameter editing state, the system will enter into user password authorization state, and display “0.0.0.0.0.”. The operator must input user password correctly, or access will not be granted. In the unlocked state of password protection, the user password can be altered at any time, and the user password will be confirmed as the last input numerical value. When F07.00 is set to 0, the user password will be canceled; while power is on and F07.00 is set to non-0, then parameters are protected by the password.

4. When the function code values are altered with serial communications, the user password still function as described above.

## Function & Parameter Table

Function code	Name	Description(setting range)	Factory Default	Change
Group F00: Standard Function Parameters				
F00.00	Speed control mode	0: non-PG vector control (SVC) 1: PG vector control (FVC) 2: V/F control	2	●
F00.01	Command source selection	0:keypad control 1:terminal control 2:RS 485 communication control	0	※
F00.02	Run command source of communication	0: Modbus communication card	0	※
F00.03	Max.output frequency	50.00Hz~600.00Hz	50.00Hz	●
F00.04	Run frequency upper limit	F00.05~F00.03 (max.frequency)	50.00Hz	※
F00.05	Run frequency lower limit	0.00Hz~F00.04(run frequency upper limit)	00.00Hz	※
F00.06	Frequency A command selection	0:keypad, no retentive upon power failure 1:keypad, retentive upon power failure 2:analog AI1 3:analog AI2 4:analog AI3 5:pulse (HDI) 6:multi-speed running 7:simple PLC 8:PID control 9:RS485 Communication 10:potentiometer	0	●
F00.07	Frequency B command selection	same as F00.06	0	●
F00.08	Range of frequency B command selection	0: relative to maximum frequency 1: relative to frequency A command	0	※

Function code	Name	Description(setting range)	Factory Default	Change
F00.09	Frequency source combination mode	0 : frequency A command 1 : frequency B command 2 : switch over between frequency A command and frequency B command 3 : A+B 4 : A-B 5 : MAX (A and B) 6 : MIN (A and B)	0	※
F00.10	Keypad setting frequency	0.00Hz~F00.03 (max. frequency)	50.00Hz	※
F00.11	Frequency reference resolution	1:0.1Hz 2:0.01Hz	2	●
F00.12	Acceleration time 1	0.00s~6500.0s	Model dependent	※
F00.13	Deceleration time 1	0.00s~6500.0s	Model dependent	※
F00.14	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1	●
F00.15	Acceleration/Deceleration time base frequency	0:max.frequency (F00.03) 1:setting frequency 2:100Hz	0	●
F00.16	Rotation direction	0: same direction 1: reverse direction	0	※
F00.17	Carrier frequency	0.5kHz~16.0kHz	Model dependent	※
F00.18	Carrier frequency adjustment with temperature	0: No 1 : Yes	1	※
F00.19	Source of frequency upper limit	0 : set by F00.04 1: analog AI1 2:analog AI2 3:analog AI3 4:pulse(HDI) 5:RS485 communication	0	●
F00.20	Frequency upper limit offset	0.00Hz~max.frequency (F00.03)	00.00Hz	※
F00.21	Base frequency for UP/DOWN modification during running	0: running frequency 1: set frequency	0	●

Function code	Name	Description(setting range)	Factory Default	Change
F00.22	Binding command source to frequency source	Unit digit: (Binding keypad command to frequency source) 0: no binding 1 : keypad setting 2: analog AI1 3: analog AI2 4: analog AI3 5:pulse setting (HDI) 6: multi-speed run setting 7: Simple PLC 8: PID control 9: RS485 communication Ten's digit (Binding terminal command to frequency source) Hundred' s digit (Binding communication command to frequency source) Thousands digit: (Binding auto-operation command to frequency source)	0000	※
F00.23	Range of frequency B source during superposition	0%～150%	100%	※
F00.25	Frequency offset of frequency B source during superposition	0.00Hz～max.frequency F00.03	00.00Hz	※
F00.26	Retention of keypad frequency setting upon power failure	0: no retentive 1: retentive	0	※
F00.27	Motor model selection	0: G type (constant torque load) 1: P type (variable torque load)	Model dependent	**
F00.28	Function parameter restore	0: no operation 1: restore factory defaults,not include motor parameter 2: clear fault file	0	●
F00.29	Reserved	-		
F00.30	Reserved	-		

Function code	Name	Description(setting range)	Factory Default	Change
Group F01: Start-stop Control Parameters				
F01.00	Start mode	0:direct start 1:rotational speed tracking restart (valid on V/F control) 2: pre-excited start	0	※
F01.01	Startup frequency	0.00Hz~10.00Hz	0.00Hz	※
F01.02	Startup frequency holding time	0.0s~100.0s	0.0s	●
F01.03	Startup DC braking current/ Pre-excited current	0%~100%	0%	●
F01.04	Startup DC braking time/ Pre-excited time	0.0s~100.0s	0.0s	●
F01.05	Acceleration/ deceleration mode	0: line Acc/Dec time 1 : S curve Acc/Dec A 2 : S curve Acc/Dec B	0	●
F01.06	Time proportion of S-curve start segment	0.0%~ (100.0%-F01.07)	30.0%	●
F01.07	Time proportion of S-curve end segment	0.0%~ (100.0%-F01.06)	30.0%	●
F01.08	Stop mode	0: deceleration to stop 1:stop freely	0	※
F01.09	Initial frequency of stop DC braking	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F01.10	Waiting time of stop DC braking	0.0s~100.0s	0.0s	※
F01.11	Stop DC braking current	0%~100%	0%	※
F01.12	Stop DC braking time	0.0s~100.0s	0.0s	※
F01.13	Rotational speed tracking mode	0: start from frequency at stop 1 : start from zero speed 2: start from max. frequency	0	●
F01.14	Rotational speed tracking speed	1~100	20	※
F01.15	Brake usage rate	0%~100%	100%	※

Function code	Name	Description(setting range)	Factory Default	Change
Group F02: Motor 1 Parameters				
F02.00	Motor type selection	0:common asynchronous motor 1:variable frequency asynchronous motor	0	●
F02.01	Rated power of asynchronous motor 1	0.1kW~1000.0kW	Model dependent	●
F02.02	Rated frequency of asynchronous motor 1	0.01Hz~F00.03 (max. frequency)	Model dependent	●
F02.03	Rated speed of asynchronous motor 1	1rpm~65535rpm	Model dependent	●
F02.04	Rated voltage of asynchronous motor 1	1V~2000V	Model dependent	●
F02.05	Rated current of asynchronous motor 1	0.01A~655.35A (AC drive power<=55kW) 0.1A~6553.5A (AC drive power>55kW)	Model dependent	●
F02.06	Stator resistance of asynchronous motor 1	0.001Ω~65.535Ω (inverter power<=55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	●
F02.07	Rotor resistance of asynchronous motor 1	0.001Ω~65.535Ω (AC drive power<=55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	●
F02.08	Leakage inductive reactance of asynchronous motor 1	0.01mH~655.35mH (AC drive power<=55kW) 0.001mH~65.535mH (AC drive power>55kW)	Model dependent	●
F02.09	Mutual inductive reactance of asynchronous motor 1	0.1mH~6553.5mH (inverter power<=55kW) 0.01mH~655.35mH (AC drive power>55kW)	Model dependent	●
F02.10	No-load current of asynchronous motor 1	0.01A~F02.05 (inverter power<=55kW) 0.1A~F02.05 (AC drive power>55kW)	Model dependent	●

Function code	Name	Description(setting range)	Factory Default	Change
F02.27	Encoder type	0:ABZ incremental encoder 1:UVW incremental encoder	0	●
F02.28	Selection of PG card	0:QEP1	0	●
F02.29	Encoder pulses per revolution	1~65535	2500	●
F02.30	AB phase sequence of ABZ incremental encoder	0: forward 1: reverse	0	●
F02.31	Encoder installation angle	0.0~359.9°	0.0°	●
F02.32	UVW phase sequence of UVW encoder	0: forward 1: reverse	0	●
F02.33	UVW encoder angle offset	0.0~359.9°	0.0°	●
F02.36	Encoder wire-break fault detection time	0.0s: No action 0.1~10.0s	0.0	●
F02.37	Self-learning of motor parameter	0: no self-learning 1: static self-learning of asynchronous motor 2: dynamic self-learning of asynchronous motor	0	●

Function code	Name	Description(setting range)	Factory Default	Change
Group F03: Vector Control Parameters				
F03.00	Proportional gain 1 of speed loop	1~100	30	※
F03.01	Integral time 1 of speed loop	0.01s~10.00s	0.50s	※
F03.02	Switch over low point frequency	0.00Hz~F03.05	5.00Hz	※
F03.03	Proportional gain 2 of speed loop	1~100	20	※
F03.04	Integral time 2 of speed loop	0.01s~10.00s	1.00s	※
F03.05	Switch over high point frequency	F03.02~F00.03 (max. frequency)	10.00Hz	※
F03.06	Vector control slip gain	50%~200%	100%	※
F03.07	Speed loop output filter	0.000s~0.100s	0.000s	※
F03.08	Vector control over excitation gain	0~200	64	※
F03.09	Torque upper limit source in speed control mode	0:F03.10 1:analog AI1 2:analog AI2 3:analog AI3 4:Pulse (HDI) 5:RS485 Communication 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) ( corresponding to F03.10 digital setting)	0	※
F03.10	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	150.0%	※
F03.13	Excitation adjustment proportional gain	0~60000	2000	※
F03.14	Excitation adjustment integral gain	0~60000	1300	※
F03.15	Torque adjustment proportion gain	0~60000	2000	※
F03.16	Torque adjustment integral gain	0~60000	1300	※
F03.17	Speed loop integral property	Units' digit: integral separation 0: invalid 1: valid	0	※

Function code	Name	Description(setting range)	Factory Default	Change
F03.21	Field weakening automatic adjustment gain	10%~500%	100%	※
F03.22	Field weakening integral multiple	2~10	2	※
F03.23	Speed/torque control mode selection	0: speed control 1: torque control	0	●
F03.24	Torque setting mode selection	0: digital setting (F03.26) 1:analog AI1 2:analog AI2 3:analog AI3 4:PULSE (HDI) 5:RS485 Communication 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) ( corresponding to F03.26 digital setting)	0	●
F03.26	Torque setting by keypad	-200.0%~200.0%	150.0%	※
F03.28	Upper frequency limit of forward when torque control	0.00Hz~F00. 03(max. frequency)	50.00Hz	※
F03.29	Upper frequency limit of reverse when torque control	0.00Hz~F00. 03 (max. frequency)	50.00Hz	※
F03.30	Torque control acceleration time	0.00s~650.00s	0.00s	※
F03.31	Torque control deceleration time	0.00s~650.00s	0.00s	※

## Group F04: V/F Control Parameters

F04.00	Motor1 V/F curve setting	0 : linear V/F 1 : multi-point V/F 2 : square V/F 3 : V/F complete separation 4 : V/F half separation 5 : 1. 2 square V/F 6 : 1. 4 square V/F 7 : 1. 6 square V/F 8 : 1. 8 square V/F	0	●
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Function code	Name	Description(setting range)	Factory Default	Change
F04.01	Motor 1 torque boost	0.0% : (auto torque boost) 0.1%~30.0%	Model dependent	※
F04.02	Cut-off frequency of motor 1 torque boost	0.00Hz~F00.03(max.frequency)	50.00Hz	●
F04.03	Motor1 V/F frequency point 1	0.00Hz~F04.05	0.00Hz	●
F04.04	Motor1 V/F voltage point 1	0.0%~100.0%	0.0%	●
F04.05	Motor1 V/F frequency point 2	F04.03~F04.07	0.00Hz	●
F04.06	Motor1 V/F voltage point 2	0.0%~100.0%	0.0%	●
F04.07	Motor1 V/F frequency point 3	F04.05~F02.02 motor rated frequency	0.00Hz	●
F04.08	Motor1 V/F voltage point 3	0.0%~100.0%	0.0%	●
F04.09	Motor1 V/F slip compensation gain	0.0%~200.0%	0.0%	※
F04.10	V/F over-excitation gain	0~200	64	※
F04.11	V/F oscillation suppression gain	0~100	Model dependent	※
F04.13	Voltage source for V/F separation	0: digital setting (F04.14) 1: analog AI1 2: analog AI2 3: analog AI3 4: pulse (HDI) 5: multi-speed operation 6: simple PLC 7: PID control 8: RS485 Communication ( corresponding F02.04 digital setting)	0	※
F04.14	Digital setting V/F separation of voltage	0V~F02.04(motor rated voltage)	0V	※
F04.15	Voltage digital setting for V/F separation	0.0s~1000.0s note: time from 0V to motor rated voltage (F02.04)	0.0s	※

Function code	Name	Description(setting range)	Factory Default	Change
Group F05: Input Terminals				
F05.00	S1 terminal function selection		1	●
F05.01	S2 terminal function selection	0: no function	4	●
F05.02	S3 terminal function selection	1: forward run	9	●
F05.03	S4 terminal function selection	2: reverse run	12	●
F05.04	S5 terminal function selection	3: 3-wire operation control	13	●
F05.05	S6 terminal function selection	4: forward jog	2	●
F05.06	S7 terminal function selection	5: reverse jog	0	●
F05.07	S8 terminal function selection	6: coast to stop	0	●
F05.08	S9 terminal function selection	7: fault reset	0	●
F05.09	HDI terminal function selection	8: external fault normal open input 9: UP command 10: DOWN command 11: clear UP/DOWN (terminal, keypad) 12: multi-speed terminal 1 13: multi-speed terminal 2 14: multi-speed terminal 3 15: multi-speed terminal 4 16: Pause operation 17: Acc/Dec time selection 1 18: Acc/Dec time selection 2 19: frequency source switch over 20: run command switch over terminal 21: Acceleration/Deceleration prohibited 22: PID pause 23: PLC status reset 24: swing pause	0	●

Function code	Name	Description(setting range)	Factory Default	Change
		25:terminal count 26:counter reset 27:length count input 28:length reset 29:torque control prohibited 30:pulse input (enabled only for HDI) 31:reserved 32:immediate DC braking 33:Normally closed (NC) input of external fault 34:frequency modification forbidden 35:reverse PID action direction 36:external STOP terminal 1 37:command source switch over terminal 2 38:PID integral pause 39:reserved 40:reserved 41:motor selection terminal 1 42:reserved 43:PID parameter switch over 44:reserved 45:reserved 46:speed / torque control switch over 47:emergency stop 48:external stop terminal 2 49:deceleration DC braking 50:clear the current running time		

Function code	Name	Description(setting range)	Factory Default	Change
F05.10	Input terminal valid mode selection 1	0 : valid on high level 1 : valid on low level units' digit: S1 tens' digit: S2 hundreds' digit: S3 thousands' digit: S4 ten thousands' digit: S5	00000	●
F05.11	Input terminal polarity selection 2	0 : valid on high level 1 : valid on low level units' digit: S6 tens' digit: S7 hundreds' digit: S8 thousands' digit: S9 ten thousands' digit: HDI	00000	●
F05.12	Filtering time of switch	0.000s~1.000s	0.010s	※
F05.13	Terminal control operation mode	0: 2-wire control 1 1: 2-wire control 2 2: 3-wire control1 3: 3-wire control 2	0	●
F05.14	Terminal UP/DOWN rate	0.001Hz/s~65.535Hz/s	1.00Hz/s	※
F05.15	S1 delay time	0.0s~3600.0s	0.0s	●
F05.16	S2 delay time	0.0s~3600.0s	0.0s	●
F05.17	S3 delay time	0.0s~3600.0s	0.0s	●
F05.18	AI1 lower limit	0.00V~F05.20	0.00V	※
F05.19	Corresponding setting of AI1 lower limit	-100.0%~+100.0%	0.0%	※
F05.20	AI1 upper limit	F05.18~+10.00V	10.00V	※
F05.21	Corresponding setting of AI1 upper limit	-100.0%~+100.0%	100.0%	※
F05.22	AI1 input filter time	0.00s~10.00s	0.10s	※
F05.23	AI2 low limit	0.00V~F05.25	0.00V	※

Function code	Name	Description(setting range)	Factory Default	Change
F05.24	Corresponding setting of AI2 lower limit	-100.0%~+100.0%	0.0%	※
F05.25	AI2 upper limit	F05.23~+10.00V	10.00V	※
F05.26	Corresponding setting of AI2 upper limit	-100.0%~+100.0%	100.0%	※
F05.27	AI2 input filter time	0.00s~10.00s	0.10s	※
F05.28	AI3 lower limit	-10.00V~F05.30	0.00V	※
F05.29	Corresponding setting of AI3 lower limit	-100.0%~+100.0%	0	※
F05.30	AI3 upper limit	F05.28~+10.00V	4.00V	※
F05.31	Corresponding setting of AI3 upper limit	-100.0%~+100.0%	100.0%	※
F05.32	AI3 input filter time	0.00s~10.00s	0.10s	※
F05.33	HDI lower limit	0.00kHz~F05.35	0.00kHz	※
F05.34	Corresponding setting of HDI lower limit	-100.0%~+100.0%	0.0%	※
F05.35	HDI upper limit	F05.33~+100.00kHz	50.00kHz	※
F05.36	Corresponding setting of HDI upper limit	-100.0%~+100.0%	100.0%	※
F05.37	HDI frequency input filter time	0.00s~10.00s	0.10s	※
F05.38	AI curve selection	units' digit: AI curve selection 1: curve 1 (2 point, see F05.18~F05.21) 2: curve 2 (2 point, see F05.23~F05.26) 3: curve 3 (2 point, see F05.28~F05.31) 4: curve 4 (4 point, see F05.40~F05.47) 5: curve 5 (4 point, see F05.48~F05.55) tens' digit: : AI2 curve selection hundreds' digit: AI3 curve selection	H.321	※
F05.39	Setting for AI less than minimum input	units' digit: (setting for AI1 less than minimum input) 0: corresponding to the minimum input set 1: 0.0% tens' digit: (setting for AI2 less than minimum input) setting selection hundreds' digit: (setting for AI3 less than minimum input)	H.000	※

Function code	Name	Description(setting range)	Factory Default	Change
F05.40	AI curve 4 lower limit	-10.00V~F05.42	0.00V	※
F05.41	AI curve 4 lower limit setting	-100.0%~+100.0%	0.0%	※
F05.42	AI curve 4 inflection point 1 input	F05.40~F05.44	3.00V	※
F05.43	AI curve 4 inflection point 1 input setting	-100.0%~+100.0%	30.0%	※
F05.44	AI curve 4 inflection point 2 input	F05.42~F05.46	6.00V	※
F05.45	AI curve 4 inflection point 2 input setting	-100.0%~+100.0%	60.0%	※
F05.46	AI curve 4 upper limit	F05.44~ +10.00V	10.00V	※
F05.47	AI curve 4 upper limit setting	-100.0%~+100.0%	100.0%	※
F05.48	AI curve 5 lower limit	-10.00V~F05.50	-10.00V	※
F05.49	AI curve 5 lower limit setting	-100.0%~+100.0%	-100.0%	※
F05.50	AI curve 5 inflection point 1 input	F05.48~F05.52	-3.00V	※
F05.51	AI curve 5 inflection point 1 setting	-100.0%~+100.0%	-30.0%	※
F05.52	AI curve 5 inflection point 2 input	F05.50~F05.54	3.00V	※
F05.53	AI curve 5 inflection point 2 setting	-100.0%~+100.0%	30.0%	※
F05.54	AI curve 5 upper limit	F05.52~ +10.00V	10.00V	※
F05.55	AI curve 5 upper limit setting	-100.0%~+100.0%	100.0%	※
F05.64	AI1 jump point setting	-100.0%~100.0%	0.0%	※
F05.65	AI1 jump point range setting	0.0%~100.0%	0.5%	※
F05.66	AI2 jump point setting	-100.0%~100.0%	0.0%	※
F05.67	AI2 jump point range setting	0.0%~100.0%	0.5%	※
F05.68	AI3 jump point setting	-100.0%~100.0%	0.0%	※
F05.69	AI3 jump point range setting	0.0%~100.0%	0.5%	※

Function code	Name	Description(setting range)	Factory Default	Change
Group F06: Output Terminals				
F06.00	HDO terminal output mode	0: Pulse output (HDOP) 1: Switch signal output (HDOR)	0	※
F06.01	HDOR output selection	0: no output	0	※
F06.02	Relay TA output selection (TA*TB*TC)	1: frequency reached 2: frequency-level detection	2	※
F06.03	Relay RA output selection (RA*RB*RC)	FDT1 output 3: fault output (stop)	0	※
F06.04	MO1 output selection	4: motor overload pre-warning 5: AC drive overload pre-warning 6: zero-speed running (no output at stop) 7: zero-speed running 2 (no output at stop) 8: frequency upper limit reached 9: frequency lower limit reached (no output at stop) 10: set count value reached 11: designated count value reached 12: length reached 13: PLC cycle complete 14: accumulative running time reached 15: frequency limited 16: torque limited 17: ready for RUN 18: AC drive running 19: AI1>AI2 20: undervoltage state output 22: reserved 23: reserved 24: accumulative power-on time reached 25: Frequency level detection FDT2 output	1	※

Function code	Name	Description(setting range)	Factory Default	Change
		26:frequency 1 reached 27:frequency 2 reached 28:current 1 reached 29:current 2 reached 30:timing reached 31:AI1 input limit exceeded 32:load becoming 0 33:reverse running 34:zero current state 35:module temperature reached 36:output current limit exceeded 37:Frequency lower limit reached (having output at stop) 38:Alarm output (keep running) 39:motor overheat warning 40:current running time reached		
F06.06	Output terminal valid mode selection	0: Positive logic 1: Negative logic Unit's digit: HDO Ten's digit: TA Hundred's digit: RA Thousand's digit: MO1	0000	※
F06.07	HDO delay time	0.0s~3600.0s	0.0s	※
F06.08	TA delay time	0.0s~3600.0s	0.0s	※
F06.09	RA delay time	0.0s~3600.0s	0.0s	※
F06.10	MO1 output delay time	0.0s~3600.0s	0.0s	※

Function code	Name	Description(setting range)	Factory Default	Change
F06.12	HDOP output selection		0	※
F06.13	AO1 output selection	0: setting frequency 1: running frequency	0	※
F06.14	AO2 output selection	2:output current 3:output voltage 4:output speed 5:output torque 6:output power 7:Pulse input (100% corresponding to 100.0kHz) 8:AI1 9:AI2 10:AI3 11:lenth 12:count value 13:RS485 communication 14:output current (100.0% corresponding to 1000.0A) 15:output voltage (100.0% corresponding to 1000.0V) 16:reserved	1	※
F06.15	AO1 offset coefficient	-100.0%~100.0%	0.0%	※
F06.16	AO1 gain	-10.00~+10.00	1.00	※
F06.17	AO2 offset coefficient	-100.0%~100.0%	0.0%	※
F06.18	AO2 gain	-10.00~+10.00	1.00	※
F06.19	AO1 output filter time	0~10.00	0	※
F06.20	AO2 output filter time	0~10.00	0	※
F06.21	HDO output filter time	0~10.00	0	※
F06.22	HDO output max.frequency	0.01kHz~100.00kHz	50.00kHz	※

Function code	Name	Description(setting range)	Factory Default	Change
Group F07: Keypad And Display				
F07.00	User password	0~65535	0	※
F07.02	STOP key function selection	0: STOP/RST key enabled only in keypad control 1: STOP/RST key enabled in any operation mode	1	※
F07.03	LED display running parameters 1	0000–FFFF Bit00: running frequency 1 (Hz) Bit01: set frequency (Hz) Bit02: output current (A) Bit03: output voltage (V) Bit04: load speed display Bit05: output power (kW) Bit06: output torque (%) Bit07: bus voltage (V) Bit08: PID setting Bit09: PID feedback value Bit10: input terminal status Bit11: output terminal status Bit12: AI1 voltage (V) Bit13: AI2 voltage (V) Bit14: AI3 voltage (V) Bit15: count value	H.008F	※

Function code	Name	Description(setting range)	Factory Default	Change
F07.04	LED display running parameters 2	0000–FFFF Bit00:length value Bit01:PLC stage Bit02: pulse setting frequency(kHz) Bit03:running frequency 2 (Hz) Bit04:remaining running time Bit05:AI1 voltage before correction (V) Bit06:AI2 voltage before correction (V) Bit07:AI3 voltage before correction (V) Bit08: linear speed Bit09: current power-on time(Hour) Bit10: current running time (Min) Bit11: pulse setting frequency(Hz) Bit12: Rs485 communication setting value Bit13: encoder feedback speed(Hz) Bit14: main frequency A display(Hz) Bit15: auxiliary frequency B display (Hz)	H.0000	※
F07.05	LED display stop parameters	0000–FFFF Bit00: set frequency (Hz) Bit01: bus voltage (V) Bit02: input terminal status Bit03: output terminal status Bit04: PID setting Bit05: AI1 voltage (V) Bit06: AI2 voltage (V) Bit07: AI3 voltage (V) Bit08: Count value Bit09: Length value Bit10: PLC stage Bit11: Load speed Bit12: Pulse setting frequency (kHz)	H.0063	※

Function code	Name	Description(setting range)	Factory Default	Change
F07.06	Load speed display coefficient	0.0001~6.5000	1.0000	※
F07.07	Heatsink temperature of rectifier bridge	0.0°C~100.0°C	-	**
F07.08	Heatsink temperature of inverter module	0.0°C~100.0°C	-	**
F07.09	Software version	-	-	**
F07.10	Accumulative running time	0h~65535h	-	**
F07.11	Product number	-	-	**
F07.12	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	※
F07.13	Accumulative power-on time	0h~65535h	-	**
F07.14	Accumulative power consumption	0~65535 kWh	-	**

## Group F08: Auxiliary Functions

F08.00	Acceleration time 2	0.0s~6500.0s	Model dependent	※
F08.01	Deceleration time 2	0.0s~6500.0s	Model dependent	※
F08.02	Acceleration time 3	0.0s~6500.0s	Model dependent	※
F08.03	Deceleration time 3	0.0s~6500.0s	Model dependent	※
F08.04	Acceleration time 4	0.0s~6500.0s	Model dependent	※
F08.05	Deceleration time 4	0.0s~6500.0s	Model dependent	※
F08.06	JOG running frequency	0.00Hz~F00.03 (max. frequency)	2.00Hz	※
F08.07	JOG acceleration time	0.0s~6500.0s	20.0s	※
F08.08	JOG deceleration time	0.0s~6500.0s	20.0s	※
F08.09	Jump frequency 1	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F08.10	Jump frequency 2	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F08.11	Frequency jump amplitude	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F08.12	Forward/Reverse rotation dead-zone time	0.0s~3000.0s	0.0s	※
F08.13	Reverse control	0: enabled 1: disabled	0	※
F08.14	Running mode when set frequency lower than frequency lower limit	0:run at frequency lower limit 1:stop 2:run at zero speed	0	※

Function code	Name	Description(setting range)	Factory Default	Change
F08.15	Accumulative power-on time threshold	0h~65000h	0h	※
F08.16	Accumulative running time threshold	0h~65000h	0h	※
F08.17	Startup protection	0: No 1: Yes	0	※
F08.18	Droop control	0.00Hz~10.00Hz	0.00Hz	※
F08.19	Motor switch over	0:Motor 1 1:Motor 2	0	●
F08.20	Frequency detection value (FDT1)	0.00Hz~F00.03 (max. frequency)	50.00Hz	※
F08.21	Frequency detection hysteresis (FDT hysteresis 1)	0.0%~100.0% (FDT1 level)	5.0%	※
F08.22	Frequency detection value (FDT2)	0.00Hz~F00.03 (max. frequency)	50.00Hz	※
F08.23	Frequency detection hysteresis (FDT hysteresis 2)	0.0%~100.0% (FDT2 level)	5.0%	※
F08.24	Detection range of frequency reached	0.0%~100.0% (F00.03 (max. frequency))	0.0%	※
F08.25	Jump frequency during acceleration/deceleration	0: disabled 1: enabled	0	※
F08.28	Frequency switch over point between acceleration time 1 and acceleration time 2	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F08.29	Frequency switch over point between deceleration time 1 and deceleration time 2	0.00Hz~F00.03 (max. frequency)	0.00Hz	※
F08.30	Terminal JOG preferred	0: disabled 1: enabled	0	※
F08.31	Any frequency reaching detection value 1	0.00Hz~F00.03 (max. frequency)	50.00Hz	※
F08.32	Any frequency reaching detection amplitude 1	0.0%~100.0% (F00.03 (max.frequency))	0.0%	※
F08.33	Any frequency reaching detection value 2	0.00Hz~F00.03 (max. frequency)	50.00Hz	※
F08.34	Any frequency reaching detection amplitude 2	0.0%~100.0% (F00.03 (max. frequency))	0.0%	※
F08.35	Zero current detection level	0.0%~300.0% (rated motor current)	5.0%	※
F08.36	Zero current detection delay time	0.01s~600.00s	0.10s	※
F08.37	Output overcurrent threshold	0.0% (no detection) 0.1%~300.0% (rated motor current)	200.0%	※
F08.38	Output overcurrent detection delay time	0.00s~600.00s	0.00s	※
F08.39	Any current reaching 1	0.0%~300.0% ((rated motor current))	100.0%	※

Function code	Name	Description(setting range)	Factory Default	Change
F08.40	Any current reaching 1 amplitude	0.0%~300.0% (rated motor current)	0.0%	※
F08.41	Any current reaching 2	0.0%~300.0% (rated motor current)	100.0%	※
F08.42	Any current reaching 2 amplitude	0.0%~300.0% (rated motor current)	0.0%	※
F08.43	Timing function	0: Disabled 1: Enabled	0	※
F08.44	Timing duration source	0: F08.45 1: analog AI1 2: analog AI2 3: analog AI3 (100% of analog input corresponds to the value of F8.45)	0	※
F08.45	Timing duration	0.0Min~6500.0Min	0.0Min	※
F08.46	AI1 input voltage lower limit	0.00V~F08.47	3.10V	※
F08.47	AI1 input voltage upper limit	F08.46~10.00V	6.80V	※
F08.48	Module temperature threshold	0°C~100°C	75°C	※
F08.49	Cooling fan control	0: Fan working during running 1: Fan working continuously	0	※
F08.50	Wakeup frequency	Dormant frequency (F8.52) to maximum frequency (F00.03)	0.00Hz	※
F08.51	Wakeup delay time	0.0s~6500.0s	0.0s	※
F08.52	Dormant frequency	0.00 Hz to wakeup frequency F08.50	0.00Hz	※
F08.53	Dormant delay time	0.0s~6500.0s	0.0s	※
F08.54	Current running time reached	0.0Min~6500.0Min	0.0Min	※
F08.55	DPWM switch over running frequency upper limit	0.00Hz~15.00Hz	12.00Hz	※
F08.56	PWM modulation system	0: asynchronous modulation 1: synchronous modulation	0	※
F08.57	Dead zone compensation mode selection	0: no compensation 1: compensation mode 1 2: compensation mode 2	1	※
F08.58	Depth of PWM random	0: PWM random disabled 1~10: PWM carrier frequency random depth	0	※
F08.59	Rapid current limit	0: Disabled 1: Enabled	1	※

Function code	Name	Description(setting range)	Factory Default	Change
F08.60	Current detection compensation	0~100	5	※
F08.61	Under-voltage point	60.0%~140.0%	100.0%	※
F08.62	SVC optimize mode selection	0: no optimize 1: optimize mode 1 2: optimize mode 2	1	※
F08.63	Dead-zone time adjustment	100%~200%	150%	※
F08.64	Over-voltage point	200.0V~2500.0V	Model dependent	※

## Group F09: Fault and Protection

F09.00	Input phase loss protection	0: disabled 1: enabled	1	※
F09.01	Output phase loss protection	0: disabled 1: enabled	1	※
F09.02	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0	※
F09.03	Voltage rally judging time at instantaneous power failure	0.00s~100.00s	0.50s	※
F09.04	Action judging voltage at instantaneous power failure	60.0%~100.0%(standard bus voltage)	80.0%	※
F09.05	Ovvoltage stall gain	0~100	0	※
F09.06	Ovvoltage stall protective voltage	120%~150%	130%	※
F09.07	Overcurrent stall gain	0~100	20	※
F09.08	Overcurrent stall protective current	100%~200%	150%	※
F09.09	Motor overload warning selection	0: disabled 1: enabled	1	※
F09.10	Motor overload pre-alarm warning detection levels	0.20~10.00	1.00	※
F09.11	Motor overload pre-alarm warning detection time	50%~100%	80%	※
F09.12	Protection upon load becoming 0	0: disabled 1: enabled	0	※
F09.13	Detection level of load becoming 0	0.0~100.0% (rated motor current)	10.0%	※
F09.14	Detection time of load becoming 0	0.0~60.0s	1.0s	※
F09.15	Over-speed detection value	0.0%~50.0% (F00.03 (max. frequency))	20.0%	※

Function code	Name	Description(setting range)	Factory Default	Change
F09.16	Over-speed detection time	0.0~60.0s	1.0s	※
F09.17	Detection value of too large speed deviation	0.0%~50.0% (F00.03 (max. frequency))	20.0%	※
F09.18	Detection time of too large speed deviation	0.0s~60.0s	5.0s	※
F09.19	Fault auto reset times	0~20	0	※
F09.20	Time interval of fault auto reset	0.1s~100.0s	1.0s	※
F09.21	Fault protection action selection 1	Unit's digit:motor overload (E007) 0:coast to stop 1:stop according to the stop mode 2:continue to run Ten's digit :power input phase loss (E012) Hundred's digit:power output phase loss (E013) Thousand's digit:external equipment fault(E00d) Ten thousand's digit:communication fault(E018)	00000	※
F09.22	Fault protection action selection 2	Unit's digit:encoder/PG card fault(E026) 0:coast to stop Ten's digit:EEPROM read-write fault(E021) 0:coast to stop 1:stop according to the stop mode Hundred's digit: reserved Thousand's digit: motor overheat(E036) Ten thousand's digit (Accumulative running time reached)(E020)	00000	※
F09.23	Fault protection action selection 3	Unit's digit: reserved Ten's digit: reserved Hundred's digit (Accumulative power-on time reached (E029) 0: coast to stop 1: stop according to the stop mode 2: continue to run Thousand's digit: off load (E030) 0: coast to stop 1 : decelerate to stop 2 : continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers	00000	※

Function code	Name	Description(setting range)	Factory Default	Change
		Ten thousand's digit :PID feedback lost during running (E02E) 0:coast to stop 1:stop according to the stop mode 2:continue to run		
F09.24	Fault protection action selection 4	Unit's digit :too large speed deviation (E034) 0:coast to stop 1:stop according to the stop mode 2:continue to run Ten's digit :motor over-speed (E035) Hundred's digit :initial position fault (E037)	000	※
F09.26	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Set frequency 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0	※
F09.27	Current fault type	0: No fault 1: Overcurrent during acceleration (E004) 2: Overcurrent during deceleration (E005) 3: Overcurrent at constant speed 4: Overvoltage during acceleration (E002) 5: Overvoltage during deceleration (E00A) 6: Overvoltage at constant speed (E003) 7: Undervoltage (E001) 8: Motor overload (E007) 9: AC drive overload (E008) 10: Power input phase loss (E012) 11: Power output phase loss (E013) 12: Module overheat (E00E) 13: Buffer resistance overload (E014)	—	●
F09.28	2nd fault type		—	●
F09.29	1st fault type		—	●

Function code	Name	Description(setting range)	Factory Default	Change
		14: Contactor fault (E017) 15: External equipment fault (E00d) 16: Communication fault(E018) 17: Current detection fault (E015) 18: Motor auto-tuning fault (E016) 19: Running time reached (E020) 20: EEPROM read-write fault (E00F) 21: Short circuit to ground (E023) 22: PID feedback lost during running (E02E) 23: Encoder/PG card fault(E026) 24: AC drive hardware fault (E033) 25: Power-on time reached (E029) 26: Load becoming 0 (E030) 27: With-wave current limit fault (E032) 28: Too large speed deviation (E034) 29: Motor switch over fault during running (E038) 30: Motor over-speed (E035) 31: Motor overheat (E036) 32: Initial position fault (E037)		
F09.30	Frequency upon current fault	–	–	●
F09.31	Output current upon current fault	–	–	●
F09.32	Bus voltage upon current fault	–	–	●
F09.33	Input terminal status upon current fault	–	–	●
F09.34	Output terminal status upon current fault	–	–	●
F09.35	AC drive status upon current fault	–	–	●
F09.36	Power-on time status upon current fault	–	–	●
F09.37	Running time status upon current fault	–	–	●
F09.38	Frequency upon 2nd fault	–	–	●
F09.39	Output current upon 2nd fault	–	–	●

Function code	Name	Description(setting range)	Factory Default	Change
F09.40	Bus voltage upon 2nd fault	–	–	●
F09.41	Input terminal status upon 2nd fault	–	–	●
F09.42	Output terminal status upon 2nd fault	–	–	●
F09.43	AC drive status upon 2nd fault	–	–	●
F09.44	Power-on time upon 2nd fault	–	–	●
F09.45	Running time upon 2nd fault	–	–	●
F09.46	Frequency upon 1st fault	–	–	●
F09.47	Output current upon 1st fault	–	–	●
F09.48	Bus voltage upon 1st fault	–	–	●
F09.49	Input terminal status upon 1st fault	–	–	●
F09.50	Output terminal status upon 1st fault	–	–	●
F09.51	AC drive status upon 1st fault	–	–	●
F09.52	Power-on time upon 1st fault	–	–	●
F09.53	Running time upon 1st fault	–	–	●
F09.54	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	1	※
F09.55	Output terminal action during fault auto reset	0: Not act 1: Act	0	※
F09.56	Backup frequency upon abnormality	0.0%~100.0% (100.0% corresponding to maximum frequency)F00.03)	100.0%	※
F09.57	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	※
F09.58	Motor overheat protection threshold	0°C ~200°C	110°C	※
F09.59	Motor overheat warning threshold	0°C ~200°C	90°C	※
F09.60	Action pause judging voltage at instantaneous power failure	F09.04~100.0%	90.0%	※

Function code	Name	Description(setting range)	Factory Default	Change
Group F10: Process Control PID Function				
F10.00	PID setting source	0: Keypad (F10.01) 1: Analog AI1 2: Analog AI2 3: Analog AI3 4: Pulse setting (HDI) 5: Rs485 communication setting 6: Multi-speed command	0	※
F10.01	PID digital setting	0.0~100.0%	50.0%	※
F10.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1 – AI2 4: Pulse setting (HDI) 5: Rs485 communication setting 6: AI1 + AI2 7: MAX ( AI1 ,  AI2 ) 8: MIN ( AI1 ,  AI2 )	0	※
F10.03	PID output characteristic	0 : positive 1 : negative	0	※
F10.04	PID setting feedback range	0~65535	1000	※
F10.05	Proportional gain Kp1	0.0~100.0	20.0	※
F10.06	Integral time Ti1	0.01s~10.00s	2.00s	※
F10.07	Differential time Td1	0.000s~10.000s	0.000s	※
F10.08	Cut-off frequency of PID reverse rotation	0.00~F00.03(maximum frequency )	2.00Hz	※
F10.09	PID deviation limit	0.0%~100.0%	0.0%	※
F10.10	PID differential limit	0.00%~100.00%	0.10%	※
F10.11	PID setting change time	0.00~650.00s	0.00s	※
F10.12	PID feedback filter time	0.00~60.00s	0.00s	※
F10.13	PID output filter time	0.00~60.00s	0.00s	※
F10.15	Proportional gain Kp2	0.0~100.0	20.0	※

Function code	Name	Description(setting range)	Factory Default	Change
F10.16	Integral time Ti2	0.01s~10.00s	2.00s	※
F10.17	Differential time Td2	0.000s~10.000s	0.000s	※
F10.18	PID parameter switch over condition	0: No switch over 1: Switch over via input terminal 2: Automatic switch over based on deviation	0	※
F10.19	PID parameter switch over deviation 1	0.0%~F10.20	20.0%	※
F10.20	PID parameter switch over deviation 2	F10.19~100.0%	80.0%	※
F10.21	PID initial value	0.0%~100.0%	0.0%	※
F10.22	PID initial value holding time	0.00~650.00s	0.00s	※
F10.23	Maximum deviation between two PID outputs in forward direction	0.00%~100.00%	1.00%	※
F10.24	Maximum deviation between two PID outputs in reverse direction	0.00%~100.00%	1.00%	※
F10.25	PID integral property	Unit's digit :Integral separated 0: Invalid 1: Valid Ten's digit :Whether to stop integral operation when the output reaches the limit 0: Continue integral operation 1: Stop integral operation	00	※
F10.26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1%~100.0%	0.0%	※
F10.27	Detection time of PID feedback loss	0.0s~20.0s	0.0s	※
F10.28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0	※

Function code	Name	Description(setting range)	Factory Default	Change
<b>Group F11: Swing Frequency, Fixed Length and Count</b>				
F11.00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0	※
F11.01	Swing frequency amplitude	0.0%~100.0%	0.0%	※
F11.02	Jump frequency amplitude	0.0%~50.0%	0.0%	※
F11.03	Swing frequency cycle	0.1s~3000.0s	10.0s	※
F11.04	Triangular wave rising time coefficient	0.1%~100.0%	50.0%	※
F11.05	Set length	0m~65535m	1000m	※
F11.06	Actual length	0m~65535m	0m	※
F11.07	Number of pulses per meter	0.1~6553.5	100.0	※
F11.08	Set count value	1~65535	1000	※
F11.09	Designated count value	1~65535	1000	※
<b>Group F12: Simple PLC Function And Multi-speed control</b>				
F12.00	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0	※
F12.01	Simple PLC retentive selection	Unit's digit :Retentive upon power failure 0: No 1: Yes Ten's digit :Retentive upon stop 0: No 1: Yes	00	※
F12.02	Multi-speed 0	-100.0%~100.0%	0.0%	※
F12.03	Multi-speed 1	-100.0%~100.0%	0.0%	※
F12.04	Multi-speed 2	-100.0%~100.0%	0.0%	※
F12.05	Multi-speed 3	-100.0%~100.0%	0.0%	※
F12.06	Multi-speed 4	-100.0%~100.0%	0.0%	※
F12.07	Multi-speed 5	-100.0%~100.0%	0.0%	※
F12.08	Multi-speed 6	-100.0%~100.0%	0.0%	※
F12.09	Multi-speed 7	-100.0%~100.0%	0.0%	※

Function code	Name	Description(setting range)	Factory Default	Change
F12.10	Multi-speed 8	-100.0%~100.0%	0.0%	※
F12.11	Multi-speed 9	-100.0%~100.0%	0.0%	※
F12.12	Multi-speed 10	-100.0%~100.0%	0.0%	※
F12.13	Multi-speed 11	-100.0%~100.0%	0.0%	※
F12.14	Multi-speed 12	-100.0%~100.0%	0.0%	※
F12.15	Multi-speed 13	-100.0%~100.0%	0.0%	※
F12.16	Multi-speed 14	-100.0%~100.0%	0.0%	※
F12.17	Multi-speed 15	-100.0%~100.0%	0.0%	※
F12.18	Running time of simple PLC multi-speed 0	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.19	Acceleration/deceleration time of simple PLC multi-speed 0	0~3	0	※
F12.20	Running time of simple PLC multi-speed 1	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.21	Acceleration/deceleration time of simple PLC multi-speed 1	0~3	0	※
F12.22	Running time of simple PLC multi-speed 2	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.23	Acceleration/deceleration time of simple PLC multi-speed 2	0~3	0	※
F12.24	Running time of simple PLC multi-speed 3	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.25	Acceleration/deceleration time of simple PLC multi-speed 3	0~3	0	※
F12.26	Running time of simple PLC multi-speed 4	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.27	Acceleration/deceleration time of simple PLC multi-speed 4	0~3	0	※
F12.28	Running time of simple PLC multi-speed 5	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.29	Acceleration/deceleration time of simple PLC multi-speed 5	0~3	0	※
F12.30	Running time of simple PLC multi-speed 6	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.31	Acceleration/deceleration time of simple PLC multi-speed 6	0~3	0	※
F12.32	Running time of simple PLC multi-speed 7	0.0s(h)~6500.0s(h)	0.0s(h)	※

Function code	Name	Description(setting range)	Factory Default	Change
F12.33	Acceleration/deceleration time of simple PLC multi-speed 7	0~3	0	※
F12.34	Running time of simple PLC multi-speed 8	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.35	Acceleration/deceleration time of simple PLC multi-speed 8	0~3	0	※
F12.36	Running time of simple PLC multi-speed 9	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.37	Acceleration/deceleration time of simple PLC multi-speed 9	0~3	0	※
F12.38	Running time of simple PLC multi-speed 10	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.39	Acceleration/deceleration time of simple PLC multi-speed 10	0~3	0	※
F12.40	Running time of simple PLC multi-speed 11	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.41	Acceleration/deceleration time of simple PLC multi-speed 11	0~3	0	※
F12.42	Running time of simple PLC multi-speed 12	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.43	Acceleration/deceleration time of simple PLC multi-speed 12	0~3	0	※
F12.44	Running time of simple PLC multi-speed 13	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.45	Acceleration/deceleration time of simple PLC multi-speed 13	0~3	0	※
F12.46	Running time of simple PLC multi-speed 14	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.47	Acceleration/deceleration time of simple PLC multi-speed 14	0~3	0	※
F12.48	Running time of simple PLC multi-speed 15	0.0s(h)~6500.0s(h)	0.0s(h)	※
F12.49	Acceleration/deceleration time of simple PLC multi-speed 15	0~3	0	※
F12.50	Time unit of multi-speed	0: s (second) 1: h (hour)	0	※

Function code	Name	Description(setting range)	Factory Default	Change
F12.51	Multi-speed 0 source	0: Set by F12.02 1: AI1 2: AI2 3: AI3 4: Pulse setting 5: PID 6: Set frequency via keypad (F00.10), modified UP/DOWN	0	※
Group F13: Communication Parameters				
F13.00	Local address	1~247, 0 is broadcast address	1	※
F13.01	Baud rate	0: 300BPS 1: 600BPS 2: 1200BPS 3: 2400BPS 4: 4800BPS 5: 9600BPS 6: 19200BPS 7: 38400BPS 8: 57600BPS 9: 115200BPS	5	※
F13.02	Data format	0: No check, data format (8,N,2) 1: Even parity check, data format (8,E,1) 2: Odd Parity check, data format (8,O,1) 3: Data format (8,N,1)	3	※
F13.03	Response delay	0ms~20ms	20	※
F13.04	Communication timeout	0.0 (invalid) , 0.1s~60.0s	0.0	※
F13.05	Modbus protocol selection	0: Non-standard Modbus protocol 1: Standard Modbus protocol	1	※
F13.06	Communication reading current resolution	0: 0.01A 1: 0.1A	0	※

Function code	Name	Description(setting range)	Factory Default	Change
<b>Group F15: Motor 2 Parameters</b>				
F15.00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	●
F15.01	Rated motor power	0.1kW~1000.0kW	Model dependent	●
F15.02	Rated motor frequency	0.01Hz~F00.03(maximum frequency)	Model dependent	●
F15.03	Rated motor rotational speed	1rpm~65535rpm	Model dependent	●
F15.04	Rated motor voltage	1V~2000V	Model dependent	●
F15.05	Rated motor current	0.01A~655.35A (AC drive power≤ 55kW) 0.1A~6553.5A (AC drive power>55kW)	Model dependent	●
F15.06	Stator resistance	0.001Ω~65.535Ω (AC drive power≤ 55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	●
F15.07	Rotor resistance	0.001Ω~65.535Ω (AC drive power≤ 55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent	●
F15.08	Leakage inductive reactance	0.01mH~655.35mH (AC drive power≤ 55kW) 0.001mH~65.535mH (AC drive power>55kW)	Model dependent	●
F15.09	Mutual inductive reactance	0.1mH~6553.5mH (AC drive power≤ 55kW) 0.01mH~655.35mH (AC drive power>55kW)	Model dependent	●
F15.10	No-load current	0.01A~F15.05 (AC drive power≤ 55kW) 0.1A~F15.05 (AC drive power>55kW)	Model dependent	●

Function code	Name	Description(setting range)	Factory Default	Change
F15.27	Encoder type	0: ABZ incremental encoder 1: UVW incremental encoder	0	●
F15.28	PG card selection	0: QEP1	0	●
F15.29	Encoder pulses per revolution	1~65535	2500	●
F15.30	A, B phase sequence of ABZ incremental encoder	0: Forward 1: Reverse	0	●
F15.31	Encoder installation angle	0.0~359.9°	0.0°	●
F15.32	U, V, W phase sequence of UVW encoder	0: Forward 1: Reverse	0	●
F15.33	UVW encoder angle offset	0.0~359.9°	0.0°	●
F15.36	Encoder wire-break fault detection time	0.0 : no action 0.1s~10.0s	0.0	●
F15.37	Self-learning selection	0: No self-learning 1: Asynchronous motor static self-learning 2: Asynchronous motor dynamic self-learning	0	●
F15.38	Speed loop proportional gain 1	1~100	30	※
F15.39	Speed loop integral time 1	0.01s~10.00s	0.50s	※
F15.40	Switch over frequency 1	0.00~F15.43	5.00Hz	※
F15.41	Speed loop proportional gain 2	1~100	20	※
F15.42	Speed loop integral time 2	0.01s~10.00s	1.00s	※
F15.43	Switch over frequency 2	F15.40~F00.03(maximum frequency)	10.00Hz	※
F15.44	Vector control slip gain	50%~200%	100%	※
F15.45	Time constant of speed loop filter	0.000s~0.100s	0.000s	※
F15.46	Vector control overexcitation gain	0~200	64	※

Function code	Name	Description(setting range)	Factory Default	Change
F15.47	Torque upper limit source in speed control mode	0: F15.48 1: AI1 2: AI2 3: AI3 4: Pulse setting (HDI) 5: Rs485 communication 6: MIN(AI1,AI2) 7: MIN(AI1,AI2)	0	※
F15.48	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	150.0%	※
F15.51	Excitation adjustment proportional gain	0~60000	2000	※
F15.52	Excitation adjustment integral gain	0~60000	1300	※
F15.53	Torque adjustment proportional gain	0~60000	2000	※
F15.54	Torque adjustment integral gain	0~60000	1300	※
F15.55	Speed loop integral property	Unit's digit: Integral separated 0: Disabled 1: Enabled	0	※
F15.61	Motor 2 control mode	0: non-PG vector control 1: PG vector control 2: V/F control	0	●
F15.62	Motor 2 acceleration/ deceleration time	0: Same as motor 1 1: Acceleration/Deceleration time 1 2: Acceleration/Deceleration time 2 3: Acceleration/Deceleration time 3 4: Acceleration/Deceleration time 4	0	※
F15.63	Motor 2 torque boost	0.0%: Automatic torque boost 0.1%~30.0%	Model dependent	※
F15.65	Motor 2 oscillation suppression gain	0~100	Model dependent	※

## Chapter 6 Description of Function Codes

### Group F00: Standard Function Parameters

Function Code	Parameter Name	Setting Range	Default
F00.00	Speed control mode	0: non-PG vector control (SVC) 1: PG vector control (FVC) 2: V/F control	2

0: non-PG vector control (SVC)

Indicates open-loop vector control, and is applicable to high-performance control applications without encoder such as machine tool, centrifuge, wire drawing machine and injection molding machine. One AC drive can operate only one motor.

1: PG vector control (FVC)

Applicable to high-accuracy speed control or torque control applications such as high-speed paper making machine, crane and elevator. One AC drive can operate only one motor. An encoder must be installed at the motor side, and a PG card matching the encoder must be installed at the AC drive side.

2: V/F control

Applicable to applications with low load requirements or applications where one AC drive operates multiple motors, such as fan and pump.

Note: If vector control is used, motor self-learning must be performed because the advantages of vector control can only be utilized after correct motor parameters are obtained. Better performance can be achieved by adjusting speed regulator parameters in group F03 (or groups F15 for motor 2)

Function Code	Parameter Name	Setting Range	Default
F00.01	Command source selection	0: keypad control 1: terminal control 2: RS 485 communication control	0

Used to determine the input channel of the AC drive control commands, such as run, stop, forward rotation, reverse rotation and jog operation. You can input the commands in the following three channels:

0: Keypad control

Commands are given by pressing keys RUN, STOP/RES on the keypad

1: Terminal control

Commands are given by means of multi-functional input terminals with functions such as FWD, REV, forward JOG, and reverse JOG

2: RS 485 communication control

Commands are given from host computer. Refer to Group F13: Communication Parameters for function codes

Function Code	Parameter Name	Setting Range	Default
F00.03	Max.output frequency	50.00Hz~600.00Hz	50.00Hz

Used to set the maximum output frequency of the inverter. It is the basis of the frequency setting, as well as the foundation of acceleration and deceleration speed.

#### WARNING.

When analog input,pulse input(HDI),multiple command are set as frequency source of VP600, the maximum frequency must match F00.03.

Function Code	Parameter Name	Setting Range	Default
F00.04	Run frequency upper limit	F00.05 ~ F00.03(max.frequency)	50.00Hz

Upper limit of the inverter's output frequency. The value should be less than or equal to the maximum output frequency.

Function Code	Parameter Name	Setting Range	Default
F00.05	Run frequency lower limit	0.00Hz ~ F00.04 (run frequency upper limit)	00.00Hz

Lower limit of the inverter's output frequency.

When the set frequency is lower than the lower limit frequency,or when the starting set frequency is lower than the lower limit of frequency, the motor will not be started. When the set frequency entered while running, is lower than the run frequency lower limit, AC drive will stop, run at run frequency lower limit or go to zero speed via F08.14

Function Code	Parameter Name	Setting Range	Default
F00.06	Frequency A command selection	0:keypad,non-retentive at power failure 1:keypad, retentive at power failure 2:analog AI1 3:analog AI2 4:analog AI3 5:pulse (HDI) 6:multi-speed running 7:simple PLC 8:PID control 9:RS485 Communication 10:potentiometer	0

Used to select the setting channel of the main frequency. You can set the main frequency in the following 10 channels:

- 0:keypad,non-retentive at power failure

The initial value of the set frequency is the value of F00.10 (Preset frequency). You can change the set frequency by pressing UP and DOWN on the operation panel (or using the UP/DOWN function of input terminals).

When the AC drive is powered on after power failure, the set frequency reverts to the value of F00.10.

- 1: keypad,retentive at power failure

The initial value of the set frequency is the value of F00.10 (Preset frequency). You can change the set frequency by pressing keys UP and DOWN on the operation panel (or using the UP/DOWN function of input terminals).

When the AC drive is powered on after power failure, the set frequency is the value memorized at the moment of the last power failure.

Note that F00.26 (Retentive of digital setting frequency upon power failure) determines whether the set frequency is memorized or cleared when the AC drive stops. It is related to stop rather than power failure.

- 2: AI1 (0–10 V voltage input or 0–20 mA current input, determined by jumper)
- 3: AI2 (0–10 V voltage input or 0–20 mA current input, determined by jumper)
- 4: AI3 (-10–10 V voltage input)

The frequency is set by analog input. The VP600 control board provides three analog input (AI) terminals (AI1, AI2, AI3).

The VP600 provides five curves indicating the mapping relationship between the input voltage of AI1, AI2 and AI3 and the target frequency, three of which are linear (2 point) curves and two of which are four-point curves. You can set the curves by using function code F05.38, and select curves for AI1, AI2 and AI3. When AI is used as the frequency setting source, the range of values of the voltage/current input should correspond to the limit values of F05.18 to F05.32

#### • 5: Pulse setting (HDI)

The frequency is set by HDI (high-speed pulse). The signal specification of pulse setting is 9–26 V (voltage range) and 0–100 kHz (frequency range). The corresponding value 100% of pulse setting corresponds to the value of F00.03 (Maximum frequency).

#### • 6: Multi-reference

In multi-reference mode, combinations of different input terminal states correspond to different set frequencies by setting Group F05 and F12. The VP600 supports a maximum of 16 speeds implemented by 16 state combinations of four terminals in Group F12.

The multiple references indicate percentages of the value of F00.03 (Maximum frequency).

If an S terminal is used for the multi-reference function, you need to perform related setting in group F05.

#### • 7: Simple PLC

When the simple programmable logic controller (PLC) mode is used as the frequency source, the running frequency of the AC drive can be switched among the 16 frequency references. You can set the holding time and acceleration/deceleration time of the 16 frequency references. For details, refer to the descriptions of Group F12.

- 8: PID

The output of PID control is used as the running frequency. PID control is generally used in on-site closed-loop control, such as constant pressure closed-loop control and constant tension closed-loop control.

When applying PID as the frequency source, you need to set parameters of PID function in group F10.

- 9: Communication setting

The main frequency source is set by means of communication.

For details, see the description of Appendix A Serial Communications

- 10: Potentiometer

The frequency is set by keyboard potentiometer.

Function Code	Parameter Name	Setting Range	Default
F00.07	Frequency B command selection	same as F00.06	0

When used as an independent frequency input channel (frequency source switched over from A to B), the auxiliary frequency source B is used in the same way as the main frequency source A (refer to F00.06).

When the auxiliary frequency source is used for operation (frequency source is "A + B operation"), pay attention to the following aspects:

1) If the auxiliary frequency source B is keypad setting, the preset frequency (F00.10) does not take effect. You can directly adjust the set main frequency by pressing UP and DOWN keys on the operation panel (or using the UP/DOWN function of input terminals).

2) If the auxiliary frequency source B is analog input (AI1, AI2 and AI3) or pulse setting, 100% of the input corresponds to the range of the auxiliary frequency B (set in F00.08 and F00.25).

3) If the auxiliary frequency source B is pulse setting, it is similar to analog input.

NOTE: The main frequency source A and auxiliary frequency source B must not use the same channel. That is, F00.06 and F00.07 cannot be set to the same value.

Function Code	Parameter Name	Setting Range	Default
F00.08	Range of command selection frequency B	0: relative to maximum frequency 1: relative to frequency A command	0

You can set the auxiliary frequency to be relative to either maximum frequency or main frequency A. If relative to main frequency A, the setting range of the auxiliary frequency B varies according to the main frequency A.

Function Code	Parameter Name	Setting Range	Default
F00.09	Frequency source combination mode	0:frequency A command 1:frequency B command 2:switch between A and B 3:A+B 4:A-B 5:MAX (A and B) 6:MIN (A and B)	0

Used to select the frequency setting channel. If the frequency source involves A and B operation, you can set the frequency offset in F00.25 when combining A and B operation, for flexibility to meet various requirements..

0:Frequency A command

Frequency A as target frequency

1:Frequency B command

Frequency B as target frequency

2:Switch between frequency A command and frequency B command

If multi-function input terminal is set with a function code value of 19, and the terminal is open circuit to terminal DCM, frequency A is target frequency; If the same multi-function input terminal is closed circuit to terminal DCM, frequency B is target frequency.

3:A+B

Target frequency is addition of both A and B.

4:A-B

Target frequency is difference value of A-B.

5:MAX (A and B)

Target frequency is Max. absolute value.

6:MIN (A and B)

Target frequency is Min. absolute value.

Function Code	Parameter Name	Setting Range	Default
F00.10	Keypad setting frequency	0.00Hz ~ F00.03 ( max.frequency )	50.00Hz

If the frequency source is Keypad setting or terminal UP/DOWN, the value of this parameter is the initial frequency of the AC drive (digital setting).

Function Code	Parameter Name	Setting Range	Default
F00.11	Frequency reference resolution	1:0.1Hz 2:0.01Hz	2

Used to set the resolution of all frequency-related parameters. If the resolution is 0.1 Hz, the VP600 can output up to 600.0 Hz. If the resolution is 0.01 Hz, the VP600 can output up to 300.0 Hz.

Function Code	Parameter Name	Setting Range	Default
F00.12	Acceleration time 1	0.00s ~ 6500.0s	Model dependent
F00.13	Deceleration time 1	0.00s ~ 6500.0s	Model dependent

Acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to "Acceleration/Deceleration base frequency" (F00.15), that is, t1 in Figure 6-1.  
 Deceleration time indicates the time required by the AC drive to decelerate from "Acceleration/Deceleration base frequency" (F00.15) to 0 Hz, that is, t2 in Figure 6-1.

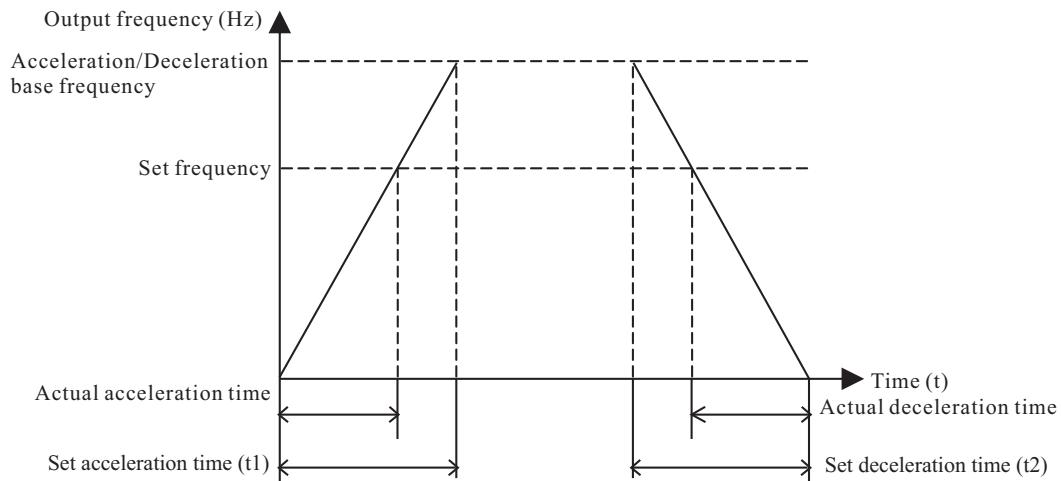


Figure 6-1 Acceleration/Deceleration time

The DV600 provides a total of four groups of acceleration/deceleration time for selection. You can switch different acceleration/deceleration settings using a DI terminal.

- Group 1: F00.12, F00.13
- Group 2: F08.00, F08.01
- Group 3: F08.02, F08.03
- Group 4: F08.04, F08.05

Function Code	Parameter Name	Setting Range	Default
F00.14	Acceleration/Deceleration time unit	0:1s 1: 0.1s 2: 0.01s	1

To satisfy requirements of different applications, the VP600 provides three acceleration/deceleration time units, 1s, 0.1s and 0.01s.

Function Code	Parameter Name	Setting Range	Default
F00.15	Acceleration/Deceleration time base frequency	0:max.frequency ( F00.03 ) 1:setting frequency 2:100Hz	0

The acceleration/deceleration time indicates the time for the AC drive to increase from 0 Hz to the frequency set in F00.15. If this parameter is set to 1, the acceleration/deceleration time is related to the set frequency. If the set frequency changes frequently, the motor's acceleration/deceleration also changes.

Function Code	Parameter Name	Setting Range	Default
F00.16	Rotation direction	0: same direction 1: reverse direction	0

You can change the rotation direction of the motor just by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

Note: The motor will resume running in the original direction after parameter initialization. Do not use this function in applications where changing the rotating direction of the motor is prohibited after system commissioning is complete.

Function Code	Parameter Name	Setting Range	Default
F00.17	Carrier frequency	0.5kHz~16.0kHz	Model dependent

Carrier frequency	Motor noise	Leakage current	AC drive temperature rise
0.5kHz	Large	Small	Low
10kHz			
16kHz	Small	Large	High

Relationship between model and carrier frequency

Carrier frequency Model	Highest carrier frequency (kHz)	Lowest carrier frequency (kHz)	Default (kHz)
G model: 0.75kW~11kW P model: 0.75kW~15kW	16	0.5	6
G model 15kW~45kW P model 18.5kW~55kW	16	0.5	4
G model: 55kW P model: 75kW	16	0.5	3
G model: 75kW~315kW P model: 93kW~350kW	16	0.5	2

The factory setting of carrier frequency varies with the AC drive power. If you need to modify the carrier frequency, note that if the set carrier frequency is higher than factory setting, it will lead to an increase in temperature rise of the AC drive's heatsink. In this case, you need to de-rate the AC drive. Otherwise, the AC drive may overheat and trip. No need to modify this parameter in general.

Function Code	Parameter Name	Setting Range	Default
F00.18	Carrier frequency adjustment with temperature	0: No 1: Yes	1

Used to set whether the carrier frequency is adjusted based on the temperature. The AC drive automatically reduces the carrier frequency when detecting that the heatsink temperature is high. The AC drive resumes the carrier frequency to the set value when the heatsink temperature becomes normal. This function reduces the overheat alarms.

Function Code	Parameter Name	Setting Range	Default
F00.19	Source of frequency upper limit	0: set by F00.04 1: analog AI1 2:analog AI2 3:analog AI3 4:pulse (HDI ) 5:RS485 communication	0

Used to set the source of the frequency upper limit, including digital setting (F00.04), AI,pulse setting or communication setting. If the frequency upper limit is set by means of AI1,AI2, AI3, DI5 or communication, the setting is similar to that of frequency A command. For details, see the description of F00.04.

For example, to avoid runaway in torque control mode in winding application, you can set the frequency upper limit by means of analog input. When the AC drive reaches the upper limit, it will continue to run at this speed.

Function Code	Parameter Name	Setting Range	Default
F00.20	Frequency upper limit offset	0.00Hz ~ max.frequency ( F00.03 )	00.00Hz

If the source of the frequency upper limit is analog input or pulse setting, the final frequency upper limit is obtained by adding the offset in this parameter to the frequency upper limit set in F00.19.

Function Code	Parameter Name	Setting Range	Default
F00.21	Base frequency for UP/DOWN modification during running	0: running frequency 1: set frequency	0

This function code is valid only when the frequency source is a digital setting.

Used to set the base frequency to be modified by using UP and DOWN keys or the terminal UP/DOWN function. If the running frequency and set frequency are different, there will be a large difference between the AC drive's performance during the acceleration/deceleration process.

Function Code	Parameter Name	Setting Range	Default
F00.22	Binding command source to frequency source	Unit digit:Binding keypad command to frequency source 0: no binding 1:keypad setting 2: analog AI1 3: analog AI2 4: analog AI3 5:pulse setting (HDI) 6: multi- speed run setting 7: Simple PLC 8: PID control 9:RS485 communication  Ten's digit :Binding terminal command to frequency source Hundred' s digit :Binding communication command to frequency source Thousands digit: Binding auto-operation command to frequencysource	0000

Used to bind three running command sources to nine frequency sources to facilitate synchronous switching.

For details on the frequency sources, see the description of F00.06 ( frequency A command selection).

Different running command sources can be bound to the same frequency source.

If a command source has a bound frequency source, the frequency source set in F00.06 to F00.09 no longer takes effect when the command source is effective.

Function Code	Parameter Name	Setting Range	Default
F00.23	Range of frequency B source during superposition	0%~150%	100%

If frequency A and frequency B operation is used, F00.09 and F00.08 are used to set the adjustment range of the auxiliary frequency source.

You can set the auxiliary frequency to be relative to either maximum frequency or main frequency A. If relative to main frequency A, the setting range of the auxiliary frequency B varies according to the main frequency A.

Function Code	Parameter Name	Setting Range	Default
F00.25	Frequency offset of frequency B source during superposition	0.00Hz ~ max.frequency F00.03	00.00Hz

If the frequency source contains A and B operations, you can set the frequency offset in F00.25 to overlap the results of A and B operations, maintaining flexibility to meet different requirements.

Function Code	Parameter Name	Setting Range	Default
F00.26	Retention of keypad setting frequency upon power failure	0: Not retentive 1: Retentive	0

This function code is valid only when the frequency source is set to keypad.

If F00.26 is set to 0, the keypad setting frequency value resumes to the value of F00.10 (Preset frequency) after the AC drive stops. The modification by using keys or the terminal UP/DOWN function is cleared.

If F00.26 is set to 1, the keypad setting frequency value is the set frequency at the moment when the AC drive stops. The modification by using keys or the terminal UP/DOWN function remains effective.

Function Code	Parameter Name	Setting Range	Default
F00.27	Motor model selection	0: G type (constant torque load) 1: P type (variable torque load)	Model dependent

This function code is used to display the delivered model and cannot be modified.

- 1: Applicable to constant torque load with rated parameters specified
- 2: Applicable to variable torque load (fan and pump) with rated parameters specified

Function Code	Parameter Name	Setting Range	Default
F00.28	Function parameter restore	0: no operation 1: restore factory defaults, not include motor parameter 2: clear fault file	0

## Group F01: Start-stop Control Parameters

Function Code	Parameter Name	Setting Range	Default
F01.00	Start mode	0:direct start 1:rotational speed tracking restart (valid on V/F control) 2: pre-excited start	0

- 0: Direct start

- 1: Rotational speed tracking restart (valid on V/F control)

The AC drive assesses the rotational speed and direction of the motor first and then starts at the tracked frequency. Enabling a smooth start that has no impact on the rotating motor. It is applicable to the restart from transient power failures of large-inertia loads. To ensure the performance of rotational speed tracking restart, set the motor parameters in group F02 correctly.

- 2: Pre-excited start (asynchronous motor)

Applicable only for asynchronous motor and used for building the magnetic field before the motor runs. For pre-excited current and pre-excited time, see function codes F01.03 and F01.04.

Function Code	Parameter Name	Setting Range	Default
F01.01	Startup frequency	0.00Hz~10.00Hz	0.00Hz
F01.02	Startup frequency holding time	0.0s~100.0s	0.0s

To ensure the motor torque at AC drive startup, set a suitable startup frequency. In addition, to build excitation when the motor starts up, the startup frequency must be held for a certain period. The startup frequency (F01.01) is not restricted by the frequency lower limit. If the set target frequency is lower than the startup frequency, the AC drive will not start and stays in the standby state.

During switch over between forward rotation and reverse rotation, the startup frequency holding time is disabled.

Function Code	Parameter Name	Setting Range	Default
F01.03	Startup DC braking current/ Pre-excited current	0%~100%	0%
F01.04	Startup DC braking time/ Pre-excited time	0.0s~100.0s	0.0s

Startup DC braking is generally used during restart of the AC drive after the rotating motor stops. Pre-excitation is used to make the AC drive build magnetic field for the asynchronous motor before startup to improve the responsiveness.

Startup DC braking is applicable only for direct start (F01.00=0). In this case, the AC drive performs DC braking at the set startup DC braking current. After the startup DC braking time, the AC drive starts to run. If the startup DC braking time is 0, the AC drive starts directly without DC braking. The larger the startup DC braking current is, the larger the braking force is.

If the startup mode is pre-excited start (F01.00 = 2), the AC drive builds magnetic field based on the set pre-excited current. After the pre-excited time, the AC drive starts to run. If the pre-excited time is 0, the AC drive starts directly without pre-excitation.

The startup DC braking current or pre-excited current is a percentage relative to the base value.

Function Code	Parameter Name	Setting Range	Default
F01.05	Acceleration/ deceleration mode	0: line Acc/Dec time 1:S curve A 2:S curve Acc/Dec B Acc/Dec	0

Used to set the frequency change mode during the AC drive start and stop process.

- 0: Linear acceleration/deceleration

The output frequency increases or decreases in linear mode. The VP600 provides four group of acceleration/deceleration time, which can be selected by using F05.00 to F5.08.

- 1: S-curve acceleration/deceleration A

The output frequency increases or decreases along the S curve. This mode is generally used in the applications where start and stop processes are relatively smooth, such as elevator and conveyor belt. F01.06 and F01.07 respectively define the time proportions of the start segment and the end segment.

- 2: S-curve acceleration/deceleration B

In this curve, the rated motor frequency  $f_b$  is always the inflection point. This mode is usually used in applications where acceleration/deceleration is required at speeds higher than the rated frequency.

When the set frequency is higher than the rated frequency, the acceleration/ deceleration time is:

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

In the formula,  $f$  is the set frequency,  $f_b$  is the rated motor frequency and  $T$  is the acceleration time from 0 Hz to  $f_b$ .

Function Code	Parameter Name	Setting Range	Default
F01.06	Time proportion of S-curve start segment	0.0% ~ (100.0% - F01.07)	30.0%
F01.07	Time proportion of S-curve end segment	0.0% ~ (100.0% - F01.06)	30.0%

These two function codes respectively define the time proportions of the start segment and the end segment of S-curve acceleration/deceleration. They must satisfy the requirement:  $F01.06 + F01.07 \leq 100.0\%$ .

In Figure 6-2,  $t_1$  is the time defined in F6-08, within which the slope of the output frequency change increases gradually.  $t_2$  is the time defined in F01.07, within which the slope of the output frequency change gradually decreases to 0. Within the time between  $t_1$  and  $t_2$ , the slope of the output frequency change remains as a linear acceleration/deceleration.

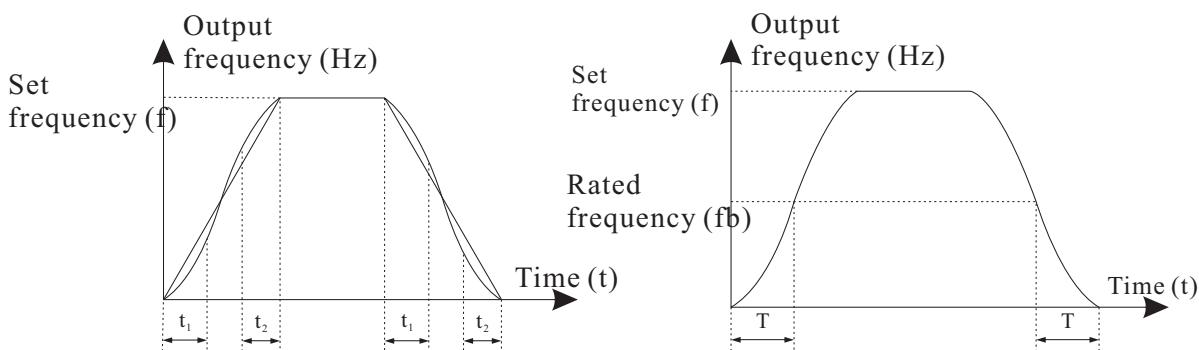


Figure 6-2 S-curve acceleration/deceleration A

Figure 6-3 S-curve acceleration/deceleration B

Function Code	Parameter Name	Setting Range	Default
F01.08	Stop mode	0: deceleration to stop 1:stop freely	0

- 0: Decelerate to stop

After the stop command is enabled, the AC drive decreases the output frequency according to the deceleration time and stops when the frequency decreases to zero.

- 1: Coast to stop

After the stop command is enabled, the AC drive immediately stops the output. The motor will coast to stop based on the mechanical inertia.

Function Code	Parameter Name	Setting Range	Default
F01.09	Initial frequency of stop DC braking	0.00Hz ~ F00.03(max.frequency)	0.00Hz
F01.10	Waiting time of stop DC braking	0.0s ~ 100.0s	0.0s
F01.11	Stop DC braking current	0% ~ 100%	0%
F01.12	Stop DC braking time	0.0s ~ 100.0s	0.0s

During the process of decelerating to stop, the AC drive starts DC braking when the running frequency is lower than the value of F01.09.

When the running frequency decreases to the initial frequency of stop DC braking, the AC drive stops output for a certain period (F01.10) and then starts DC braking. This prevents faults such as overcurrent caused due to DC braking at high speed.

F01.11 function code specifies the output current at DC braking and is a percentage relative to the base value. The larger current ,the greater the effect of DC brake, increased temperature rise of the motor, and increased temperature rise of the AC drive.

F01.12 specifies the holding time of DC braking. If it is set to 0, DC braking is cancelled. The stop DC braking process is shown in the following figure 6-4

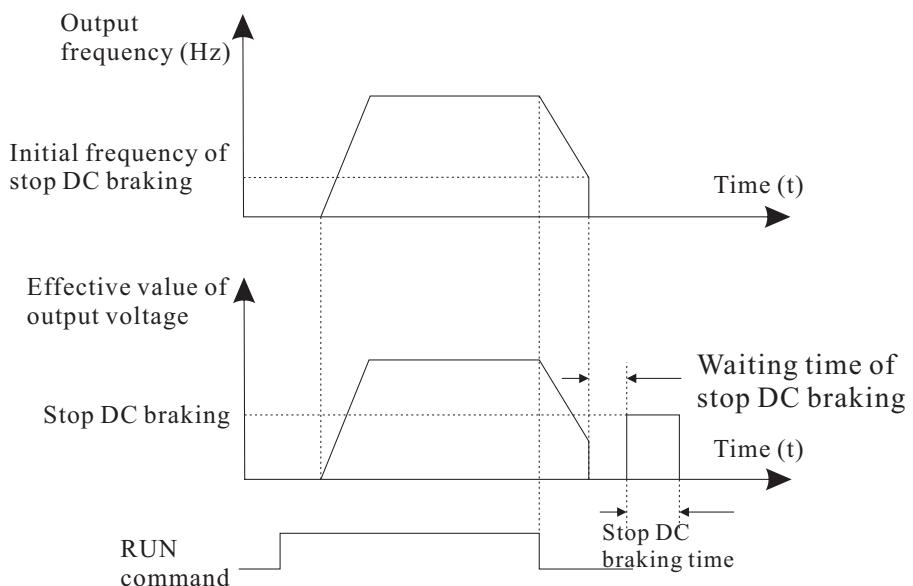


Figure 6-4 The stop DC braking process

Function Code	Parameter Name	Setting Range	Default
F01.13	Rotational speed tracking mode	0: start from frequency at stop 1: start from zero speed 2: start from max.frequency	0

To complete the rotational speed tracking process within the shortest time, select the applicable mode in which the AC drive tracks the motor rotational speed.

- 0: From frequency at stop  
Most commonly selected mode.
- 1: From zero frequency  
Applicable to restart after a long time of power failure.
- 2: From the maximum frequency  
Applicable to the power-generating load.

Function Code	Parameter Name	Setting Range	Default
F01.14	Rotational speed tracking speed	1~100	20

In the rotational speed tracking restart mode, select the rotational speed tracking speed. The larger the value is, the faster the tracking is. However, too large value may cause unreliable tracking.

Function Code	Parameter Name	Setting Range	Default
F01.15	Brake usage rate	0%~100%	100%

Applicable only for the AC drive with internal braking unit and used to adjust the duty ratio of the braking unit. The larger the value of this parameter is, the better the braking result will be. However, too larger value causes great fluctuation of the AC drive bus voltage during the braking process.

## Group F02: Motor 1 Parameters

Function Code	Parameter Name	Setting Range	Default
F02.00	Motor type selection	0:common asynchronous motor 1:variable frequency asynchronous motor	0
F02.01	Rated power of asynchronous motor 1	0.1kW~1000.0kW	Model dependent
F02.02	Rated frequency of asynchronous motor 1	0.01Hz ~ F00.03(max.frequency)	Model dependent
F02.03	Rated speed of asynchronous motor 1	1rpm~65535rpm	Model dependent
F02.04	Rated voltage of asynchronous motor 1	1V~2000V	Model dependent
F02.05	Rated current of asynchronous motor 1	0.01A ~ 655.35A ( AC drive power<=55kW) 0.1A ~ 6553.5A (AC drive power>55kW)	Model dependent

Set the parameters according to the motor nameplate no matter whether V/F control or vector control is adopted.

To achieve better V/F or vector control performance, motor auto-tuning is required. The motor auto-tuning accuracy depends on the correct setting of motor nameplate parameters.

Function Code	Parameter Name	Setting Range	Default
F02.06	Stator resistance of asynchronous motor 1	0.001Ω~65.535Ω (inverter power<=55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent
F02.07	Rotor resistance of asynchronous motor 1	0.001Ω~65.535Ω (AC drive power<=55kW) 0.0001Ω~6.5535Ω (AC drive power>55kW)	Model dependent
F02.08	Leakage inductive reactance of asynchronous motor 1	0.01mH~655.35mH (AC drive power<=55kW) 0.001mH~65.535mH (AC drive power>55kW)	Model dependent
F02.09	Mutual inductive reactance of asynchronous motor 1	0.1mH~6553.5mH (inverter power<=55kW) 0.01mH~655.35mH (AC drive power>55kW)	Model dependent

Function Code	Parameter Name	Setting Range	Default
F02.10	No-load current of asynchronous motor 1	0.01A～F02.05 (inverter power<=55kW) 0.1A～F02.05 (AC drive power>55kW)	Model dependent

The function codes of F02.06 to F02.10 are asynchronous motor parameters. These parameters are unavailable on the motor nameplate and are obtained by means of motor self-learning. F02.06 to F02.08 can only be obtained through static motor auto-tuning. Through complete motor auto-tuning, encoder phase sequence and current loop PI can be obtained in addition to the parameters in F02.06 to F02.10.

Each time "Rated motor power" (F02.01) or "Rated motor voltage" (F02.04) is changed, the AC drive automatically restores values of F02.06 to F02.10 to the parameter setting for the common standard asynchronous motor.

If it is impossible to perform motor auto-tuning onsite, manually input the values of these function codes according to data provided by the motor manufacturer.

Function Code	Parameter Name	Setting Range	Default
F02.27	Encoder type	0:ABZ incremental encoder 1:UVW incremental encoder	0

The VP600 supports two types of encoder.

After installation of the PG card is complete, set this function code appropriately based on the actual condition. Otherwise, the AC drive will not run correctly.

Function Code	Parameter Name	Setting Range	Default
F02.29	Encoder pulses per revolution	1～65535	2500

This function code is used to set the pulses per revolution (PPR) of ABZ or UVW incremental encoder. In CLVC mode, the motor will not run correctly if this parameter is set incorrectly.

Function Code	Parameter Name	Setting Range	Default
F02.30	AB phase sequence of ABZ incremental encoder	0:forward 1:reverse	0

This function code is applicable only for ABZ incremental encoder (F02.27 = 0) and is used to set the A/B phase sequence of the ABZ incremental encoder.

It is suitable for both asynchronous motor and synchronous motor. The A/B phase sequence can be obtained through "Asynchronous motor complete self-learning".

Function Code	Parameter Name	Setting Range	Default
F02.31	Encoder installation angle	0.0～359.9°	0.0°
F02.32	UVW phase sequence of UVW encoder	0: Forward 1: Reverse	0
F02.33	UVW encoder angle offset	0.0～359.9°	0.0°

Function Code	Parameter Name	Setting Range	Default
F02.36	Encoder wire-break fault detection time	0.0s: No action 0.1–10.0s	0.0

This function code is used to set the delay time for a wire-break fault. If it is set to 0.0s, the AC drive does not detect the encoder wire-break fault. If the duration of the encoder wire-break fault detected by the AC drive exceeds the time set in this function code, the AC drive reports E026.

Function Code	Parameter Name	Setting Range	Default
F02.37	Self-learning of motor parameter	0: no self-learning 1: static self-learning of asynchronous motor 2: complete self-learning of asynchronous motor	0

- 0: No self-learning
- 1: Static self-learning of asynchronous motor

Applicable to scenarios where complete self-learning cannot be performed because the asynchronous motor cannot be disconnected from the load.

Before performing static self-learning, correctly set the motor type and motor nameplate parameters of F02.00 to F02.05 first. The AC drive will obtain parameters of F02.06 to F02.08 by dynamic self-learning.

Set this function code to 1, and press "RUN", the AC drive will obtain motor parameters. Press "STOP" to stop self-learning.

- 2: Complete self-learning of asynchronous motor

To perform this type of self-learning, ensure that the motor is disconnected from the load. During the process of complete self-learning, the AC drive performs static self-learning first and then accelerates to 80% of the rated motor frequency within the acceleration time set in F00.12. The AC drive keeps running for a certain period and then decelerates to stop within deceleration time set in F00.13.

Before performing complete self-learning, correctly set the motor type, motor nameplate parameters of F02.00 to F02.05, "Encoder type" (F02.27) and "Encoder pulses per revolution" (F02.28) first.

Set this function code to 2, and press "RUN", the AC drive will obtain motor parameters of F02.06 to F02.10, "A/B phase sequence of ABZ incremental encoder" (F02.30) and vector control current loop PI parameters of F03.13 to F03.16 by complete self-learning. Press "STOP" to stop self-learning.

NOTE: Motor self-learning can be performed only in keypad mode. Function code will turn to 0 after finish self-learning.

## Group F03: Vector Control Parameters

Group F03 is applicable for vector control, and not applicable for V/F control.

Function Code	Parameter Name	Setting Range	Default
F03.00	Proportional gain 1 of speed loop	0~100	30
F03.01	Integral time 1 of speed loop	0.01s~10.00s	0.50s
F03.02	Switch over low point frequency	0.00Hz~F03.05	5.00Hz
F03.03	Proportional gain 2 of speed loop	1~100	20
F03.04	Integral time 2 of speed loop	0.01s~10.00s	1.00s
F03.05	Switch over high point frequency	F03.02~F00.03(max.frequency)	10.00Hz

Speed loop PI parameters vary with running frequencies of the AC drive.

- If the running frequency is less than or equal to "Switch over frequency 1" (F03.02), the speed loop PI parameters are F03.00 and F03.01.
- If the running frequency is equal to or greater than "Switch over frequency 2" (F03.05), the speed loop PI parameters are F03.03 and F03.04.
- If the running frequency is between F03.02 and F03.05, the speed loop PI parameters are obtained from the linear switch over between the two groups of PI parameters.

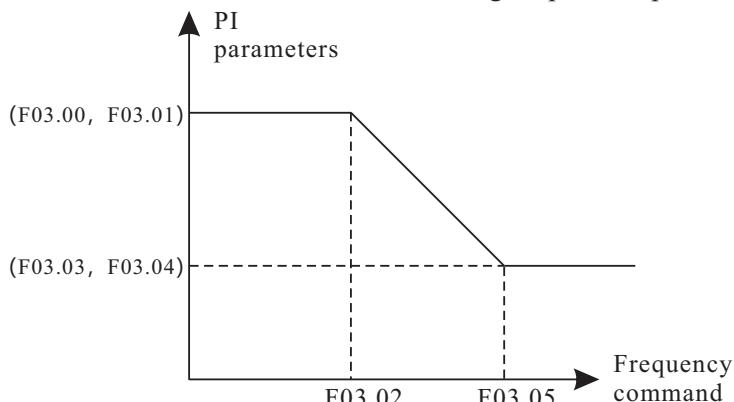


Figure 6-5 Relationship between running frequencies and PI parameters

The speed dynamic response characteristics in vector control can be adjusted by setting the proportional gain and integral time of the speed regulator.

To achieve a faster system response, increase the proportional gain and reduce the integral time. Be aware that this may lead to system oscillation.

The recommended adjustment method is as follows:

If the factory setting cannot meet the requirements, make suitable adjustment. Increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure that the system has quick response and small overshoot. Improper PI parameter setting may cause too large speed overshoot, and overvoltage fault may even occur when the overshoot drops.

Function Code	Parameter Name	Setting Range	Default
F03.06	Vector control slip gain	50%~200%	100%

For SFVC, it is used to adjust speed stability accuracy of the motor. When the motor with load runs at a very low speed, increase the value of this function code; when the motor with load runs at a very large speed, decrease the value of this function code.

For CLVC, this function code is used to adjust the output current of the AC drive with same load.

Function Code	Parameter Name	Setting Range	Default
F03.07	Speed loop output filter	0.000s~0.100s	0.000s

In the vector control mode, the output of the speed loop regulator is torque current referenced. This function code is used to filter the torque references. It need not be adjusted usually and can be increased in the case of large speed fluctuation. In the case of motor oscillation, decrease the value of this function code suitably.

If the value of this function code is small, the output torque of the AC drive may fluctuate considerably, but the response is quick.

Function Code	Parameter Name	Setting Range	Default
F03.08	Vector control over-excitation gain	0~200	64

During deceleration of the AC drive, over-excitation control can restrain rise of the bus voltage to avoid the overvoltage fault. The larger the over-excitation gain is, the better the restraining effect is.

Increase the over-excitation gain if the AC drive is liable to overvoltage error during deceleration. Too large over-excitation gain, however, may lead to an increase in output current. Therefore, set this parameter to a proper value in actual applications.

Set the over-excitation gain to 0 in applications of small inertia (the bus voltage will not rise during deceleration) or where there is a braking resistor.

Function Code	Parameter Name	Setting Range	Default
F03.09	Torque upper limit source in speed control mode	0:F03.10 1:analog AI1 2:analog AI2 3:analog AI3 4:Pulse (HDI) 5:RS485 Communication 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) ( corresponding F03.10 digital setting)	0
F03.10	Digital setting of torque upper limit in speed control mode	0.0%~200.0%	150.0%

In the speed control mode, the maximum output torque of the AC drive is restricted by F03.09. If the torque upper limit is analog, pulse or communication setting, 100% of the setting corresponds to the value of F03.10, and 100% of the value of F03.10 corresponds to the AC drive rated torque.

Function Code	Parameter Name	Setting Range	Default
F03.13	Excitation adjustment proportional gain	0~60000	2000
F03.14	Excitation adjustment integral gain	0~60000	1300
F03.15	Torque adjustment proportional gain	0~60000	2000
F03.16	Torque adjustment integral gain	0~60000	1300

These are current loop PI parameters for vector control. These parameters are automatically obtained through "Asynchronous motor complete self-learning", and need not be modified. The dimension of the current loop integral regulator is integral gain rather than integral time. Note that too large current loop PI gain may lead to oscillation of the entire control loop. Therefore, when current oscillation or torque fluctuation is great, manually decrease the proportional gain or integral gain here.

Function Code	Parameter Name	Setting Range	Default
F03.17	Speed loop integral property	0: invalid 1: valid	0
F03.21	Field weakening automatic adjustment gain	10%~500%	100%
F03.22	Field weakening integral multiple	2~10	2

The VP600 provides two field weakening modes: direct calculation and automatic adjustment.

- In direct calculation mode, directly calculate the demagnetized current and manually adjust the demagnetized current by means of F03.19. The smaller the demagnetized current is, the smaller the total output current is. However, the desired field weakening effect may not be achieved.
- In automatic adjustment mode, the best demagnetized current is selected automatically. This may influence the system dynamic performance or cause instability.

The adjustment speed of the field weakening current can be changed by modifying the values of F03.21 and F03.22. A small adjustment may cause instability. Therefore, it is recommended not to modify them manually.

Function Code	Parameter Name	Setting Range	Default
F03.23	Speed/torque control mode selection	0: speed control 1: torque control	0

Function Code	Parameter Name	Setting Range	Default
F03.24	Torque setting mode selection	0: digital setting (F03.26) 1:analog AI1 2: analog AI2 3: analog AI3 4:PULSE(HDI) 5:RS485 Communication 6:MIN(AI1,AI2) 7:MAX(AI1,AI2) ( corresponding F03.26 digital setting)	0
F03.26	Torque setting by keypad	-200.0%~200.0%	150.0%

If the torque setting mode is 1~7, analog, pulse or communication setting are 100% of the setting corresponds to the value of F03.26.

Function Code	Parameter Name	Setting Range	Default
F03.28	Upper frequency limit of forward when torque control	0.00Hz~F00.03(max.frequency)	50.00Hz
F03.29	Upper frequency limit of reverse when torque control	0.00Hz~F00.03(max.frequency)	50.00Hz

Please limit the max.speed of motor when torque control.

Function Code	Parameter Name	Setting Range	Default
F03.30	Torque control acceleration time	0.00s~650.00s	0.00s
F03.31	Torque control deceleration time	0.00s~650.00s	0.00s

## Group F04: V/F Control Parameters

Group F04 is valid only for V/F control.

The V/F control mode is applicable to low load applications (fan or pump) or applications where one AC drive operates multiple motors or there is a large difference between the AC drive power and the motor power.

Function Code	Parameter Name	Setting Range	Default
F04.00	Motor1 V/F curve setting	0:linear V/F 1:multi-point V/F 2:square V/F 3:V/F complete separation 4:V/F half separation 5:1.2 square V/F 6:1.4 square V/F 7:1.6 square V/F 8:1.8 square V/F	0

- 0: Linear V/F

Applicable to common constant torque load.

- 1: Multi-point V/F

Applicable to special load such as dehydrator and centrifuge. Any such V/F curve can be obtained by setting parameters of F04.03 to F04.08.

- 2: Square V/F

Applicable to centrifugal loads such as fan and pump.

- 3: V/F complete separation

In this mode, the output frequency and output voltage of the AC drive are independent. The output frequency is determined by the frequency source, and the output voltage is determined by "Voltage source for V/F separation" (F04.13).

Applicable to induction heating, inverse power supply and torque motor control.

- 4: V/F half separation

In this mode, V and F are proportional and the proportional relationship can be set in F04.13. The relationship between V and F are also related to the rated motor voltage and rated motor frequency in Group F02.

Assume that the voltage source input is X (0 to 100%), the relationship between V and F is:

$$V/F = 2 * X * (\text{Rated motor voltage}) / (\text{Rated motor frequency})$$

Function Code	Parameter Name	Setting Range	Default
F04.01	Motor 1 torque boost	0.0%:(auto torque boost) 0.1% to 30.0%	Model dependent
F04.02	Cut-off frequency of motor 1 torque boost	0.00Hz ~ F00.03(max.frequency)	50.00Hz

To compensate the low frequency torque characteristics of V/F control, you can boost the output voltage of the AC drive at low frequency by modifying F04.02.

If the torque boost is set to too large, the motor may overheat, and the AC drive may suffer overcurrent.

If the load is large and the motor startup torque is insufficient, increase the value of F04.01. If the load is small, decrease the value of F04.01. If F04.01 is set to 0.0, the AC drive performs automatic torque boost. In this case, the AC drive automatically calculates the torque boost value based on motor parameters including the stator resistance.

F04.02 specifies the frequency under which torque boost is activated. Torque boost is deactivated when this frequency is exceeded, as shown in the following figure.

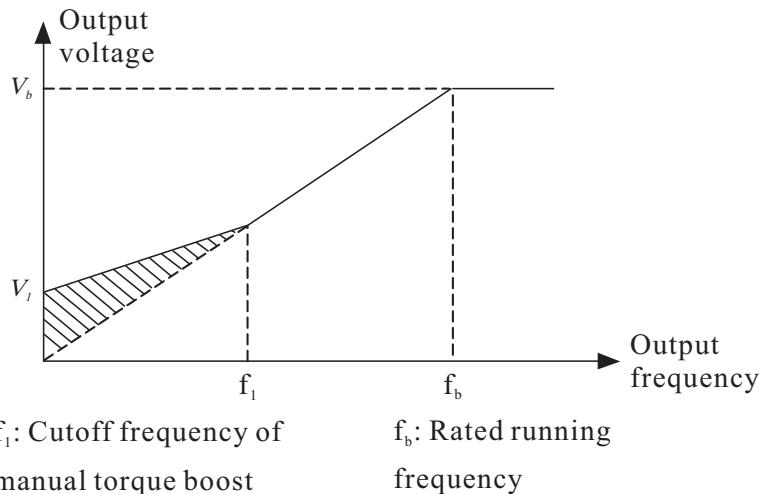


Figure 6-4 Manual torque boost

Function Code	Parameter Name	Setting Range	Default
F04.03	Motor1 V/F frequency point 1	0.00Hz~F04.05	0.00Hz
F04.04	Motor1 V/F voltage point 1	0.0%~100%	0.0%
F04.05	Motor1 V/F frequency point 2	F04.03~F04.07	0.00Hz
F04.06	Motor1 V/F voltage point 2	0.0%~100%	0.0%
F04.07	Motor1 V/F frequency point 3	F04.05~F02.02 motor rated frequency	0.00Hz
F04.08	Motor1 V/F voltage point 3	0.0%~100%	0.0%

These six parameters are used to define the multi-point V/F curve.

The multi-point V/F curve is set based on the motor's load characteristic. The relationship between voltages and frequencies is:

$$V_1 < V_2 < V_3 \quad f_1 < f_2 < f_3$$

At low frequency, higher voltage may cause overheat or even burnt out of the motor and overcurrent stall or overcurrent protection of the AC drive.

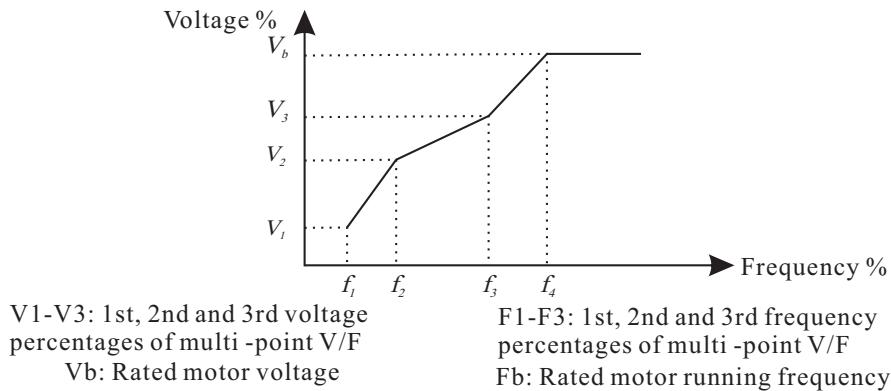


Figure 6-7 Setting of multi-point V/F curve

Function Code	Parameter Name	Setting Range	Default
F04.09	Motor1 V/F slip compensation gain	0.0%~200.0%	0.0%

This function code is used only for asynchronous motors.

It can compensate the rotational speed slip of the asynchronous motor when the load of the motor increases, stabilizing the motor speed in case of load change. If this function code is set to 100%, it indicates that the compensation when the motor bears rated load is the rated motor slip. The rated motor slip is automatically obtained by the AC drive through calculation based on the rated motor frequency and rated motor rotational speed in group F02.

Normally, if the motor rotational speed is different from the target speed, apply small adjustments to the value of this function code.

Function Code	Parameter Name	Setting Range	Default
F04.10	V/F over-excitation gain	0~200	64

During deceleration of the AC drive, over-excitation can restrain rise of the bus voltage, preventing the overvoltage fault. The larger the over-excitation, the better the restraining result.

Increase the over-excitation gain if the AC drive is prone to overvoltage error during deceleration. However, too large over-excitation gain may lead to an increase in the output current.

Set the over-excitation gain to 0 in the applications where the inertia is small and the bus voltage will not rise during motor deceleration or where there is a braking resistor.

Function Code	Parameter Name	Setting Range	Default
F04.11	V/F oscillation suppression gain	0~100	Model dependent

Set this function code to a value as small as possible, essential for effective oscillation suppression, to avoid influence on V/F control.

Set this function code to 0 if the motor has no oscillation. Increase the value suitably only when the motor displays obvious oscillation. The larger the value, the better the oscillation suppression result will be.

When the oscillation suppression function is enabled, the rated motor current and no load current must be correct. Otherwise, the V/F oscillation suppression effect will not be adequate.

Function Code	Parameter Name	Setting Range	Default
F04.13	Voltage source for V/F separation	0: digital setting (F04.14) 1: analog AI1 2: analog AI2 3: analog AI3 4: pulse (HDI) 5: multi-speed operation 6: simple PLC 7: PID control 8: RS485 Communication ( corresponding F02.04 digital setting)	0
F04.14	Voltage digital setting for V/F separation	0V~F02.04(motor rated voltage)	0V

V/F separation is generally applicable to scenarios such as induction heating, inverse power supply and motor torque control.

If V/F separated control is enabled, the output voltage can be set in F04.14 or by means of analog, multi-reference, simple PLC, PID or communication. If you set the output voltage by means of non-digital setting, 100% of the setting corresponds to the rated motor voltage. If a negative percentage is set, its absolute value is used as the effective value.

- 0: Digital setting (F04.14)

The output voltage is set directly in F04.14.

- 1: AI1; 2: AI2; 3: AI3

The output voltage is set by AI terminals.

- 4: Pulse setting (HDI)

The output voltage is set by pulses of the terminal.

Pulse setting specification: voltage range 9–26V, frequency range 0–100 kHz

- 5: Multi-speed operation

If the voltage source is multi-speed command, function codes in group F05 and F12 must be set to determine the corresponding relationship between setting signal and setting voltage. 100.0% of the multi-speed setting in group F12 corresponds to the rated motor voltage.

- 6: Simple PLC

If the voltage source is simple PLC mode, function codes in group F12 must be set to determine the setting output voltage.

- 7: PID control

The output voltage is generated based on PID closed loop. For details, see the description of PID in group F10.

- 8: Rs485 communication

The output voltage is set by the host computer by means of communication.

The voltage source for V/F separation is set in the same way as the frequency source. 100.0% of the setting in each mode corresponds to the rated motor voltage.

If the corresponding value is negative, its absolute value is used.

Function Code	Parameter Name	Setting Range	Default
F04.15	Voltage rise time for V/F separation	0.0s ~ 1000.0s note: time from 0V to motor rated voltage (F02.04)	0.0s

F04.15 indicates the time required for the output voltage to rise from 0 V to the rated motor voltage shown as  $t_1$  in the following figure.

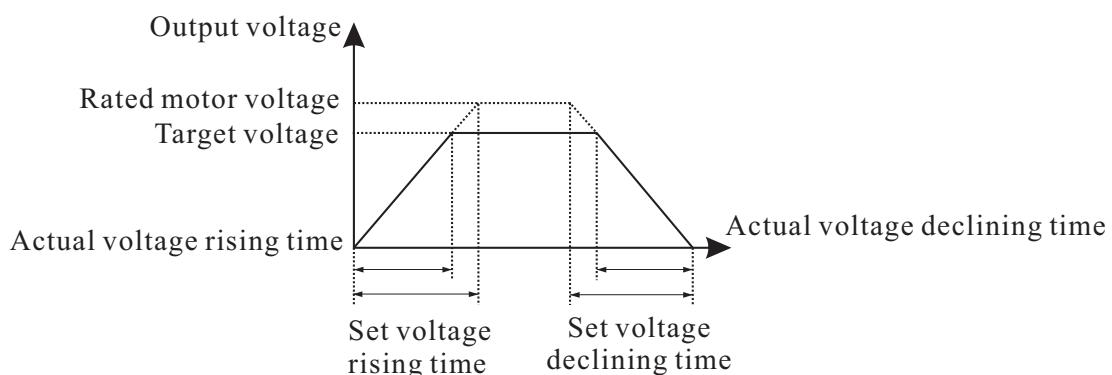


Figure 6-8 Voltage of V/F separation

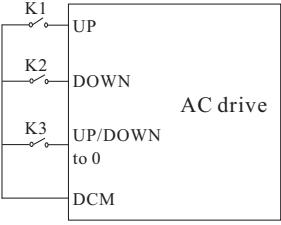
## Group F05: Input terminals

The VP600 provides six multi-function digital input (DI) terminals and three analog input (AI) terminals. The optional extension card provides another four DI terminals (S7 to HDI), (HDI can be used for high-speed pulse input)

Function Code	Parameter Name	Setting Range	Default
F05.00	S1 terminal function	0~50	1
F05.01	S2 terminal function	0~50	4
F05.02	S3 terminal function	0~50	9
F05.03	S4 terminal function	0~50	12
F05.04	S5 terminal function	0~50	13
F05.05	S6 terminal function	0~50	2
F05.06	S7 terminal function	0~50	0
F05.07	S8 terminal function	0~50	0
F05.08	S9 terminal function	0~50	0
F05.09	HDI terminal function	0~50	0

The following table lists the functions available for the DI terminals.

Value	Function	Description
0	No function	Set 0 for reserved terminals to avoid malfunction.
1	Forward RUN (FWD)	The terminal is used to control forward or
2	Reverse RUN (REV)	reverse RUN of the AC drive.
3	3-wire operation control	The terminal determines three-line control of the AC drive. For details, see the description of F05.13.
4	Forward jog	Forward jog indicates forward JOG running, while reverse jog indicates reverse JOG running. The JOG frequency, acceleration time and deceleration time are described respectively in F08.06, F08.07 and F08.08.
5	Reverse jog	
6	Coast to stop	The AC drive blocks its output, the motor coasts to rest and is not controlled by the AC drive. It is the same as coast to stop described in F02.10.

Value	Function	Description
7	Fault reset (RESET)	The terminal is used for fault reset function, the same as the function of RESET key on the operation panel. Remote fault reset is implemented by this function.
8	Normally open (NO) input of external fault	If this terminal becomes ON, the AC drive reports E00d and performs the fault protection action. For more details, see the description of F09.21.
9	Terminal UP	If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification.
10	Terminal DOWN	<p>If the frequency is determined by external terminals, the terminals with the two functions are used as increment and decrement commands for frequency modification.</p> 
11	Clear UP/ DOWN terminal keypad )	When the frequency source is digital setting, they are used to adjust the frequency.
12	Multi- speed terminal 1	The setting of 16 speed or 16 other commands can be implemented through combinations of 16 states of these four terminals.
13	Multi- speed terminal 2	
14	Multi- speed terminal 3	
15	Multi- speed terminal 4	
16	Pause operation	The AC drive decelerates to stop, but the running parameters are all memorized, such as PLC, swing frequency and PID parameters. After this function is disabled, the AC drive resumes its status before stop.
17	Acc/ Dec time selection 1	A total of four separate acceleration/deceleration times can be selected through combinations of the two states of these two terminals.
18	Acc/ Dec time selection 2	
19	Frequency source switch over	The terminal is used to perform switch over between two frequency sources according to the setting in F00.09.
20	Run command switch over terminal	If the command source is set to terminal control (F00.01= 1), this terminal is used to perform switch over between terminal control and keypad control. If the command source is set to communication control (F00.01 = 2), this terminal is used to perform switch over between communication control and keypad control.

Value	Function	Description
21	Acceleration/Deceleration prohibited	Enables the AC drive to maintain the current frequency output without being affected by external signals (except the STOP command).
22	PID pause	PID is disabled temporarily. The AC drive maintains the current frequency output without supporting PID adjustment of frequency source.
23	PLC status reset	The terminal is used to restore the original status of PLC control for the AC drive when PLC control is started again after a pause.
24	Swing pause	The AC drive outputs the central frequency, and the swing frequency function pauses.
25	Terminal count	Count once when terminal closed once.
26	Counter reset	This terminal is used to clear the counter status.
27	Length count input	This terminal is used to count the length.
28	Length reset	This terminal is used to clear the length.
29	Torque control prohibited	The AC drive is prohibited from torque control and enters the speed control mode.
30	Pulse input (enabled only for HDI)	HDI is used for pulse input.
31	Reserved	Reserved
32	Immediate DC braking	After this terminal becomes ON, the AC drive immediately engages the DC braking state.
33	Normally closed (NC) input of external fault	After this terminal becomes ON, the AC drive reports E00d and stops.
34	Frequency modification forbidden	After this terminal becomes ON, the AC drive does not respond to any frequency modification.
35	Reverse PID action direction	After this terminal becomes ON, the PID action direction is reversed to the direction set in FA-03.
36	External STOP terminal 1	In operation panel mode, this terminal can be used to stop the AC drive, equivalent to the function of the STOP key on the operation panel.
37	Command source switch over terminal 2	Used to perform switch over between terminal control and communication control. If the command source is terminal control, the system will switch over to communication control after this terminal becomes ON.
38	PID integral pause	After this terminal becomes ON, the integral adjustment function pauses. However, the proportional and differentiation adjustment functions are still operational.

Value	Function	Description
41	Motor selection terminal 1	Switch over among the two groups of motor parameters can be implemented through the two state combinations of these two terminals.
43	PID parameter switch over	If the PID parameters switch over performed by means of DI terminal (F10.18 = 1), the PID parameters are F10.05 to F10.07 when the terminal becomes OFF; the PID parameters are F10.15 to F10.17 when this terminal becomes ON.
46	Speed control/Torque control switch over	This terminal enables the AC drive to switch over between speed control and torque control. When this terminal becomes OFF, the AC drive runs in the mode set in A03.23. When this terminal becomes ON, the AC drive switches over to the other control mode.
47	Emergency stop	When this terminal becomes ON, the AC drive stops within the shortest time. During the stop process, the current remains at the set current upper limit. This function is used to satisfy the requirement of stopping the AC drive in emergency state.
48	External STOP terminal 2	In any control mode (operation panel, terminal or communication), it can be used to make the AC drive decelerate to stop. In this case, the deceleration time is deceleration time 4.
49	Deceleration DC braking	When this terminal becomes ON, the AC drive decelerates to the initial frequency of stop DC braking and then switches over to DC braking state.
50	Clear the current running time	When this terminal becomes ON, the AC drive's current running time is cleared. This function must be supported by F08.43 and F08.54.

The four multi-command terminals have 16 state combinations, corresponding to 16 reference values, as listed in the following table.

S1	S2	S3	S4	Multi-step speed setting	Corresponding function code
OFF	OFF	OFF	OFF	Multi-step speed 0	F12.02
OFF	OFF	OFF	ON	Multi-step speed 1	F12.03
OFF	OFF	ON	OFF	Multi-step speed 2	F12.04
OFF	OFF	ON	ON	Multi-step speed 3	F12.05
OFF	ON	OFF	OFF	Multi-step speed 4	F12.06
OFF	ON	OFF	ON	Multi-step speed 5	F12.07
OFF	ON	ON	OFF	Multi-step speed 6	F12.08
OFF	ON	ON	ON	Multi-step speed 7	F12.09
ON	OFF	OFF	OFF	Multi-step speed 8	F12.10
ON	OFF	OFF	ON	Multi-step speed 9	F12.11
ON	OFF	ON	OFF	Multi-step speed 10	F12.12
ON	OFF	ON	ON	Multi-step speed 11	F12.13
ON	ON	OFF	OFF	Multi-step speed 12	F12.14
ON	ON	OFF	ON	Multi-step speed 13	F12.15
ON	ON	ON	OFF	Multi-step speed 14	F12.16
ON	ON	ON	ON	Multi-step speed 15	F12.17

If the frequency source is multi-reference, the value 100% of F12.02 to F12.17 corresponds to the value of F00.03 (Maximum frequency).

Besides the multi-speed function, the multi-reference can be also used as the PID setting source or the voltage source for V/F separation, satisfying the requirement on switch over of different setting values.

Two terminals for acceleration/deceleration time selection have four state combinations, as listed in the following table.

State combinations of two terminals for acceleration/deceleration time selection as follow table:

Terminal 2	Terminal 1	Acceleration Time selection	Corresponding Function code
OFF	OFF	Acceleration time 1	F00.12, F00.13
OFF	ON	Acceleration time 2	F08.00, F08.01
ON	OFF	Acceleration time 3	F08.02, F08.03
ON	ON	Acceleration time 4	F08.04, F08.05

State combinations of motor selection terminals as follow table:

Terminal	Selected Motor	Corresponding Group
OFF	Motor 1	Group F02
ON	Motor 2	Group F15

Function Code	Parameter Name	Setting Range	Default
F05.10	Input terminal operation mode selection 1	0: operation on high level 1: operation on low level  units' digit: S1 tens' digit: S2 hundreds' digit: S3 thousands' digit: S4 ten thousands' digit: S5	00000
F05.11	Input terminal polarity selection 2	0: operation on high level 1: operation on low level  units' digit: S6 tens' digit: S7 hundreds' digit: S8 thousands' digit: S9 ten thousands' digit: HDI	00000

These function codes are used to set the operation mode of digital input DI terminals.

- 0: High level operation

The DI terminal (S) is operative when receiving a high signal from COM, and inoperative when receiving a low signal from COM.

- 1: Low level operation

The DI terminal (S) is inoperative when receiving a high signal from COM, and operative when receiving a low signal from COM.

Function Code	Parameter Name	Setting Range	Default
F05.12	Filtering time of switch	0.000s~1.000s	0.010s

Used to set the software filter time of digital input (DI) terminal status. If DI terminals are liable to interference and may cause malfunction, increase the value of this function code to enhance the anti-interference capability. However, increase of DI filter time will reduce the response of DI terminals.

Function Code	Parameter Name	Setting Range	Default
F05.13	Terminal control operation mode	0: 2-wire control 1 1: 2-wire control 2 2: 3-wire control 1 3: 3-wire control 2	0

This function code is used to set the mode in which the AC drive is controlled by external terminals.

- 0: 2-wire control 1

The most commonly used two-wire mode, in which the forward/reverse rotation of the motor is decided by K1 and K2.

- 1: 2-wire control 2

In this mode, K1 is RUN enabled terminal, and K2 determines the running direction.

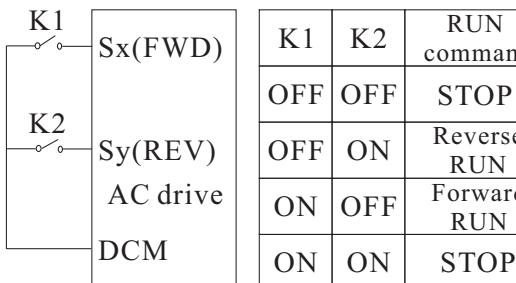


Figure 6-9 Setting of 2-wire control 1

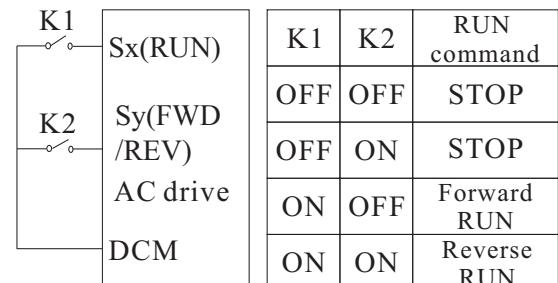


Figure 6-10 Setting of 2-wire control 2

When Sx/Sy terminal is in an operative configuration, if ac drive is stop by others stop command, it will not run even if Sx/Sy remain in an operative configuration. To restart, reinstate the desired Sx/Sy operative configuration.

#### • 2: 3-wire control 1

In this mode, EN is RUN enabled terminal, and the direction is decided by SW1 and SW3. STOP command is by normal close SW2

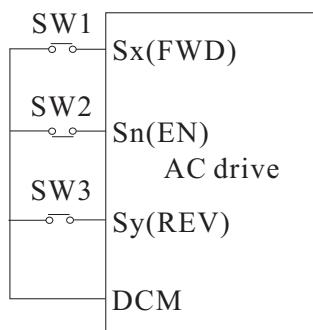


Figure 6-11 Setting of 3-wire control 1

SW1: forward run

SW2: stop run

SW3: reverse run

EN is 3-wire run enabled terminal

#### • 3: 3-wire control 2

In this mode, EN is RUN enabled terminal. The RUN command is given by SW1 and the direction is decided by K, EN is normal close input.

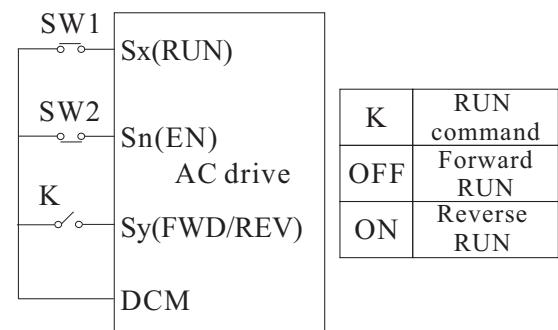


Figure 6-12 Setting of 3-wire control 2

K: forward/reverse

SW1: run

SW3: stop

EN is 3-wire run enabled terminal

Function Code	Parameter Name	Setting Range	Default
F05.14	Terminal UP/DOWN rate	0.001Hz/s~65.535Hz/s	1.00Hz/s

Used to adjust the rate of change of frequency when the frequency is adjusted by means of terminal UP/DOWN.

- If F00.11 (Frequency reference resolution) is 2, the setting range is 0.001–65.535 Hz/s.
- If F00.11 (Frequency reference resolution) is 1, the setting range is 0.01–655.35 Hz/s.

Function Code	Parameter Name	Setting Range	Default
F05.15	S1 delay time	0.0s~3600.0s	0.0s
F05.16	S2 delay time	0.0s~3600.0s	0.0s
F05.17	S3 delay time	0.0s~3600.0s	0.0s

These function codes are used to set the delay time of the AC drive when the status of S terminals changes.

Currently, only S1, S2 and S3 support the delay time function.

Function Code	Parameter Name	Setting Range	Default
F05.18	AI1 lower limit	0.00V~F05.20	0.00V
F05.19	Corresponding setting of AI1 lower limit	-100.0%~+100.0%	0.0%
F05.20	AI1 upper limit	F05.18~+10.00V	10.00V
F05.21	Corresponding setting of AI1 upper limit	-100.0%~+100.0%	100.0%
F05.22	AI1 input filter time	0.00s~10.00s	0.10s

These function codes are used to define the relationship between the analog input voltage and the corresponding setting. When the analog input voltage exceeds the maximum value (F05.20), the maximum value is used. When the analog input voltage is less than the minimum value (F05.08), the value set in F05.39 (Setting for AI less than minimum input) is used.

When the analog input is current input, 1 mA current corresponds to 0.5 V voltage. F05.22 (AI1 filter time) is used to set the software filter time of AI1. If the analog input is liable to interference, increase the value of this function code to stabilize the detected analog input. However, increase of the AI filter time will slow the response of analog detection. Set this to a suitable value based on actual conditions.

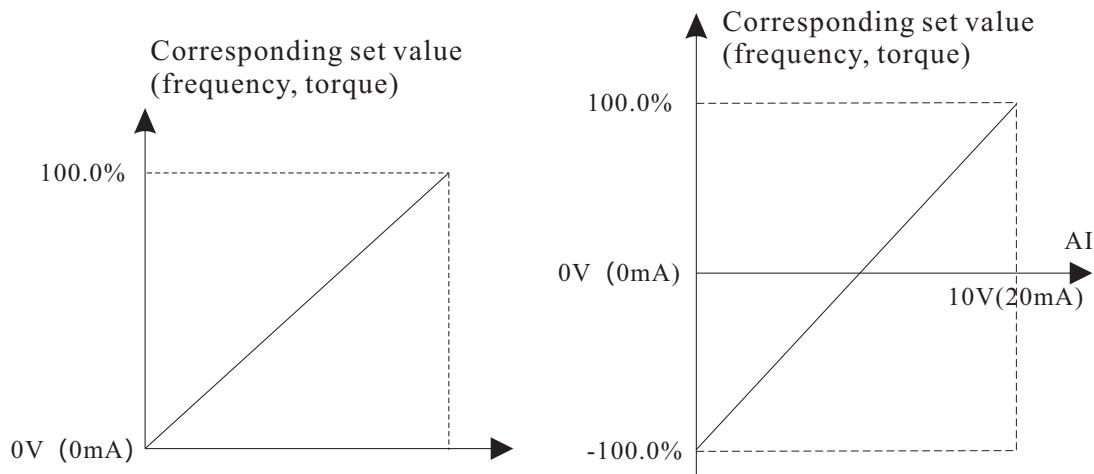


Figure 6-13 Corresponding relationship between analog input and set values

Function Code	Parameter Name	Setting Range	Default
F05.23	AI2 low limit	0.00V~F05.25	0.00V
F05.24	Corresponding setting of AI2 lower limit setting	-100.0%~+100.0%	0.0%
F05.25	AI2 upper limit	F05.23~+10.00V	10.00V
F05.26	Corresponding setting of AI2 upper limit	-100.0%~+100.0%	100.0%
F05.27	AI2 input filter time	0.00s~10.00s	0.10s

The method of setting AI2 functions is similar to that of setting AI1 function.

Function Code	Parameter Name	Setting Range	Default
F05.28	AI3 lower limit	-10.00V~F05.30	0V
F05.29	Corresponding setting of AI3 lower limit	-100.0%~+100.0%	0.0%
F05.30	AI3 upper limit	F05.28~+10.00V	4.00V
F05.31	Corresponding setting of AI3 upper limit	-100.0%~+100.0%	100.0%
F05.32	AI3 filter time	0.00s~10.00s	0.10s

The method of setting AI3 functions is similar to that of setting AI1 function.

Function Code	Parameter Name	Setting Range	Default
F05.33	HDI lower limit	0.00kHz~F05.35	0.00kHz
F05.34	Corresponding setting of HDI lower limit	-100.0%~+100.0%	0.0%
F05.35	HDI upper limit	F05.33~+100.00kHz	50.00kHz
F05.36	Corresponding setting of HDI upper limit	-100.0%~+100.0%	100.0%
F05.37	HDI frequency input filter time	0.00s~10.00s	0.10s

These function codes are used to set the relationship between HDI pulse input and corresponding settings. The pulses can only be input by HDI. The method of setting this function is similar to that of setting AI1 function.

Function Code	Parameter Name	Setting Range	Default
F05.38	AI curve selection	units' digit: AI1 curve selection 1: curve 1( 2 point, see F05.18~F05.21) 2: curve 2( 2 point, see F05.23~F05.26) 3: curve 3( 2 point, see F05.28~F05.31) 4: curve 4( 4 point, see F05.40~F05.47) 5: curve 5( 4 point, see F05.48~F05.55) tens' digit: : AI2 curve selection hundreds' digit: AI3 curve selection	H.321

The unit's digit, ten's digit and hundred's digit of this function code is respectively used to select the corresponding curve of AI1, AI2 and AI3. Any of the five curves can be selected for AI1, AI2 and AI3.

Curve 1, curve 2 and curve 3 are all 2-point curves, set in group F4. Curve 4 and curve 5 are both 4-point curves.

Function Code	Parameter Name	Setting Range	Default
F05.39	Setting for AI less than minimum input	units' digit: (setting for AI1 less than minimum input) 0: corresponding to the minimum input set 1: 0.0% tens' digit: (setting for AI2 less than minimum input) setting selection hundreds' digit: (setting for AI3 less than minimum input)	H.000

This function code is used to determine the corresponding setting when the analog input voltage is less than the minimum value. The unit's digit, ten's digit and hundred's digit of this function code respectively corresponds to the setting for AI1, AI2 and AI3.

If the value of a certain digit is 0, when analog input voltage is less than the minimum input, the corresponding setting of the minimum input (F05.19, F05.24, F05.29) is used. If the value of a certain digit is 1, when analog input voltage is less than the minimum input, the corresponding value of this analog input is 0.0%.

Function Code	Parameter Name	Setting Range	Default
F05.40	AI curve 4 lower limit	-10.00V~F05.42	0.00V
F05.41	Corresponding setting of AI curve 4 lower limit	-100.0%~+100.0%	0.0%
F05.42	AI curve 4 inflection point 1 input	F05.40~F05.44	3.00V
F05.43	Corresponding setting of AI curve 4 inflection point 1 input	-100.0%~+100.0%	30.0%
F05.44	AI curve 4 inflection point 2 input	F05.42~F05.46	6.00V
F05.45	Corresponding setting of AI curve 4 inflection point 2 input	-100.0%~+100.0%	60.0%
F05.46	AI curve 4 upper limit	F05.44~ +10.00V	10.00V
F05.47	AI curve 4 upper limit	-100.0%~+100.0%	100.0%
F05.48	AI curve 5 lower limit	-10.00V~F05.50	-10.00V
F05.49	Corresponding setting of AI curve 5 lower limit	-100.0%~+100.0%	-100.0%
F05.50	AI curve 5 inflection point 1 input	F05.48~F05.52	-3.00V
F05.51	Corresponding setting of AI curve 5 inflection point 1 input	-100.0%~+100.0%	-30.0%
F05.52	AI curve 5 inflection point 2 input	F05.50~F05.54	3.00V
F05.53	Corresponding setting of AI curve 5 inflection point 2 input	-100.0%~+100.0%	30.0%

Function Code	Parameter Name	Setting Range	Default
F05.54	AI curve 5 upper limit	F05.52~ +10.00V	10.00V
F05.55	Corresponding setting of AI curve 5 upper limit	-100.0%~+100.0%	100.0%

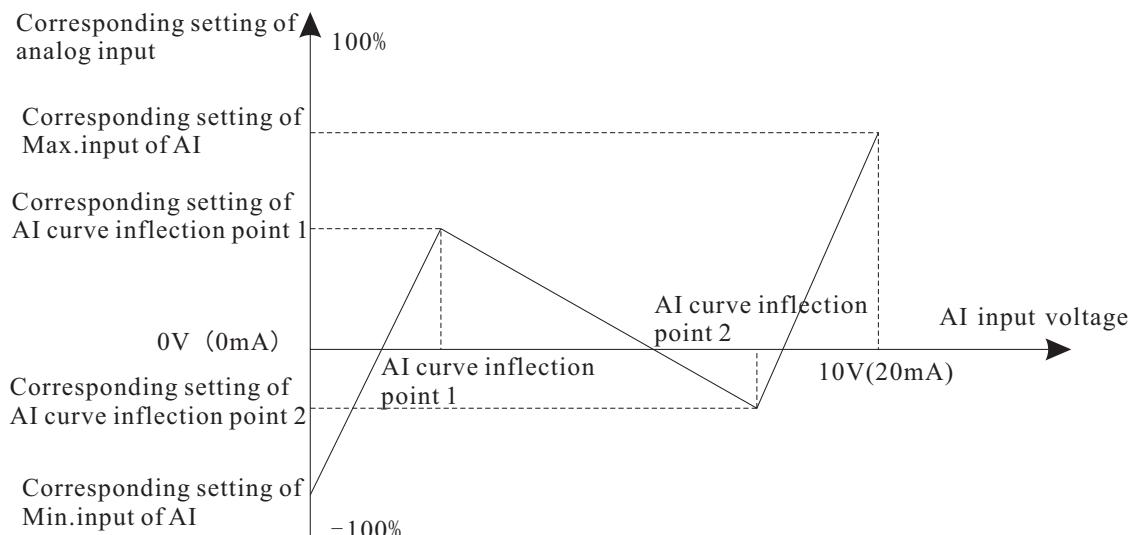


Figure 6-14 Curve 4 and curve 5

Function Code	Parameter Name	Setting Range	Default
F05.64	AI1 jump point setting	-100.0%~100.0%	0.0%
F05.65	AI1 jump point range setting	0.0%~100.0%	0.5%
F05.66	AI2 jump point setting	-100.0%~100.0%	0.0%
F05.67	AI2 jump point range setting	0.0%~100.0%	0.5%
F05.68	AI3 jump point setting	-100.0%~100.0%	0.0%
F05.69	AI3 jump point range setting	0.0%~100.0%	0.5%

## Group F06: Output Terminals

The VP600 provides 2 analog output (AO) terminal, 1 open-collector switch signal output, 2 relay terminal and a HDO terminal (used for high-speed pulse output or open-collector switch signal output) as standard. If these output terminals cannot satisfy requirements, use an optional I/O extension card that provides an AO terminal (AO2), a relay terminal (relay 2) and a DO terminal (DO2).

Function Code	Parameter Name	Setting Range	Default
F06.00	HDO terminal output mode	0: Pulse output (HDOP) 1: Switch signal output (HDOR)	0
F06.01	HDOR output selection		0
F06.02	Relay TA output selection TA*TB*TC )		2
F06.03	Relay RA output selection RA*RB*RC )		0
F06.04	MO1 output selection		1

These five function codes are used to select the functions of the five digital output terminals. TA\*TB\*TC and RA\*RB\*RC are respectively the relays on the control board. The functions of the output terminals are described in the following table.

Value	Function	Description
0	no output	The terminal has no function.
1	frequency reached	Refer to the descriptions of F08.24.
2	frequency-level detection FDT1 output	Refer to the descriptions of F08.20 and F08.21
3	fault output (stop)	When the AC drive stops due to a fault, the terminal becomes ON.
4	motor overload pre-warning	The AC drive judges whether the motor load exceeds the overload pre-warning threshold before performing the protection action. If the pre-warning threshold is exceeded, the terminal becomes ON. For motor overload parameters, see the descriptions of F09.09 to F09.11.
5	AC drive overload pre-warning	The terminal becomes ON 10s before the AC drive overload protection action is performed.
6	zero-speed running (no output at stop)	If the AC drive runs with the output frequency of 0, the terminal becomes ON. If the AC drive is in the stop state, the terminal becomes OFF.
7	zero-speed running 2 (no output at stop)	If the output frequency of the AC drive is 0, the terminal becomes ON. In the state of stop, the signal is still ON.

Value	Function	Description
8	frequency upper limit reached	If the running frequency reaches the upper limit, the terminal becomes ON.
9	frequency lower limit reached (no output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the terminal becomes OFF.
10	set count value reached	The terminal becomes ON when the count value reaches the value set in F11.08.
11	designated count value reached	The terminal becomes ON when the count value reaches the value set in F11.09.
12	length reached	The terminal becomes ON when the detected actual length exceeds the value set in F11.05.
13	PLC cycle complete	When simple PLC completes one cycle, the terminal outputs a pulse signal with width of 250 ms.
14	accumulative running time reached	If the accumulative running time of the AC drive exceeds the time set in F08.16, the terminal becomes ON.
15	frequency limited	If the set frequency exceeds the frequency upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit, the terminal becomes ON.
16	torque limited	In speed control mode, if the output torque reaches the torque limit, the AC drive enters the stall protection state and meanwhile the terminal becomes ON.
17	ready for RUN	If the AC drive main circuit and control circuit become stable, and the AC drive detects no fault and is ready for RUN, the terminal becomes ON.
18	AC drive running	When the AC drive is running and has output frequency (can be zero), the terminal becomes ON.
19	AI1>AI2	When the input of AI1 is larger than the input of AI2, the terminal becomes ON.
20	undervoltage state output	If the AC drive is in undervoltage state, the terminal becomes ON.
22	reserved	reserved
23	reserved	reserved

Value	Function	Description
24	accumulative power-on time reached	If the AC drive accumulative power-on time (F07.13) exceeds the value set in F08.15, the terminal becomes ON.
25	frequency level detection FDT2 output	Refer to the descriptions of F08.22 and F08.23.
26	frequency 1 reached	Refer to the descriptions of F08.31 and F08.32.
27	frequency 2 reached	Refer to the descriptions of F08.33 and F08.34.
28	current 1 reached	Refer to the descriptions of F08.39 and F08.40.
29	current 2 reached	Refer to the descriptions of F08.41 and F08.42.
30	timing reached	If the timing function (F08.43) is valid, the terminal becomes ON after the current running time of the AC drive reaches the set time.
31	AI1 input limit exceeded	If AI1 input is larger than the value of F08.47 (AI1 input voltage upper limit) or lower than the value of F08.46 (AI1 input voltage lower limit), the terminal becomes ON.
32	load becoming 0	If the load becomes 0, the terminal becomes ON.
33	reverse running	If the AC drive is in the reverse running state, the terminal becomes ON.
34	zero current state	Refer to the descriptions of F08.22 and F08.23.
35	module temperature reached	If the heatsink temperature of the inverter module (F07.08) reaches the set module temperature threshold (F08.48), the terminal becomes ON.
36	output current limit exceeded	Refer to the descriptions of F08.37 and F08.38.
37	frequency lower limit reached (having output at stop)	If the running frequency reaches the lower limit, the terminal becomes ON. In the stop state, the signal is still ON.
38	alarm output (keep running)	If a fault occurs on the AC drive and the AC drive continues to run, the terminal outputs the alarm signal.
39	motor overheat warning	If the motor temperature reaches the temperature set in F09.59 (motor overheat warning threshold), the terminal becomes ON.
40	current running time reached	If the current running time of AC drive exceeds the value of F08.54, the terminal becomes ON.

Function Code	Parameter Name	Setting Range	Default
F06.06	Output terminal valid mode selection	0: Positive logic 1: Negative logic Unit's digit: HDO Ten's digit: TA Hundred's digit: RA Thousand's digit: MO1	0.0s

Used to set the logic of output terminals HDO, relay 1, relay 2, MO1.

- 0: Positive logic

The output terminal is closed/high when being activated with COM, and open/low when inactive with COM.

- 1: Negative logic

The output terminal is open/low when being activated with COM, and closed/high when inactive with COM.

Function Code	Parameter Name	Setting Range	Default
F06.07	HDO delay time	0.0s~3600.0s	0.0s
F06.08	TA delay time	0.0s~3600.0s	0.0s
F06.09	RA delay time	0.0s~3600.0s	0.0s
F06.10	MO1 output delay time	0.0s~3600.0s	0.0s

These function codes are used to set the delay time of output terminals HDO, relay 1, relay 2, MO1 from status change to actual output.

Function Code	Parameter Name	Setting Range	Default
F06.12	HDOP output selection	0~15	0
F06.13	AO1 output selection		0
F06.14	AO2 output selection		1

The output pulse frequency of the HDOP terminal ranges from 0.01 kHz to "HDO output max. frequency" (F06.22). The value of F06.22 is between 0.01 kHz and 100.00 kHz. The output range of AO1 and AO2 is 0–10 V or 0–20 mA. The relationship between pulse and analog output ranges and corresponding functions is listed in the following table:

Value	Function	Description
0	setting frequency	0 to maximum output frequency
1	running frequency	0 to maximum output frequency
2	output current	0 to 2 times of rated motor current
3	output voltage	0 to 1.2 times of rated AC drive voltage
4	output speed	0 to rotational speed corresponding to maximum output frequency
5	output torque	0 to 2 times of rated motor torque
6	output power	0 to 2 times of rated power
7	pulse input	0.01kHz to 100.00kHz
8	AI1	0V to 10V
9	AI2	0V to 10V or 0 to 20mA
10	AI3	0V to 10V
11	length	0 to maximum set length
12	count value	0 to maximum count value
13	Rs485 communication	0.0% to 100.0%
14	output current 100% corresponding to 1000.0A	0.0A~1000.0A
15	output voltage 100% corresponding to 1000.0V	0.0V~1000.0V

Function Code	Parameter Name	Setting Range	Default
F06.15	AO1 offset coefficient	-100.0%~100.0%	0.0%
F06.16	AO1 gain	-10.00~+10.00	1.00
F06.17	AO2 offset coefficient	-100.0%~100.0%	0.0%
F06.18	AO2 gain	-10.00~+10.00	1.00

These function codes are used to correct the zero drift of analog output and the output amplitude deviation. They can also be used to define the desired AO curve.

If "b" represents zero offset, "k" represents gain, "Y" represents actual output, and "X" represents standard output, the actual output is:  $Y = kX + b$ .

The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

For example, if the analog output is used as the running frequency, and it is expected that the output is 8 V when the frequency is 0 and 3 V at the maximum frequency, the gain shall be set to -0.50, and the zero offset shall be set to 80%.

Function Code	Parameter Name	Setting Range	Default
F06.19	AO1 output filter time	0~10.00	0
F06.20	AO2 output filter time	0~10.00	0
F06.21	HDO output filter time	0~10.00	0

Function Code	Parameter Name	Setting Range	Default
F06.22	HDO output max.frequency	0.01kHz~100.00kHz	50.00kHz

This function code is used to select max. frequency of output pulse when HDO terminal as pulse output.

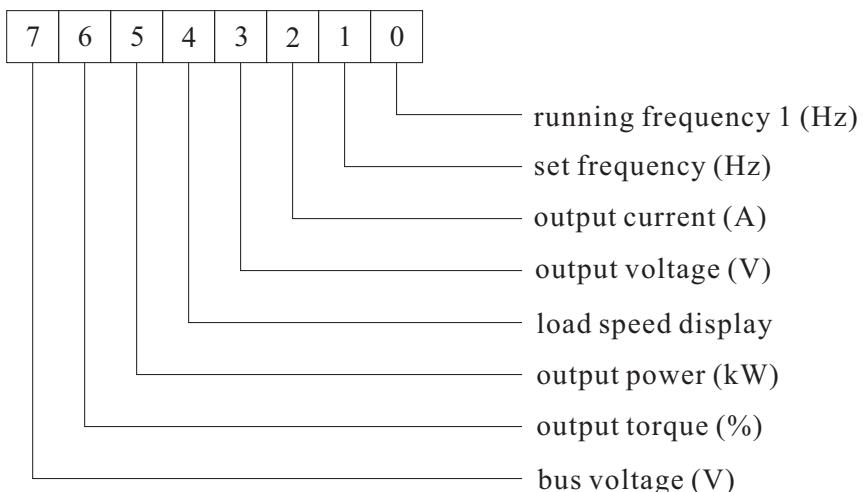
## Group F07: Keypad And Display

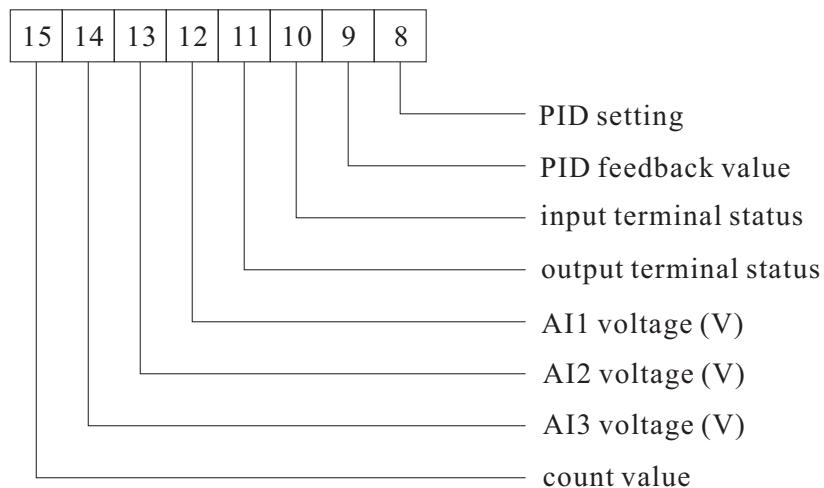
Function Code	Parameter Name	Setting Range	Default
F07.00	User password	0~65535	0

Press FUNC/DATA key to confirm password.  
Don't press again within 1 minute, password will saved.

If password is not needed, set to 00000.

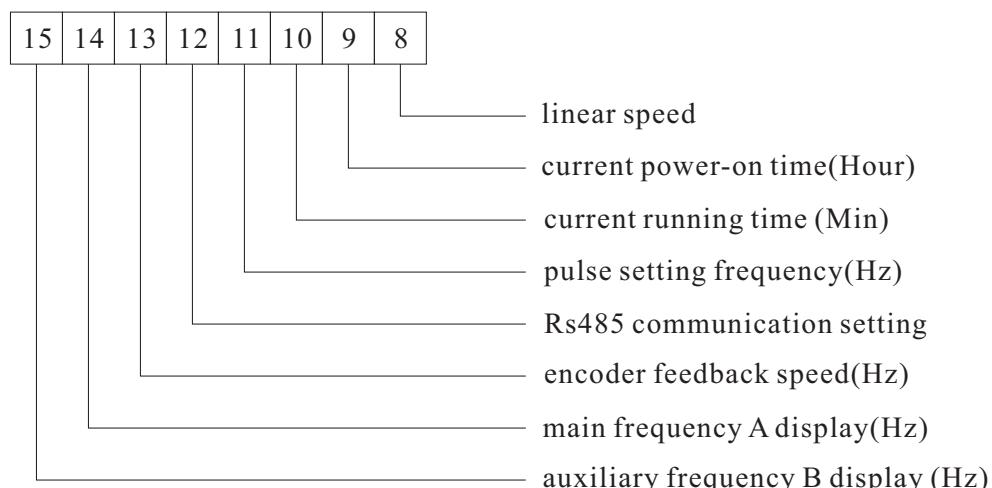
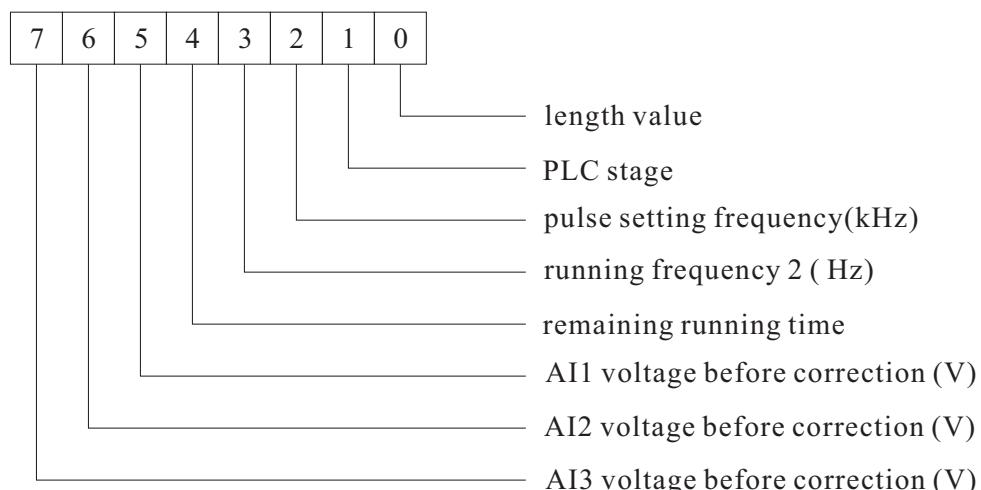
Function Code	Parameter Name	Setting Range	Default
F07.02	STOP key function selection	0: STOP/RST key enabled only in keypad control 1: STOP/RST key enabled in any operation mode	1
F07.03	LED display running parameters 1	0000~FFFF	H.008F





If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set F07.03 to the hexadecimal equivalent of the resultant binary number.

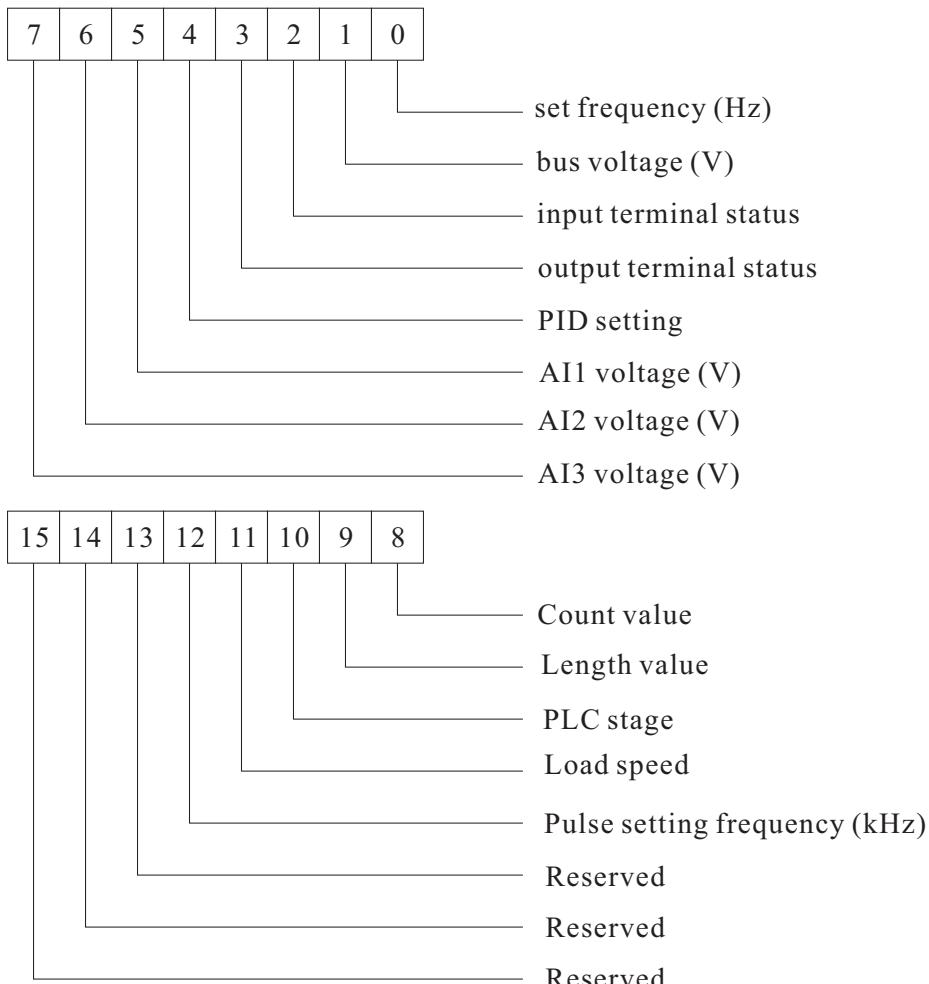
Function Code	Parameter Name	Setting Range	Default
F07.04	LED display running parameters 2	0000~FFFF	H.0000



If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set F07.04 to the hexadecimal equivalent of the resultant binary number.

These two function codes are used to set the parameters that can be viewed when the AC drive is in the running state. You can view a maximum of 32 running state parameters that are displayed from the lowest bit of F07.03.

Function Code	Parameter Name	Setting Range	Default
F07.05	LED display stop parameters	0000~FFFF	H.0063



If a parameter needs to be displayed during the running, set the corresponding bit to 1, and set F07.05 to the hexadecimal equivalent of the resultant binary number.

Function Code	Parameter Name	Setting Range	Default
F07.06	Load speed display coefficient	0.0001~6.5000	1.0000

This function code is used to adjust the relationship between the output frequency of the AC drive and the load speed. For details, see the description of F07.12.

Function Code	Parameter Name	Setting Range	Default
F07.07	Heatsink temperature of rectifier bridge	0.0°C~100.0°C	-

Function Code	Parameter Name	Setting Range	Default
F07.08	Heatsink temperature of inverter module	0.0°C ~100.0°C	-
F07.09	Software version	-	-
F07.10	Accumulative running time	0h~65535h	-
F07.11	Product number	-	-

These function codes can not be modified.

Heatsink temperature of inverter module is used to display the insulated gate bipolar transistor (IGBT) temperature of the inverter module, and the IGBT overheat protection value of the inverter module depends on the model.

Function Code	Parameter Name	Setting Range	Default
F07.12	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1

F07.12 is used to set the number of decimal places for load speed display. The following gives an example to explain how to calculate the load speed:

Assume that F07.06 (Load speed display coefficient) is 2.000 and F07.12 is 2 (2 decimal places). When the running frequency of the AC drive is 40.00 Hz, the load speed is  $40.00 \times 2.000 = 80.00$  (display of 2 decimal places).

If the AC drive is in the stop state, the load speed is the speed corresponding to the set frequency, namely, "set load speed". If the set frequency is 50.00 Hz, the load speed in the stop state is  $50.00 \times 2.000 = 100.00$  (display of 2 decimal places).

Function Code	Parameter Name	Setting Range	Default
F07.13	Accumulative power-on time	0h~65535h	-

Used to display the accumulative power-on time of the AC drive since the delivery. If the time reaches the set power-on time (F08.16), the terminal with the digital output function 24 becomes ON.

Function Code	Parameter Name	Setting Range	Default
F07.14	Accumulative power consumption	0~65535 kWh	-

Used to display the accumulative power consumption of the AC drive to present time.

## Group F08: Auxiliary Functions

Function Code	Parameter Name	Setting Range	Default
F08.00	Acceleration time 2	0.0s~6500.0s	Model dependent
F08.01	Deceleration time 2	0.0s~6500.0s	Model dependent
F08.02	Acceleration time 3	0.0s~6500.0s	Model dependent
F08.03	Deceleration time 2	0.0s~6500.0s	Model dependent
F08.04	Acceleration time 4	0.0s~6500.0s	Model dependent
F08.05	Deceleration time 2	0.0s~6500.0s	Model dependent

The VP600 provides a total of four groups of acceleration/deceleration time, that is, the preceding three groups and the group defined by F00.12 and F00.13. Definitions of four groups are completely the same. You can switch over between the four groups of acceleration/deceleration time through different state combinations of digital input( S) terminals. For more details, see the descriptions of F05.01 to F05.05.

Function Code	Parameter Name	Setting Range	Default
F08.06	JOG running frequency	0.00Hz F00.03(max.frequency)	2.00Hz
F08.07	JOG acceleration time	0.0s~6500.0s	20.0s
F08.08	JOG deceleration time	0.0s~6500.0s	20.0s

These function codes are used to define the set frequency and acceleration/deceleration time of the AC drive when jogging. The startup mode is "Direct start" (F01.00 = 0) and the stop mode is "Decelerate to stop" (F01.08 = 0) during jogging.

Function Code	Parameter Name	Setting Range	Default
F08.09	Jump frequency 1	0.00Hz F00.03(max.frequency)	0.00Hz
F08.10	Jump frequency 2	0.00Hz F00.03(max.frequency)	0.00Hz
F08.11	Frequency jump amplitude	0.00Hz F00.03(max.frequency)	0.00Hz

If the set frequency is within the frequency jump range, the actual running frequency is the jump frequency close to the set frequency. Setting the jump frequency helps to avoid the mechanical resonance point of the load.

The VP600 supports two jump frequencies. If both are set to 0, the frequency jump function is disabled. The principle of the jump frequencies and jump amplitude is shown in the following figure 6-15.

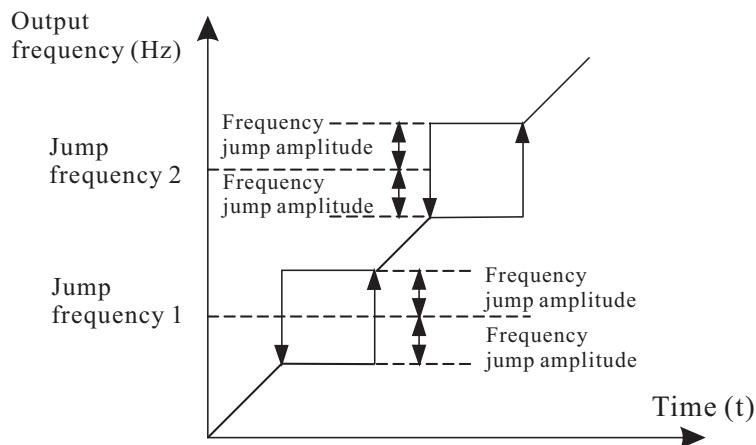


Figure 6-15 Principle of the jump frequencies and jump amplitude

Function Code	Parameter Name	Setting Range	Default
F08.12	Forward/Reverse rotation dead-zone time	0.0s~3000.0s	0.0s

Used to set the time when the output is 0 Hz at transition of the AC drive forward rotation and reverse rotation, as shown in the following figure.

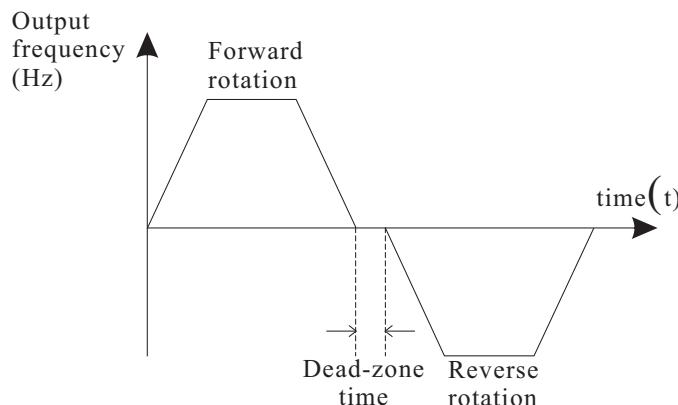


Figure 6-16 Forward/Reverse rotation dead-zone time

Function Code	Parameter Name	Setting Range	Default
F08.13	Reverse control	0: enabled 1: disabled	0

Used to set whether the AC drive allows reverse rotation. In the applications where reverse rotation is prohibited, set this parameter to 1.

Function Code	Parameter Name	Setting Range	Default
F08.14	Running mode when set frequency lower than frequency lower limit	0: run at frequency lower limit 1: stop 2: run at zero speed	0

Used to set the AC drive running mode when the set frequency is lower than the frequency lower limit. The VP600 provides three running modes to satisfy requirements of various applications.

Function Code	Parameter Name	Setting Range	Default
F08.15	Accumulative power-on time threshold	0h~65000h	0h

If the accumulative power-on time (F07.13) reaches the value set in this function code, the corresponding DO terminal becomes ON.

Function Code	Parameter Name	Setting Range	Default
F08.16	Accumulative running time threshold	0h~65000h	0h

Used to set the accumulative running time threshold of the AC drive. If the accumulative running time (F07.10) reaches the value set in this function code, the corresponding DO terminal becomes ON.

Function Code	Parameter Name	Setting Range	Default
F08.17	Startup protection	0: No 1: Yes	0

This function code is used to set whether to enable the safety protection. If set to 1, the AC drive does not respond to a valid run command upon AC drive power-on (for example, an input terminal is ON before power-on). The AC drive responds only after the run command is cancelled and then reinstated.

In addition, the AC drive does not respond to a valid run command upon fault reset of the AC drive. The run protection can be disabled only after the run command is cancelled. In this way, the motor can be protected from responding to run commands upon power-on or fault reset in unexpected conditions.

Function Code	Parameter Name	Setting Range	Default
F08.18	Droop control	0.00Hz~10.00Hz	0.00Hz

This function code is used for balancing the workload allocation when multiple motors are used to drive the same load. The output frequency of the AC drives decreases as the load increases. You can reduce the workload of the motor under load by decreasing the output frequency for this motor, implementing workload balancing between multiple motors.

Function Code	Parameter Name	Setting Range	Default
F08.19	Motor switch over	0:Motor 1 1:Motor 2	0

Function Code	Parameter Name	Setting Range	Default
F08.20	Frequency detection value (FDT1)	0.00Hz F00.03(max.frequency)	50.00Hz
F08.21	Frequency detection hysteresis (FDT hysteresis 1)	0.0% ~ 100.0% ( FDT1 level )	5.0%
F08.22	Frequency detection value (FDT2)	0.00Hz F00.03(max.frequency)	50.00Hz
F08.23	Frequency detection hysteresis (FDT hysteresis 2)	0.0% ~ 100.0% ( FDT2 level )	5.0%

If the running frequency is higher than the value of F08.20, the corresponding multifunction output terminal becomes ON. If the running frequency is lower than value of F08.20, multifunction output terminal goes OFF.

These two function codes (F08.20, F08.21) are respectively used to set the detection value of output frequency and hysteresis value upon cancellation of the output. The value of F08.21 is a percentage of the hysteresis frequency to the frequency detection value (F08.20).

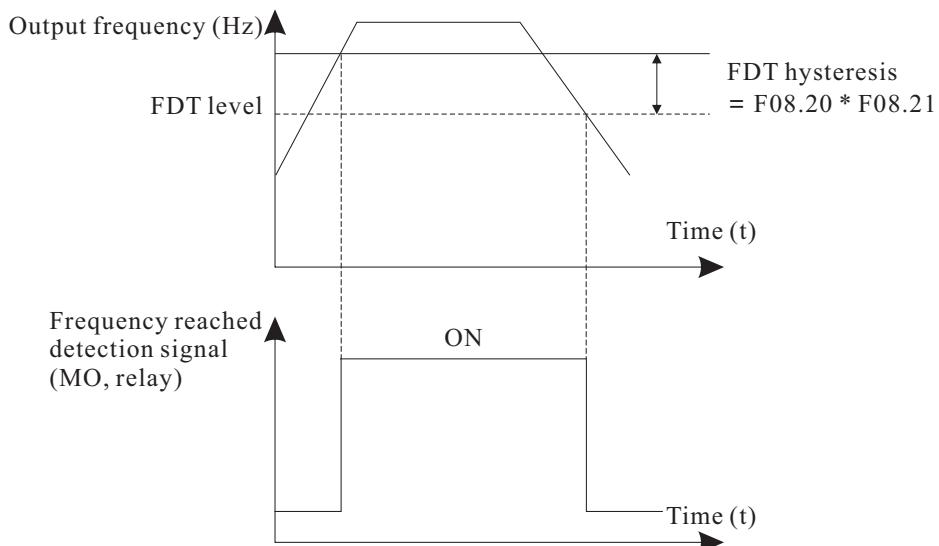


Figure 6-17 The FDT function

Function Code	Parameter Name	Setting Range	Default
F08.24	Detection range of frequency reached	0.0%~100.0% (max.frequency)	0.0%

If the AC drive running frequency is within the certain range of the set frequency, the corresponding multi-function output terminal becomes ON.

This function code is used to set the range within which the output frequency is detected to reach the set frequency. The value of this function code is a percentage relative to the maximum frequency. The detection range of frequency reached is shown in the following figure.

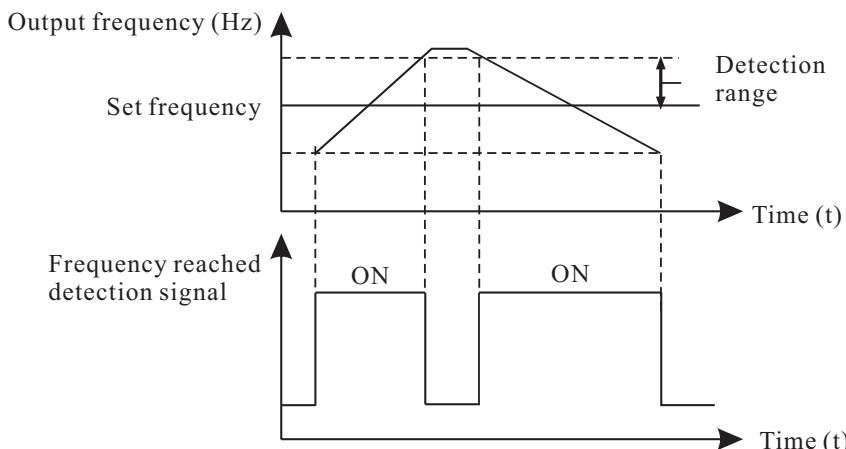


Figure 6-18 Detection range of frequency reached

Function Code	Parameter Name	Setting Range	Default
F08.25	Jump frequency during acceleration/deceleration	0: disabled 1: enabled	0

Used to set whether the jump frequencies are used during acceleration/deceleration.

When the jump frequencies are enabled during acceleration/deceleration, and the running frequency is within the frequency jump range, the actual running frequency will jump over the set frequency jump amplitude (rise directly from the lowest jump frequency to the highest jump frequency). The following figure shows the diagram when the jump frequencies are enabled during acceleration/deceleration.

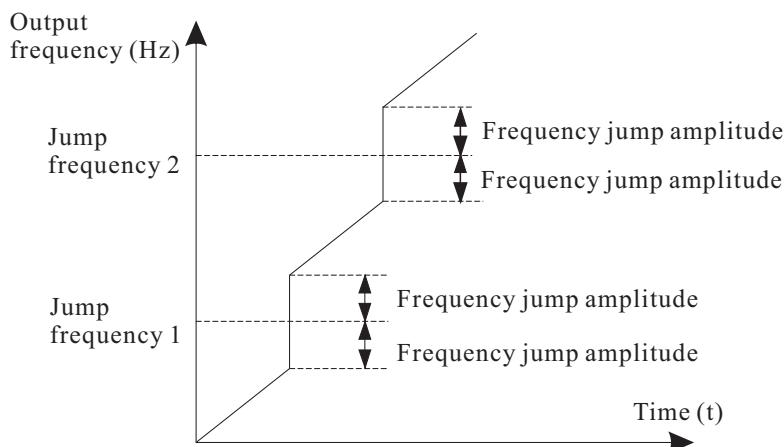


Figure 6-19 Diagram when the jump frequencies are enabled during acceleration/deceleration

Function Code	Parameter Name	Setting Range	Default
F08.28	Frequency switch over point between acceleration time 1 and acceleration time 2	0.00Hz ~ F00.03(max.frequency)	0.00Hz
F08.29	Frequency switch over point between deceleration time 1 and deceleration time 2	0.00Hz ~ F00.03(max.frequency)	0.00Hz

These function codes are enabled when motor 1 is selected and acceleration/deceleration time switch over is not performed by means of S terminal. Used to select different groups of acceleration/deceleration time based on the running frequency range rather than S terminal input during the running process of the AC drive.

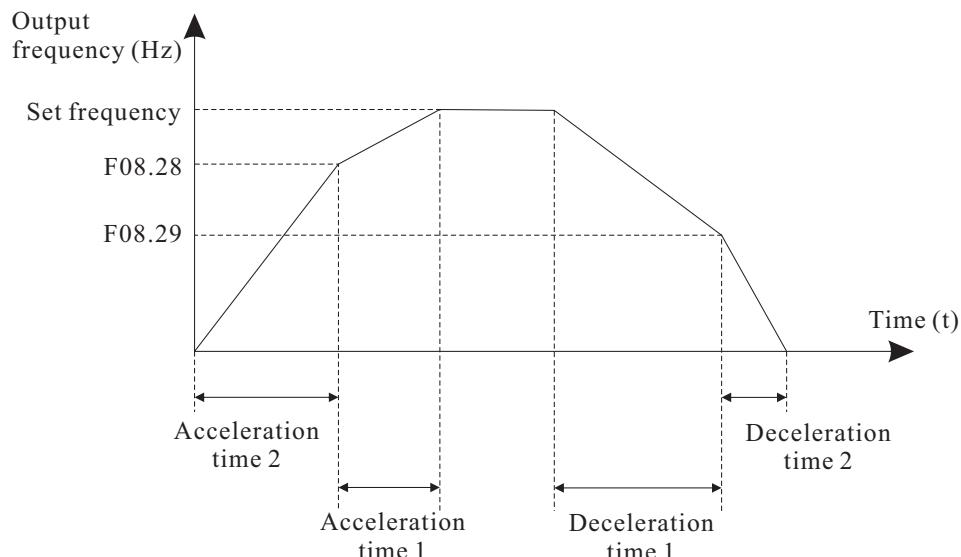


Figure 6-20 Acceleration/deceleration time switch over

During acceleration, if the running frequency is smaller than the value of F08.28, acceleration time 2 is selected. If the running frequency is larger than the value of F08.28, acceleration time 1 is selected.

During deceleration, if the running frequency is larger than the value of F08.29, deceleration time 1 is selected. If the running frequency is smaller than the value of F08.29, deceleration time 2 is selected.

Function Code	Parameter Name	Setting Range	Default
F08.30	Terminal JOG preferred	0: Disabled 1: Enabled	0

Used to set whether terminal JOG is preferred.

If terminal JOG is preferred, the AC drive switches to terminal JOG running state when there is a terminal JOG command during the running process of the AC drive.

Function Code	Parameter Name	Setting Range	Default
F08.31	Any frequency reaching detection value 1	0.00 Hz to F00.03 (maximum frequency)	50.00Hz
F08.32	Any frequency reaching detection amplitude 1	0.0%–100.0% (maximum frequency)	0.0%
F08.33	Any frequency reaching detection value 2	0.00 Hz to F00.03 (maximum frequency)	50.00Hz
F08.34	Any frequency reaching detection amplitude 2	0.00 Hz to F00.03 (maximum frequency)	0.0%

If the output frequency of the AC drive is within the positive and negative amplitudes of the any frequency reaching detection value, the corresponding multi-function output becomes ON.

The VP600 provides two groups of any frequency reaching detection parameters, including frequency detection value and detection amplitude, as shown in the following figure.

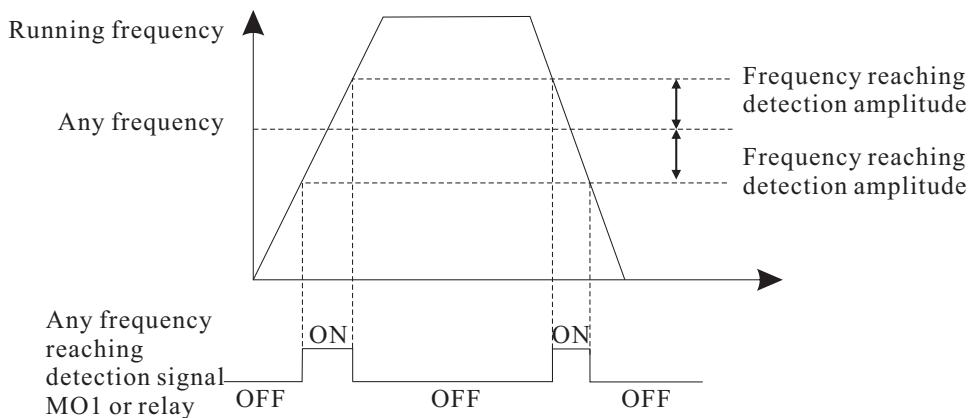


Figure 6-21 Any frequency reaching detection

Function Code	Parameter Name	Setting Range	Default
F08.35	Zero current detection level	0.0% ~ 300.0% (rated motor current)	5.0%
F08.36	Zero current detection delay time	0.01s ~ 600.00s	0.10s

If the output current of the AC drive is equal to or less than the zero current detection level and the duration exceeds the zero current detection delay time, the corresponding multi-function output terminal becomes ON.

The zero current detection is shown in the following figure:

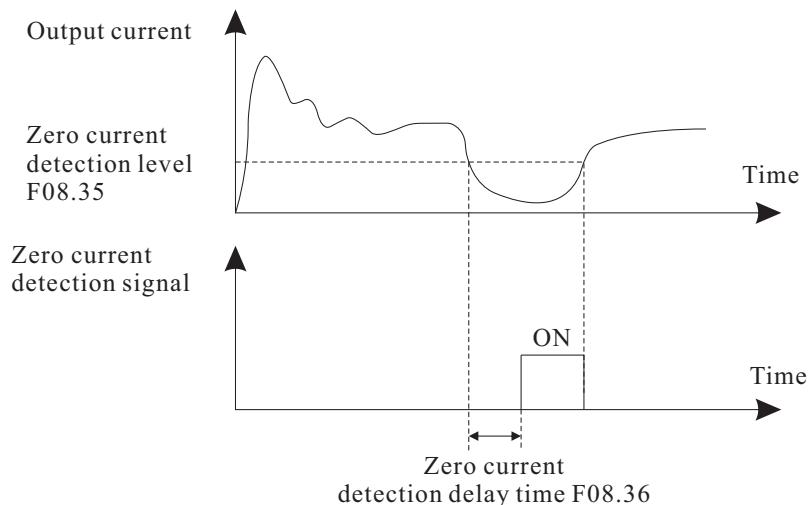


Figure 6-22 Zero current detection

Function Code	Parameter Name	Setting Range	Default
F08.37	Output overcurrent threshold	0.0% (no detection) 0.1%~300.0% (rated motor current)	200.0%
F08.38	Output overcurrent detection delay time	0.00s ~ 600.00s	0.00s

If the output current of the AC drive is equal to or higher than the overcurrent threshold and the duration exceeds the detection delay time, the corresponding multi-function output terminal becomes ON. The output overcurrent detection function is shown in the following figure.

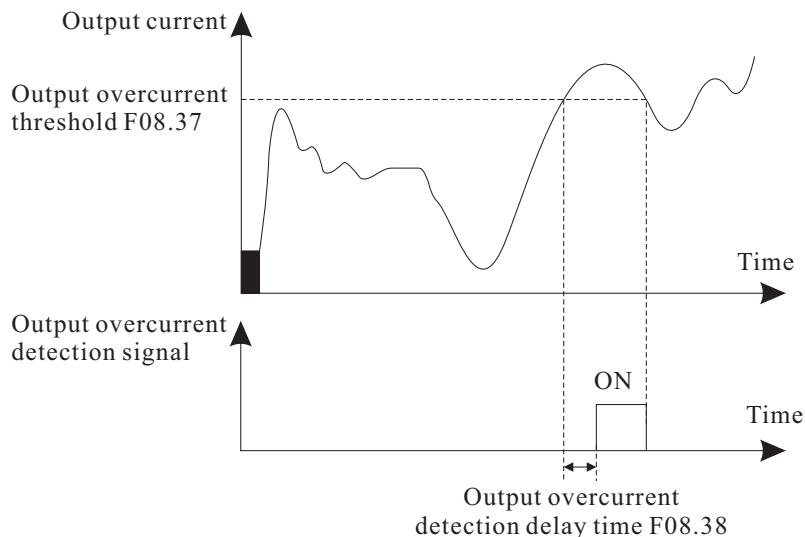


Figure 6-23 Output overcurrent detection

Function Code	Parameter Name	Setting Range	Default
F08.39	Any current reaching 1	0.0% to 300.0% ( rated motor current )	100.0%
F08.40	Any current reaching 1 amplitude	0.0% to 300.0% ( rated motor current )	0.0%
F08.41	Any current reaching 2	0.0% to 300.0% ( rated motor current )	100.0%
F08.42	Any current reaching 2 amplitude	0.0% to 300.0% ( rated motor current )	0.0%

If the output current of the AC drive is within the positive and negative amplitudes of any current reaching detection value, the corresponding multi-function output terminal becomes ON.

The VP600 provides two groups of any current reaching detection parameters, including current detection value and detection amplitudes, as shown in the following figure.

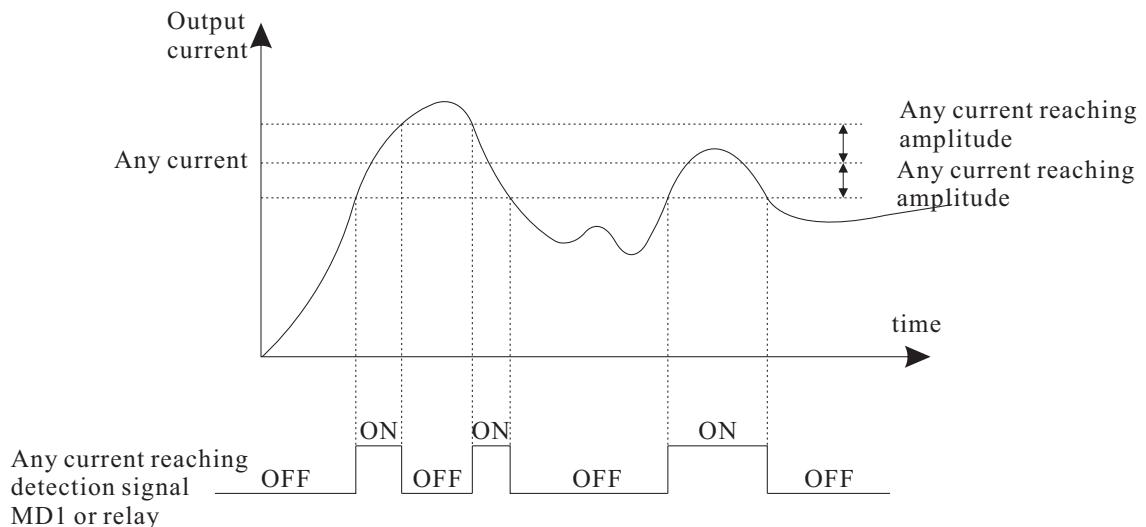


Figure 6-24 Any current reaching detection

Function Code	Parameter Name	Setting Range	Default
F08.43	Timing function	0: Disabled 1: Enabled	0
F08.44	Timing duration source	0: F08.45 1: analog AI1 2: analog AI2 3: analog AI3 (100% of analog input corresponds to the value of F8.45)	0
F08.45	Timing duration	0.0Min~6500.0Min	0.0Min

These function codes are used to implement the AC drive timing function.

If F08.43 is set to 1, the AC drive starts to time at startup. When the set timing duration is reached, the AC drive stops automatically and meanwhile the corresponding multi-function terminal output becomes ON.

The AC drive starts timing from 0 each time it starts up and the remaining timing duration. The timing duration is set in F08.44 and F08.45, in unit of minute.

Function Code	Parameter Name	Setting Range	Default
F08.46	AI1 input voltage lower limit	0.00V~F08.47	3.10V
F08.47	AI1 input voltage upper limit	F08.46~10.00V	6.80V

These two function codes are used to set the limits of the input voltage to provide protection on the AC drive. When the AI1 input is larger than the value of F08.47 or smaller than the value of F08.46, the corresponding multi-function output terminal becomes ON, indicating that AI1 input exceeds the limit.

Function Code	Parameter Name	Setting Range	Default
F08.48	Module temperature threshold	0°C ~100°C	75°C

When the heatsink temperature of the AC drive reaches the value of this parameter, the corresponding multi-function output terminal becomes ON, indicating that the module temperature reaches the threshold.

Function Code	Parameter Name	Setting Range	Default
F08.49	Cooling fan control	0: Fan working during running 1: Fan working continuously	0

Used to set the working mode of the cooling fan. If this parameter is set to 0, the fan works when the AC drive is in running state. When the AC drive stops, the cooling fan works if the heatsink temperature is higher than 40°C, and stops working if the heatsink temperature is lower than 40°C.

If this parameter is set to 1, the cooling fan keeps working after power-on.

Function Code	Parameter Name	Setting Range	Default
F08.50	Wakeup frequency	Dormant frequency (F8.52) to maximum frequency (F00.03)	0
F08.51	Wakeup delay time	0.0s~6500.0s	0.0s
F08.52	Sleep frequency	0.00 Hz to wakeup frequency ( F08.50 )	0.00Hz
F08.53	Sleep delay time	0.0s~6500.0s	0.0s

These function codes are used to implement the sleep and wakeup functions in a water supply application.

When the AC drive is in running state, the AC drive enters the sleep state and stops automatically after the sleep delay time (F08.53) if the set frequency is lower than or equal to the sleep frequency (F08.52).

When the AC drive is in sleep state and the run command is active, the AC drives starts up after the wakeup delay time (F08.51) if the set frequency is higher than or equal to the wakeup frequency (F08.50).

Set the wakeup frequency equal to or higher than the sleep frequency. If the wakeup frequency and sleep frequency are set to 0, the sleep and wakeup functions are disabled.

When the sleep function is enabled, if the frequency source is PID, whether PID operation is performed in the sleep state is determined by F10-28. In this case, select PID operation enabled in the stop state (F10.28 = 1).

Function Code	Parameter Name	Setting Range	Default
F08.54	Current running time reached	0.0Min~6500.0Min	0.0Min

If the current running time reaches the value set in this function code, the corresponding multi-function output terminal becomes ON, indicating that the current running time is reached.

Function Code	Parameter Name	Setting Range	Default
F08.55	DPWM switch over running frequency upper limit	0.00Hz~15.00Hz	12.00Hz

Only applicable in V/F control.

Function Code	Parameter Name	Setting Range	Default
F08.56	PWM modulation system	0: asynchronous modulation 1: synchronous modulation	0

Only applicable in V/F control.

Function Code	Parameter Name	Setting Range	Default
F08.57	Dead zone compensation mode selection	0: no compensation mode 1: compensation mode 1 2: compensation mode 2	1

This function code is not modified normally, only if special application of output voltage wave, or on motor oscillation.

For high power applications, compensation mode 2 is recommended.

Function Code	Parameter Name	Setting Range	Default
F08.58	Depth of PWM random	0:PWM random disabled 1 to 10: PWM carrier frequency random depth	0

This function code can be used to reduce motor noise and electromagnetic interference.

Function Code	Parameter Name	Setting Range	Default
F08.59	Rapid current limit	0: Disabled 1: Enabled	1

This function code can be used in overcurrent protection.

If rapid current limit long time, AC drive will overheat and cause drive damaged.

Function Code	Parameter Name	Setting Range	Default
F08.60	Current detection compensation	0~100	5

There is normally no need to modify this function code.

Function Code	Parameter Name	Setting Range	Default
F08.61	Under-voltage point	60.0%~140.0%	100.0%

Voltage class	Under-voltage point base value
Single phase 220V	200V
Three phase 220V	200V
Three phase 380V	350V
Three phase 480V	350V
Three phase 690V	650V
Three phase 1140V	1350V

Function Code	Parameter Name	Setting Range	Default
F08.62	SVC optimize mode selection	0 no optimize 1: optimize mode 1 2: optimize mode 2	1

Optimize mode 1: can be used in an application needing high torque control.  
 Optimize mode 2: can be used in an application needing high speed control.

Function Code	Parameter Name	Setting Range	Default
F08.63	Dead-zone time adjustment	100%~200%	150%

This function code is only applicable on 1140V and there is no need to modify normally.

Function Code	Parameter Name	Setting Range	Default
F08.64	Over-voltage point	200. 0V~2500. 0V	Model dependent

Voltage class	Under-voltage point base value
Single phase 220V	400.0V
Three phase 220V	400.0V
Three phase 380V	810.0V
Three phase 480V	890.0V
Three phase 690V	1300.0V
Three phase 1140V	2000.0V

## Group F09: Fault and Protection

Function Code	Parameter Name	Setting Range	Default
F09.00	Input phase loss protection	0: disabled 1: enabled	1

Used to determine whether to perform input phase loss or contactor energizing protection.

VP600  $\geq$  18.5KW G type drive provides the function of input phase loss protection.

VP600 < 18.5KW P type drive does not provide the function of input phase loss protection no matter whether F09.00 is set to 0 or 1.

Function Code	Parameter Name	Setting Range	Default
F09.01	Output phase loss protection	0: Disabled 1: Enabled	1

Used to determine whether to perform output phase loss protection.

Function Code	Parameter Name	Setting Range	Default
F09.02	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	0
F09.03	Voltage rally judging time at instantaneous power failure	0.00s ~ 100.00s	0.50s
F09.04	Action judging voltage at instantaneous power failure	60.0% ~ 100.0%(standard bus voltage)	80.0%

Upon instantaneous power failure or sudden voltage dip, the DC bus voltage of the AC drive reduces. This function code enables the AC drive to compensate the DC bus voltage reduction with the load feedback energy by reducing the output frequency so as to keep the AC drive running continuously.

- If F09.02 = 1, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates. Once the bus voltage resumes to normal, the AC drive accelerates to the set frequency. If the bus voltage remains normal for the time exceeding the value set in F09.03, it is considered that the bus voltage resumes to normal.
- If F09.02 = 2, upon instantaneous power failure or sudden voltage dip, the AC drive decelerates to stop.

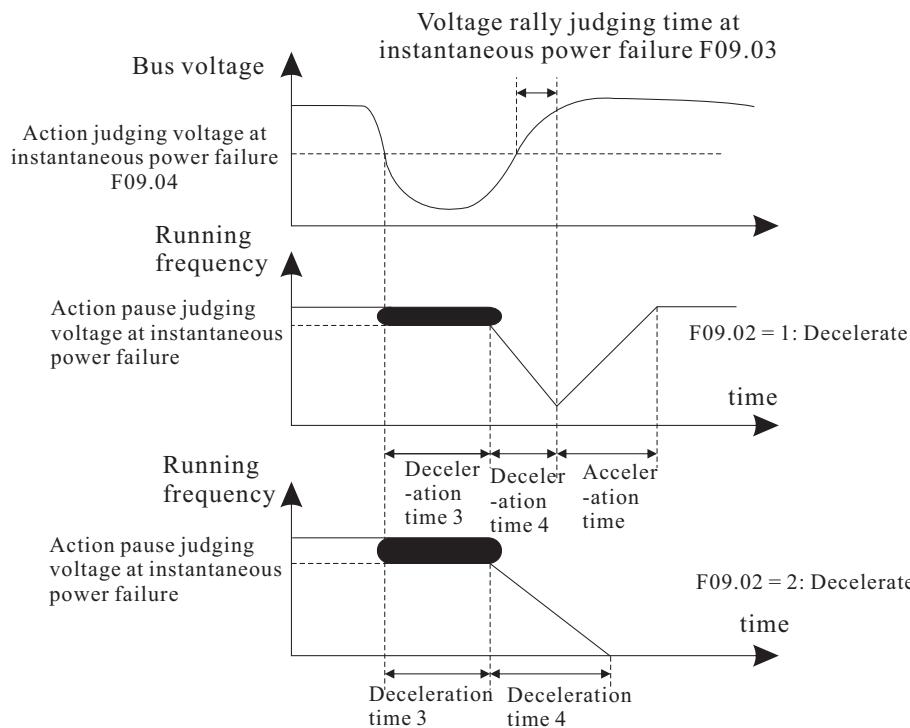


Figure 6-25 AC drive action diagram upon instantaneous power failure

Function Code	Parameter Name	Setting Range	Default
F09.05	Overshoot stall gain	0~100	0
F09.06	Overshoot stall protective voltage	120%~150%	130%

When the DC bus voltage exceeds the value of F09.06 (Overshoot stall protective voltage) during deceleration of the AC drive, the AC drive stops deceleration and keeps the present running frequency. After the bus voltage declines, the AC drive continues to decelerate. F09.05 (Overshoot stall gain) is used to adjust the overshoot suppression capacity of the AC drive. The larger the value is, the greater the overshoot suppression capacity will be.

In the prerequisite of no overshoot occurrence, set F09.05 to a small value.

For small-inertia load, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and an overshoot fault may occur.

If the overshoot stall gain is set to 0, the overshoot stall function is disabled.

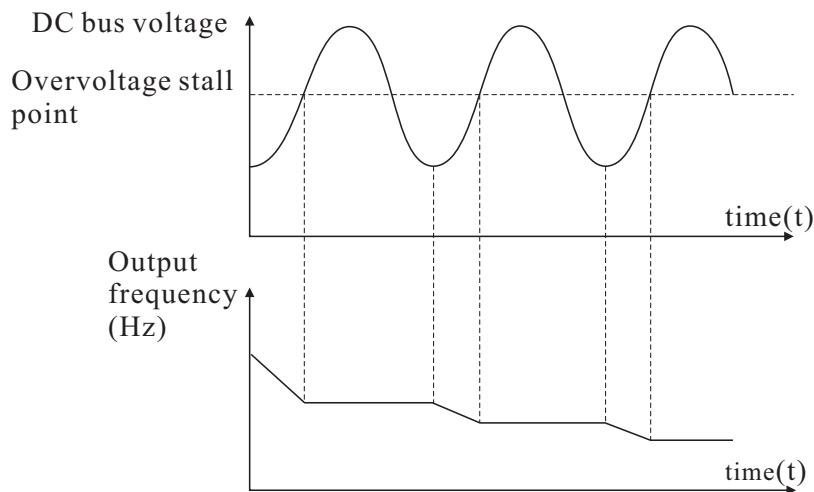


Figure 6-26 Diagram of the overvoltage stall protection function

Function Code	Parameter Name	Setting Range	Default
F09.07	Overcurrent stall gain	0~100	20
F09.08	Overcurrent stall protective current	100%~200%	150%

When the output current exceeds the overcurrent stall protective current during acceleration/deceleration of the AC drive, the AC drive stops acceleration/deceleration and keeps the present running frequency. After the output current declines, the AC drive continues to accelerate/decelerate.

F09.07(Overcurrent stall gain) is used to adjust the overcurrent suppression capacity of the AC drive. The larger the value is, the greater the overcurrent suppression capacity will be. In the prerequisite of no overcurrent occurrence, set F09.08 to a small value.

For small-inertia loads, the value should be small. Otherwise, the system dynamic response will be slow. For large-inertia load, the value should be large. Otherwise, the suppression result will be poor and overcurrent fault may occur.

If the overcurrent stall gain is set to 0, the overcurrent stall function is disabled.

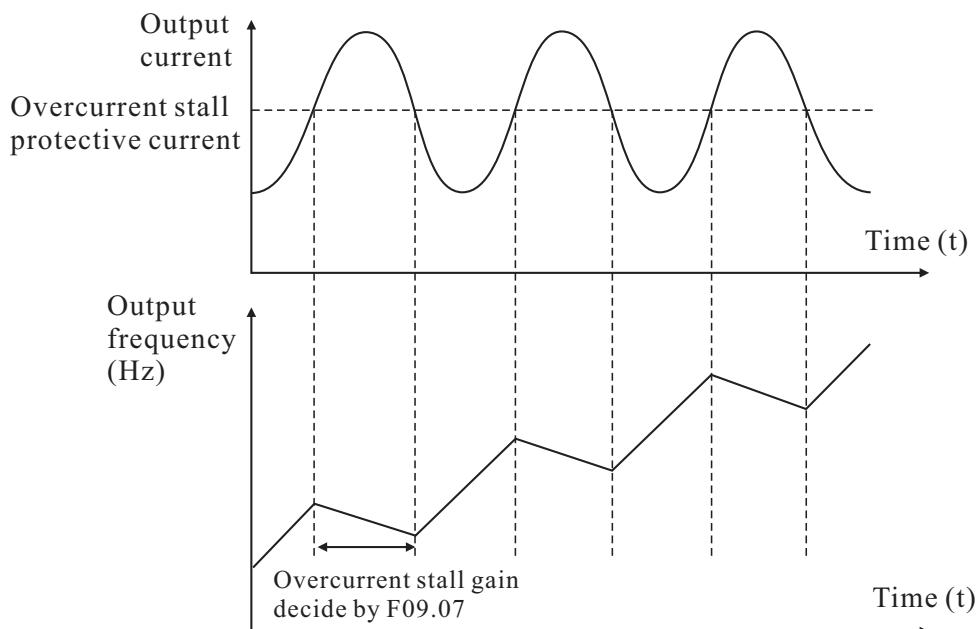


Figure 6-27 Diagram of the overcurrent stall protection function

Function Code	Parameter Name	Setting Range	Default
F09.09	Motor overload warning selection	0: disabled 1: enabled	1

F09.09=0: no motor overload protection, motor can run in an overloaded state and motor damage can occur, recommend a thermal overload relay be fitted.

F09.09=1: motor overload protection according to inverse time limit curve. Recommended

Function Code	Parameter Name	Setting Range	Default
F09.10	Motor overload pre-alarm warning detection levels	0.20~10.00	1.00
F09.11	Motor overload pre-alarm warning detection time	50%~100%	80%

Function Code	Parameter Name	Setting Range	Default
F09.12	Protection upon load becoming 0	0: disabled 1: enabled	0
F09.13	Detection level of load becoming 0	0.0~100.0% (rated motor current)	10.0%
F09.14	Detection time of load becoming 0	0.0~60.0s	1.0s

If protection upon load becoming 0 is enabled, when the output current of the AC drive is lower than the detection level (F09.13) for a time that exceeds the detection time (F09.14), the output frequency of the AC drive automatically declines to 7% of the rated frequency. During the protection, the AC drive automatically accelerates to the set frequency if the load resumes to normal.

Function Code	Parameter Name	Setting Range	Default
F09.15	Over-speed detection value	0.0%~50.0%(F00.03(max.frequency))	20.0%
F09.16	Over-speed detection time	0.0~60.0s	5.0s

This function code is applicable only when the AC drive runs in the sensor vector control mode. If the actual motor rotational speed detected by the AC drive exceeds the maximum frequency by a value that is greater than the value of F09.15 for a time that exceeds the value of F09.16, the AC drive reports E035 and acts according to the selected fault protection action.

Function Code	Parameter Name	Setting Range	Default
F09.17	Detection value of too large speed deviation	0.0%~50.0%(F00.03(max.frequency))	20.0%
F09.18	Detection time of too large speed deviation	0.0s~60.0s	0.0s

This function code is applicable only when the AC drive runs in the sensor vector control mode.

If the AC drive detects the deviation between the actual motor rotational speed detected by the AC drive and the set frequency is greater than the value of F09.17 for a time that exceeds the value of F09.18, the AC drive reports E034 and according to the selected fault protection action.

If F09.18 (Detection time of too large speed deviation) is 0.0s, this function is disabled.

Function Code	Parameter Name	Setting Range	Default
F09.19	Fault auto reset times	0~20	0

Used to set the times of fault auto resets if this function is used. After the value is exceeded, the AC drive will remain in the fault state.

Function Code	Parameter Name	Setting Range	Default
F09.20	Time interval of fault auto reset	0.1s~100.0s	1.0s

Used to set the waiting time from the alarm of the AC drive to fault auto reset.

Function Code	Parameter Name	Setting Range	Default
F09.21	Fault protection action selection 1	Unit's digit:motor overload ( E007 ) 0:coast to stop 1:stop according to the stop mode 2:continue to run Ten's digit :power input phase loss (E012) Hundred's digit:power output phase loss (E013) Thousand's digit:external equipment fault(E00d) Ten thousand's digit:communication fault(E018)	0000
F09.22	Fault protection action selection 2	Unit's digit:encoder/PG card fault(E026) 0:coast to stop Ten's digit:EEPROM read-write fault(E021) 0:coast to stop 1:stop according to the stop mode Hundred's digit: reserved Thousand's digit: motor overheat(E036) Ten thousand's digit (Accumulative running time reached)(E020)	0000

Function Code	Parameter Name	Setting Range	Default
F09.23	Fault protection action selection 3	Unit's digit reserved Ten's digit: reserved Hundred's digit (Accumulative power-on time reached( E029) 0: coast to stop 1: stop according to the stop mode 2: continue to run Thousand's digit: off load( E030) 0: coast to stop 1: decelerate to stop 2: continue to run at 7% of rated motor frequency and resume to the set frequency if the load recovers	0000
F09.24	Fault protection action selection 4	Unit's digit :too large speed deviation (E034) 0:coast to stop 1:stop according to the stop mode 2:continue to run Ten's digit :motor over-speed (E035) Hundred's digit :initial position fault (E037)	0000

If "Coast to stop" is selected, the AC drive displays E0\*\* and directly stops.

- If "Stop according to the stop mode" is selected, the AC drive displays A\*\* and stops according to the stop mode. After stop, the AC drive displays E0\*\*.
- If "Continue to run" is selected, the AC drive continues to run and displays A\*\*. The running frequency is set in F09.26.

Function Code	Parameter Name	Setting Range	Default
F09.26	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Set frequency 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	0

If a fault occurs during the running of the AC drive and the handling of fault is set to "Continue to run", the AC drive displays A\*\* and continues to run at the frequency set in F09.26.

Function Code	Parameter Name	Setting Range	Default
F09.27	Current fault type	0~32	—
F09.28	2nd fault type		—
F09.29	1st fault type		—

Used to record the types of the most recent three faults of the AC drive. 0 indicates no fault. For possible causes and solution of each fault, refer to Chapter 8.

Function Code	Parameter Name	Setting Range	Default																				
F09.30	Frequency upon current fault	It displays the frequency when the latest fault occurs	—																				
F09.31	Output current upon current fault	It displays the current when the latest fault occurs.	—																				
F09.32	Bus voltage upon current fault	It displays the bus voltage when the latest fault occurs.	—																				
F09.33	Input terminal status upon current fault	<p>It displays the status of all digital input terminals when the latest fault occurs. The sequence is as follows:</p> <table border="1"> <tr> <td>BIT9</td><td>BIT8</td><td>BIT7</td><td>BIT6</td><td>BIT5</td><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td> </tr> <tr> <td>HDI</td><td>S9</td><td>S8</td><td>S7</td><td>S6</td><td>S5</td><td>S4</td><td>S3</td><td>S2</td><td>S1</td> </tr> </table> <p>If a input terminal is ON, the setting is 1. If the DI is OFF, the setting is 0. The value is the equivalent decimal number converted from the S status..</p>	BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0	HDI	S9	S8	S7	S6	S5	S4	S3	S2	S1	—
BIT9	BIT8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0														
HDI	S9	S8	S7	S6	S5	S4	S3	S2	S1														
F09.34	Output terminal status upon current fault	<p>It displays the status of all output terminals when the latest fault occurs. The sequence is as follows:</p> <table border="1"> <tr> <td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td> </tr> <tr> <td>DO2</td><td>MO1</td><td>RA</td><td>TA</td><td>FMP</td> </tr> </table> <p>If an output terminal is ON, the setting is 1. If the output terminal is OFF, the setting is 0. The value is the equivalent decimal number converted from the S status.</p>	BIT4	BIT3	BIT2	BIT1	BIT0	DO2	MO1	RA	TA	FMP	—										
BIT4	BIT3	BIT2	BIT1	BIT0																			
DO2	MO1	RA	TA	FMP																			
F09.35	AC drive status upon current fault	Reserved	—																				
F09.36	Power-on time status upon current fault	It displays the present power-on time when the latest fault occurs	—																				
F09.37	Running time status upon current fault	It displays the present running time when the latest fault occurs.	—																				

Function Code	Parameter Name	Setting Range	Default
F09.38	Frequency upon 2nd fault	Same as F09.30~F09.37	—
F09.39	Output current upon 2nd fault		—
F09.40	Bus voltage upon 2nd fault		—
F09.41	Input terminal status upon 2nd fault		—
F09.42	Output terminal status upon 2nd fault		—
F09.43	AC drive status upon 2nd fault		—
F09.44	Power-on time upon 2nd fault		—
F09.45	Running time upon 2nd fault		—
F09.46	Frequency upon 1st fault		—
F09.47	Output current upon 1st fault		—
F09.48	Bus voltage upon 1st fault		—
F09.49	Input terminal status upon 1st fault		—
F09.50	Output terminal status upon 1st fault		—
F09.51	AC drive status upon 1st fault		—
F09.52	Power-on time upon 1st fault		—
F09.53	Running time upon 1st fault		—

Function Code	Parameter Name	Setting Range	Default
F09.54	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	1

Used to determine whether to check the motor is short-circuited to ground at power-on of the AC drive. If this function is enabled, the AC drive's UVW will have voltage output a while after power-on.

Function Code	Parameter Name	Setting Range	Default
F09.55	Output terminal action during fault auto reset	0: Not action 1: Act	0

Set by F09.55.

Function Code	Parameter Name	Setting Range	Default
F09.56	Backup frequency upon abnormality	0.0% ~ 100.0% (100.0% corresponding to maximum frequency)F00.03	100.0%

Function Code	Parameter Name	Setting Range	Default
F09.57	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0
F09.58	Motor overheat protection threshold (fault)	0°C ~200°C	110°C
F09.59	Motor overheat warning threshold	0°C ~200°C	90°C

The signal wires of the motor temperature sensor needs to be connected to the multi-function analog input terminal. Analog input AI3 can be used for the temperature signal input. The motor temperature sensor is connected to AI3 and ACM terminal. The AI3 terminal of the VP600 supports both PT100 and PT1000. Set the sensor type correctly during the use.

If the motor temperature exceeds the value set in F09.58, the AC drive reports an alarm and acts according to the selected fault protection action.

If the motor temperature exceeds the value set in F09.59, motor overheat warning becomes ON.

Function Code	Parameter Name	Setting Range	Default
F09.60	Action pause judging voltage at instantaneous power failure	F09.04~100.0%	90.0%

## Group F10: Process Control PID Function

PID control is a general process control method. By performing proportional, integral and differential operations on the difference between the feedback signal and the target signal, it adjusts the output frequency and constitutes a feedback system to stabilize the controlled counter around the target value.

It is applied to process control such as flow control, pressure control and temperature control. The following figure shows the principle block diagram of PID control.

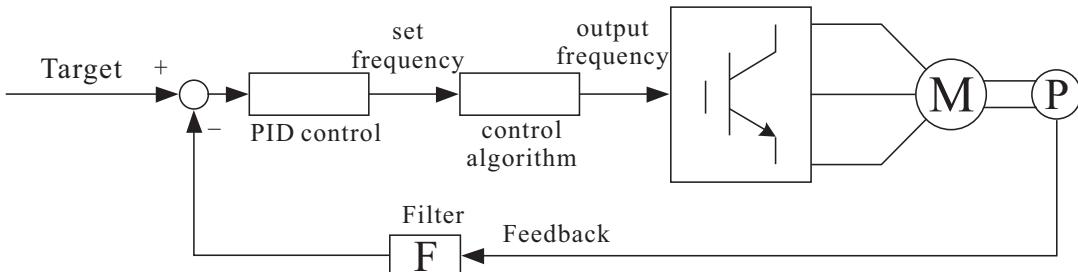


Figure 6-28 Principle block diagram of PID control

Function Code	Parameter Name	Setting Range	Default
F10.00	PID setting source	0: Keypad (F10.01) 1: Analog AI1 2: Analog AI2 3: Analog AI3 4: Pulse setting (HDI) 5: RS485 communication setting 6: Multi-speed command	0
F10.01	PID digital setting	0.0~100.0%	50.0%

F00.06 is used to select the channel of target process PID setting. The PID setting is a relative value and ranges from 0.0% to 100.0%. The PID feedback is also a relative value. The purpose of PID control is to make the PID setting and PID feedback equal.

Function Code	Parameter Name	Setting Range	Default
F10.02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1 – AI2 4: Pulse setting (HDI) 5: RS485 communication setting 6: AI1 + AI2 7: MAX ( AI1 ,  AI2 ) 8: MIN ( AI1 ,  AI2 )	0

This function code (F10.02) is used to select the feedback signal channel of process PID. The PID feedback is a relative value and ranges from 0.0% to 100.0%.

Function Code	Parameter Name	Setting Range	Default
F10.03	PID output characteristic	0 : positive 1 : negative	0

- 0 : positive

When the feedback value is smaller than the PID setting, the AC drive's output frequency rises. For example, the winding tension control requires forward PID action.

- 1 : negative

When the feedback value is larger than the PID setting, the AC drive's output frequency reduces. For example, the unwinding tension control requires reverse PID action.

Function Code	Parameter Name	Setting Range	Default
F10.04	PID setting feedback range	0~65535	1000

This function code is a non-dimensional unit. It is used for PID setting display and PID feedback display.

Relative value 100% of PID setting feedback corresponds to the value of F10.04.

Function Code	Parameter Name	Setting Range	Default
F10.05	Proportional gain Kp1	0.0~100.0	20.0
F10.06	Integral time Ti1	0.01s~10.00s	2.00s
F10.07	Differential time Td1	0.000s~10.000s	0.000s

- F10.05 (Proportional gain Kp1)

Determines the regulating intensity of the PID regulator. The higher the Kp1 is, the larger the regulating intensity is. The value 100.0 indicates when the deviation between PID feedback and PID setting is 100.0%, the adjustment amplitude of the PID regulator on the output frequency reference is the maximum frequency.

- F10.06 (Integral time Ti1)

Determines the integral regulating intensity. The shorter the integral time is, the larger the regulating intensity is. When the deviation between PID feedback and PID setting is 100.0%, the integral regulator performs continuous adjustment for the time set in F10.06. Then the adjustment amplitude reaches the maximum frequency.

- F10.07 (Differential time Td1)

Determines the regulating intensity of the PID regulator on the deviation change. The longer the differential time is, the larger the regulating intensity is. Differential time is the time within which the feedback value change reaches 100.0%, and then the adjustment amplitude reaches the maximum frequency.

Function Code	Parameter Name	Setting Range	Default
F10.08	Cut-off frequency of PID reverse rotation	0.00 ~ F00.03( maximum frequency )	2.00Hz

In some situations, only when the PID output frequency is a negative value (AC drive reverse rotation), PID setting and PID feedback can be equal. However, too high reverse rotation frequency is prohibited in some applications, and F10.08 is used to determine the reverse rotation frequency upper limit.

Function Code	Parameter Name	Setting Range	Default
F10.09	PID deviation limit	0.0%~100.0%	0.0%

If the deviation between PID feedback and PID setting is smaller than the value of F10.09, PID control stops. The small deviation between PID feedback and PID setting will make the output frequency stabilize, effective for some closed-loop control applications.

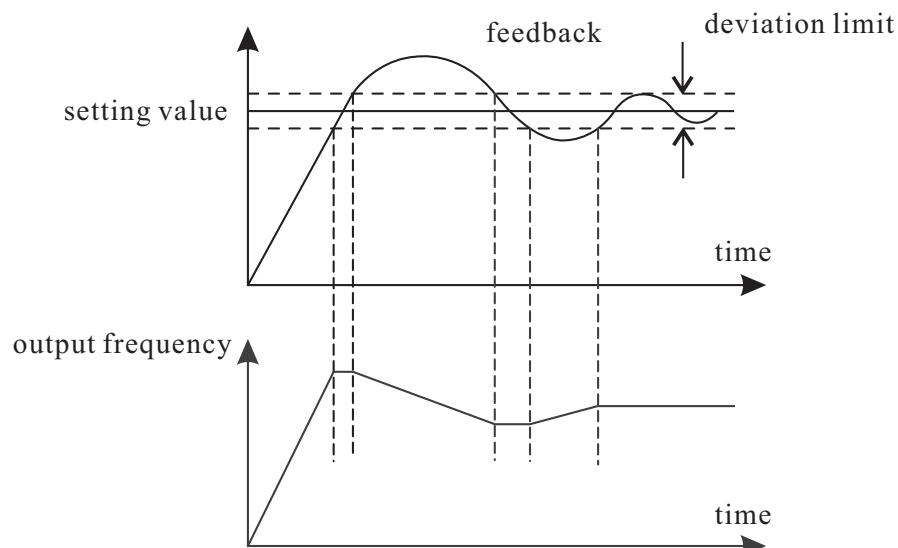


Figure 6-29 relation between deviation limit and output frequency

Function Code	Parameter Name	Setting Range	Default
F10.10	PID differential limit	0.00%~100.00%	0.10%

Used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Thus, the PID differential regulation is restricted to a small range.

Function Code	Parameter Name	Setting Range	Default
F10.11	PID setting change time	0.00~650.00s	0.00s

The PID setting change time indicates the time required for PID setting to change from 0.0% to 100.0%. The PID setting changes linearly according to the change time, reducing the impact caused by sudden setting change on the system.

Function Code	Parameter Name	Setting Range	Default
F10.12	PID feedback filter time	0.00~60.00s	0.00s
F10.13	PID output filter time	0.00~60.00s	0.00s

F10.12 is used to filter the PID feedback, helping to reduce interference on the feedback but slowing the response of the process closed-loop system.

F10.13 is used to filter the PID output frequency, helping to reduce sudden change of the AC drive output frequency but slowing the response of the process closed-loop system.

Function Code	Parameter Name	Setting Range	Default
F10.15	Proportional gain Kp2	0.0~100.0	20.0
F10.16	Integral time Ti2	0.01s~10.00s	2.00s
F10.17	Differential time Td2	0.000s~10.000s	0.000s
F10.18	PID parameter switch over condition	0: No switch over 1: Switch over via input terminal 2: Automatic switch over based on deviation	0
F10.19	PID parameter switch over deviation 1	0.0%~F10.20	20.0%
F10.20	PID parameter switch over deviation 2	F10.19~100.0%	80.0%

In some applications, PID parameter switch over is required when one group of PID parameters cannot satisfy the requirement of the whole running process.

These function codes are used for switch over between two groups of PID parameters. Regulator function codes F10.15 to F10.17 are set in the same way as F10.05 to F10.07.

The switch over can be implemented either via a S terminal or automatically implemented based on the deviation.

If you select switch over via a S terminal, the multi-function terminal must be allocated with function 43 "PID parameter switch over". If the multi-function terminal is OFF, group 1 (F10.05 to F10.07) is selected. If the multi-function terminal is ON, group 2 (F10.15 to F10.17) is selected.

If you select automatic switch over, when the absolute value of the deviation between PID feedback and PID setting is smaller than the value of F10.19, group 1 is selected. When the absolute value of the deviation between PID feedback and PID setting is higher than the value of F10.20, group 2 is selected. When the deviation is between F10.19 and F10.20, the PID parameters are the linear interpolated value of the two groups of parameter values.

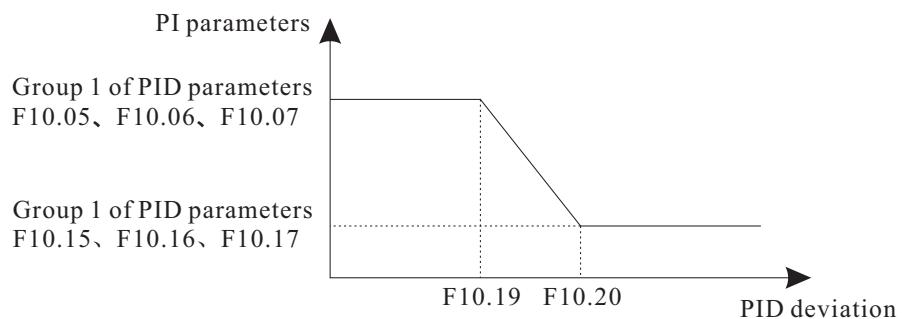


Figure 6-30 PID parameters switch over

Function Code	Parameter Name	Setting Range	Default
F10.21	PID initial value	0.0%~100.0%	0.0%
F10.22	PID initial value holding time	0.00~650.00s	0.00s

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (F10.21) for the time set in F10.22.

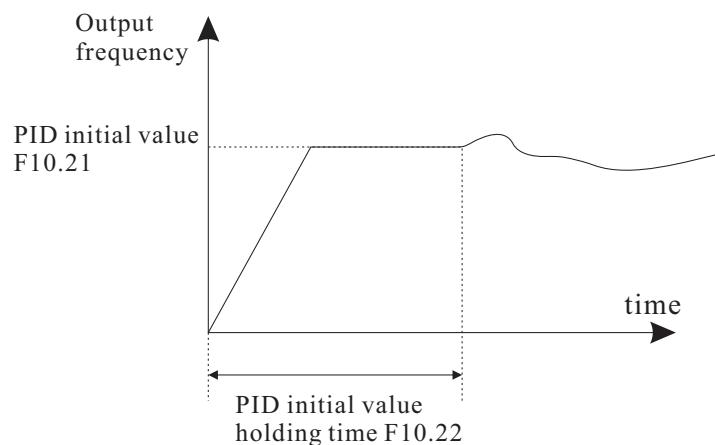


Figure 6-31 PID initial value function

Function Code	Parameter Name	Setting Range	Default
F10.23	Maximum deviation between two PID outputs in forward direction	0.00%~100.00%	1.00%
F10.24	Maximum deviation between two PID outputs in reverse direction	0.00%~100.00%	1.00%

F10.23 and F10.24 respectively correspond to the maximum absolute value of the output deviation in forward direction and in reverse direction.

Function Code	Parameter Name	Setting Range	Default
F10.25	PID integral property	Unit's digit :Integral separated 0: Disabled 1: Enabled Ten's digit :Whether to stop integral operation when the output reaches the limit 0: Continue integral operation 1: Stop integral operation	00

- Integral separated

If it is set to enabled, the PID integral operation stops when the multi-function digital S allocated with function 22 "PID integral pause" is ON. In this case, only proportional and differential operations take effect.

If it is set to disabled, integral separated remains disabled no matter whether the S allocated with function 22 "PID integral pause" is ON or not.

- Whether to stop integral operation when the output reaches the limit.

If "Stop integral operation" is selected, the PID integral operation stops, which may help to reduce the PID overshoot.

Function Code	Parameter Name	Setting Range	Default
F10.26	Detection value of PID feedback loss	0.0%: Not judging feedback loss 0.1%~100.0%	0.0%
F10.27	Detection time of PID feedback loss	0.0s~20.0s	0.0s

These function codes are used to determine whether PID feedback is lost.

If the PID feedback is smaller than the value of F10.26 for a time that exceeds the value of F10.27, the AC drive reports E02E and acts according to the selected fault protection action.

Function Code	Parameter Name	Setting Range	Default
F10.28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	0

Used to select whether to continue PID operation in the state of stop. Normally, the PID operation stops when the AC drive stops.

## Group F11: Swing Frequency, Fixed Length and Count

The swing frequency function is applied to the textile and chemical fiber fields and the applications where traversing and winding functions are required.

The swing frequency function indicates that the output frequency of the AC drive swings up and down with the set frequency as the center. The trace of running frequency at the time axis is shown in the following figure.

The swing amplitude is set in F11.00 and F11.01. When F11.01 is set to 0, the swing amplitude is 0 and the swing frequency does not take effect.

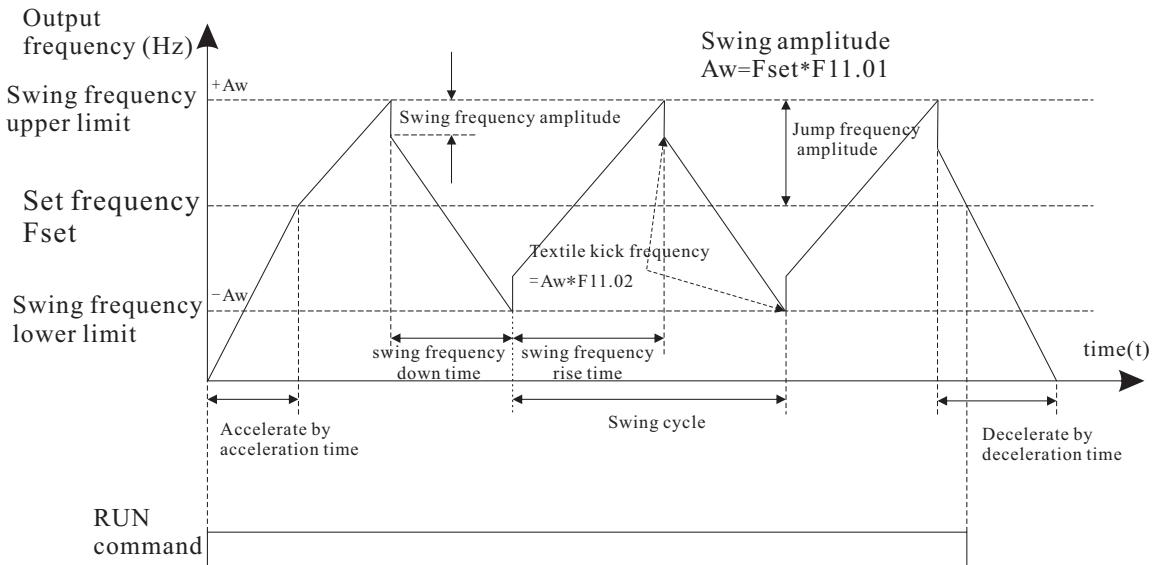


Figure 6-32 Swing frequency control

Function Code	Parameter Name	Setting Range	Default
F11.00	Swing frequency setting mode	0: Relative to the central frequency 1: Relative to the maximum frequency	0

This function code is used to select the base value of the swing amplitude.

- 0: Relative to the central frequency (F00.09 frequency source selection)

It is a variable swing amplitude system. The swing amplitude varies with the central frequency (set frequency).

- 1: Relative to the maximum frequency (F00.03 maximum output frequency)

It is a fixed swing amplitude system. The swing amplitude is fixed.

Function Code	Parameter Name	Setting Range	Default
F11.01	Swing frequency amplitude	0.0% ~ 100.0%	0.0%
F11.02	Jump frequency amplitude	0.0% ~ 50.0%	0.0%

This function code is used to determine the swing amplitude and jump frequency amplitude. The swing frequency is limited by the frequency upper limit and frequency lower limit.

- If relative to the central frequency (F11.00 = 0), the actual swing amplitude AW is the calculation result of frequency source selection multiplied by F11.00.
- If relative to the maximum frequency (F11.00 = 1), the actual swing amplitude AW is the calculation result of maximum frequency multiplied by F11.00.

Jump frequency = Swing amplitude AW x FB-02 (Jump frequency amplitude).

- If relative to the central frequency (F11.00 = 0), the jump frequency is a variable value.
- If relative to the maximum frequency (F11.00 = 1), the jump frequency is a fixed value. The swing frequency is limited by the frequency upper limit and frequency lower limit.

Function Code	Parameter Name	Setting Range	Default
F11.03	Swing frequency cycle	0.1s~3000.0s	10.0s
F11.04	Triangular wave rising time coefficient	0.1%~100.0%	50.0%

F11.03 specifies the time of a complete swing frequency cycle.

F11.04 specifies the time percentage of triangular wave rising time to F11.03 (Swing frequency cycle).

- Triangular wave rising time = F11.03 (Swing frequency cycle) x F11.04 (Triangular wave rising time coefficient, unit: s)
- Triangular wave falling time = F11.03 (Swing frequency cycle) x (1 – F11.04 Triangular wave rising time coefficient ,unit: s)

Function Code	Parameter Name	Setting Range	Default
F11.05	Set length	0m~65535m	1000m
F11.06	Actual length	0m~65535m	0m
F11.07	Number of pulses per meter	0.1~6553.5	100.0

The preceding parameters are used for fixed length control.

The length information is collected by multi-function digital input(DI) terminals. F11.06 (Actual length) is calculated by dividing the number of pulses collected by the DI terminal by F11.07 (Number of pulses each meter).

When the actual length F11.06 exceeds the set length in F11.05, the multi-function digital output terminal allocated becomes ON.

During the fixed length control, the length reset operation can be performed via the multi-function S terminal allocated with function 28. For details, see the descriptions of F05.00 to F05.09.

Allocate corresponding input terminal with function 27 (Length count input) in applications. If the pulse frequency is high, HDI must be used.

Function Code	Parameter Name	Setting Range	Default
F11.08	Set count value	1~65535	1000
F11.09	Designated count value	1~65535	1000

The count value needs to be collected by input terminal. Allocate the corresponding input terminal with function 25 (Counter input) in applications. If the pulse frequency is high, HDI must be used.

When the count value reaches the set count value (F11.08), multi-function digital output terminal allocated with function 8 (Set count value reached) becomes ON. Then the counter stops counting.

When the counting value reaches the designated counting value (F11.09), multi-function digital output terminal allocated with function 9 (Designated count value reached) becomes ON. Then the counter continues to count until the set count value is reached.

F11.09 should be equal to or smaller than F11.08.

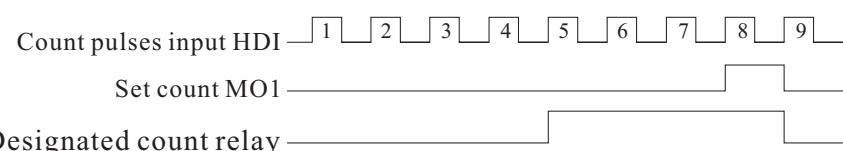


Figure 6-33 Reaching the set count value and designated count value

## Group F12: Simple PLC Function And Multi-speed control

The VP600 multi-command has many functions. Besides multi-speed, it can be used as the setting source of the V/F separated voltage source and setting source of process PID. In addition, the multi-command is relative value.

The simple PLC function is different from the VP600 user programmable function. Simple PLC can only complete simple combination of multi-command, while the user programmable function is more practical.

Function Code	Parameter Name	Setting Range	Default
F12.00	Simple PLC running mode	0: Stop after the AC drive runs one cycle 1: Keep final values after the AC drive runs one cycle 2: Repeat after the AC drive runs one cycle	0

Simple PLC can be either the frequency source or V/F separated voltage source.

When simple PLC is used as the frequency source, whether function code values of F12.02 to F12.17 are positive or negative determines the running direction. If the function code values are negative, it indicates that the AC drive runs in reverse direction.

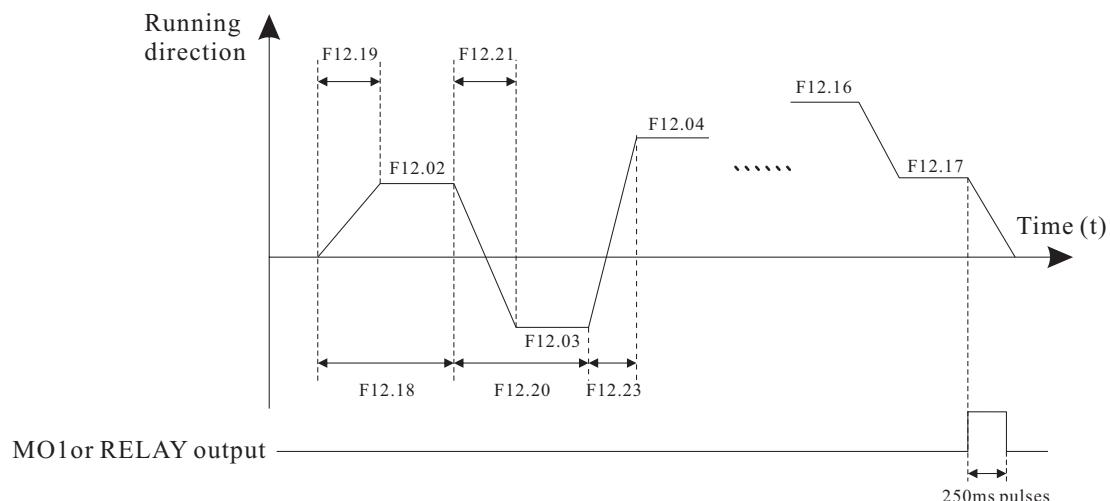


Figure 6-34 Simple PLC when used as frequency source

- 0: Stop after the AC drive runs one cycle  
The AC drive stops after running one cycle, and will not start up until receiving another command.

- 1: Keep final values after the AC drive runs one cycle  
The AC drive keeps the final running frequency and direction after running one cycle.

- 2: Repeat after the AC drive runs one cycle  
The AC drive automatically starts another cycle after running one cycle, and will not stop until receiving the stop command.

Function Code	Parameter Name	Setting Range	Default
F12.01	Simple PLC retentive selection	Unit's digit :Retentive upon power failure 0: No 1: Yes Ten's digit :Retentive upon stop 0: No 1: Yes	00

PLC retentive upon power failure indicates that the AC drive memorizes the PLC running moment and running frequency before power failure and will continue to run from the memorized moment after it is powered on again. If the unit's digit is set to 0, the AC drive restarts the PLC process after it is powered on again.

PLC retentive upon stop indicates that the AC drive records the PLC running moment and running frequency upon stop and will continue to run from the recorded moment after it starts up again. If the ten's digit is set to 0, the AC drive restarts the PLC process after it starts up again.

Function Code	Parameter Name	Setting Range	Default
F12.02	Multi-speed 0	-100.0%~100.0%	0.0%
F12.03	Multi-speed 1	-100.0%~100.0%	0.0%
F12.04	Multi-speed 2	-100.0%~100.0%	0.0%
F12.05	Multi-speed 3	-100.0%~100.0%	0.0%
F12.06	Multi-speed 4	-100.0%~100.0%	0.0%
F12.07	Multi-speed 5	-100.0%~100.0%	0.0%
F12.08	Multi-speed 6	-100.0%~100.0%	0.0%
F12.09	Multi-speed 7	-100.0%~100.0%	0.0%
F12.10	Multi-speed 8	-100.0%~100.0%	0.0%
F12.11	Multi-speed 9	-100.0%~100.0%	0.0%
F12.12	Multi-speed 10	-100.0%~100.0%	0.0%
F12.13	Multi-speed 11	-100.0%~100.0%	0.0%
F12.14	Multi-speed 12	-100.0%~100.0%	0.0%
F12.15	Multi-speed 13	-100.0%~100.0%	0.0%
F12.16	Multi-speed 14	-100.0%~100.0%	0.0%
F12.17	Multi-speed 15	-100.0%~100.0%	0.0%

Multi-command can be the setting source of frequency, V/F separated voltage and process PID. The multi-command is relative value and ranges from -100.0% to 100.0%.

As frequency source, it is a percentage relative to the maximum frequency. As V/F separated voltage source, it is a percentage relative to the rated motor voltage. As process PID setting source, it does not require conversion.

Multi-command can be switched over based on different states of multi-function digital S terminals. For details, see the descriptions of group F05.

Function Code	Parameter Name	Setting Range	Default
F12.18	Running time of simple PLC multi-speed 0	0.0s(h)~6500.0s(h)	0.0s(h)
F12.19	Acceleration/deceleration time of simple PLC multi-speed 0	0~3	0
F12.20	Running time of simple PLC multi-speed 1	0.0s(h)~6500.0s(h)	0.0s(h)
F12.21	Acceleration/deceleration time of simple PLC multi-speed 1	0~3	0
F12.22	Running time of simple PLC multi-speed 2	0.0s(h)~6500.0s(h)	0.0s(h)
F12.23	Acceleration/deceleration time of simple PLC multi-speed 2	0~3	0
F12.24	Running time of simple PLC multi-speed 3	0.0s(h)~6500.0s(h)	0.0s(h)
F12.25	Acceleration/deceleration time of simple PLC multi-speed 3	0~3	0
F12.26	Running time of simple PLC multi-speed 4	0.0s(h)~6500.0s(h)	0.0s(h)
F12.27	Acceleration/deceleration time of simple PLC multi-speed 4	0~3	0
F12.28	Running time of simple PLC multi-speed 5	0.0s(h)~6500.0s(h)	0.0s(h)
F12.29	Acceleration/deceleration time of simple PLC multi-speed 5	0~3	0
F12.30	Running time of simple PLC multi-speed 6	0.0s(h)~6500.0s(h)	0.0s(h)
F12.31	Acceleration/deceleration time of simple PLC multi-speed 6	0~3	0
F12.32	Running time of simple PLC multi-speed 7	0.0s(h)~6500.0s(h)	0.0s(h)
F12.33	Acceleration/deceleration time of simple PLC multi-speed 7	0~3	0
F12.34	Running time of simple PLC multi-speed 8	0.0s(h)~6500.0s(h)	0.0s(h)
F12.35	Acceleration/deceleration time of simple PLC multi-speed 8	0~3	0
F12.36	Running time of simple PLC multi-speed 9	0.0s(h)~6500.0s(h)	0.0s(h)

Function Code	Parameter Name	Setting Range	Default
F12.37	Acceleration/deceleration time of simple PLC multi-speed 9	0~3	0
F12.38	Running time of simple PLC multi-speed 10	0.0s(h)~6500.0s(h)	0.0s(h)
F12.39	Acceleration/deceleration time of simple PLC multi-speed 10	0~3	0
F12.40	Running time of simple PLC multi-speed 11	0.0s(h)~6500.0s(h)	0.0s(h)
F12.41	Acceleration/deceleration time of simple PLC multi-speed 11	0~3	0
F12.42	Running time of simple PLC multi-speed 12	0.0s(h)~6500.0s(h)	0.0s(h)
F12.43	Acceleration/deceleration time of simple PLC multi-speed 12	0~3	0
F12.44	Running time of simple PLC multi-speed 13	0.0s(h)~6500.0s(h)	0.0s(h)
F12.45	Acceleration/deceleration time of simple PLC multi-speed 13	0~3	0
F12.46	Running time of simple PLC multi-speed 14	0.0s(h)~6500.0s(h)	0.0s(h)
F12.47	Acceleration/deceleration time of simple PLC multi-speed 14	0~3	0
F12.48	Running time of simple PLC multi-speed 15	0.0s(h)~6500.0s(h)	0.0s(h)
F12.49	Acceleration/deceleration time of simple PLC multi-speed 15	0~3	0
F12.50	Time unit of multi-speed	0: s (second) 1: h (hour)	0
F12.51	Multi-speed 0 source	0: Set by F12.02 1: AI1 2: AI2 3: AI3 4: Pulse setting 5: PID 6: Set frequency via keypad (F00.10), modified UP/DOWN	0

Determines the setting channel of reference 0. You can perform convenient switch over between the setting channels. When multi-command or simple PLC is used as frequency source, the switch over between two frequency sources can be achieved easily.

## Group F13: Communication Parameters

Function Code	Parameter Name	Setting Range	Default
F13.00	Local address	1 ~ 247 , 0 is broadcast address	1

Function Code	Parameter Name	Setting Range	Default
F13.01	Baud rate	0:300BPS 1:600BPS 2:1200BPS 3:2400BPS 4:4800BPS 5:9600BPS 6:19200BPS 7:38400BPS 8:57600BPS 9:115200BPS	5

This function code is used on set data transfer rate between host computer and AC drive.

Note: Baud rate of host computer and AC drive must be same, or communication will fail. The higher baud rate, the faster communication speed.

Function Code	Parameter Name	Setting Range	Default
F13.02	Data format	0: No check, data format (8,N,2) 1: Even parity check, data format (8,E,1) 2: Odd Parity check, data format (8,O,1) 3: Data format (8,N,1)	3

Note: Data format of host computer and AC drive must be same, or communication will fail.

Function Code	Parameter Name	Setting Range	Default
F13.03	Response delay	0~20ms	20ms

Function Code	Parameter Name	Setting Range	Default
F13.04	Communication timeout	0.0 disable 1s to 60.0s	0.0s

This function code is disabled when set to 0.0s.

Function Code	Parameter Name	Setting Range	Default
F13.05	Modbus protocol selection	0: Non-standard Modbus protocol 1: Standard Modbus protocol	1

Function Code	Parameter Name	Setting Range	Default
F13.06	Communication reading current resolution	0: 0.01A 1: 0.1A	0

## Group F15: Motor 2 Parameters

The VP600 can switch between two motors. Motor 2 nameplate data can be entered and self-learning can be used.

Refer to description of motor 1 parameter

# Chapter 7 Fault Diagnosis and Trouble Shooting

## 7.1 Faults and Solutions

The VP600 provides a total of 34 codes for fault information and protective functions. After a fault occurs, the AC drive implements the protection function, and displays the fault code on the operation panel (if the operation panel is fitted).

Before seeking technical support, you should firstly determine the fault type, analyze the causes, and perform troubleshooting according to the following tables. If the fault cannot be rectified, contact the supplier.

E033 is the AC drive hardware overcurrent or overvoltage signal. In most situations, hardware overvoltage fault causes E033.

Display	Fault Name	Possible Causes	Solutions
E001	Bus under-voltage	1. instantaneous power failure 2. input voltage of the inverter is not within the specified requirements 3. bus voltage is abnormal 4. rectifier bridge and buffer resistance is abnormal 5. drive board is abnormal 6. main control board is abnormal	1.fault reset 2.adjust to normal voltage 3.seek technical support 4.seek technical support 5.seek technical support 6.seek technical support
E002	Over-voltage during acceleration	1.input voltage is too high 2. external force dragging motor running in the process of acceleration 3.acceleration time is too short 4.have not install a brake unit or brake resistance	1.adjust to normal voltage 2.cancel external force or add a brake resistance 3.increase acceleration time 4.install brake unit or brake resistance
E003	Over-voltage at constant speed running	1.input voltage is too high 2.external force dragging motor running in the process of running	1.adjust to normal voltage 2.cancel external force or add a brake resistance

Display	Fault Name	Possible Causes	Solutions
E004	Over-current during acceleration	1.AC drive output circuit is ground or short circuit 2.no self-learning of motor parameter 3.acceleration time is too short 4.manual torque boost or V/F curve is not suitable 5.voltage is too low 6.start rotating motor 7.additional load when acceleration 8.AC drive type is too small	1.eliminate external faults 2.self-learning of motor parameter 3.increase acceleration time 4.adjust manual torque boost or V/F curve 5.adjust to normal voltage 6.speed tracking restart or start after motor stop 7.cancel additional load 8.select an AC drive of higher power class
E005	Over-current during deceleration	1.AC drive output circuit is grounded or short circuited 2.no self-learning of motor parameter 3.deceleration time is too short 4.voltage is too low 5.additional load when deceleration 6.have no install brake unit or brake resistance	1.eliminate external faults 2.self-learning of motor parameter 3.increase deceleration time 4.adjust to normal voltage 5.cancel additional load 6.install brake unit or brake resistance
E006	Over-current at constant speed running	1.AC drive output circuit is ground or short circuit 2.no self-learning of motor parameter 3.voltage is too low 4.additional load when running 5.AC drive type is too small	1.eliminate external faults 2.self-learning of motor parameter 3.adjust to normal voltage 4.cancel additional load 5.select an AC drive of higher power class.
E007	Motor overload	1. Check protection function code F09.10 is correct 2. Load may be too heavy or motor has a locked rotor 3.AC drive type is too small	1.setting parameter correctly 2.reduce the load and check the motor and mechanical condition. 3.select an AC drive of higher power class.

Display	Fault Name	Possible Causes	Solutions
E008	AC drive overload	1.The load is too heavy or locked motor occurs on the motor. 2.The AC drive model is of too small power class.	1. reduce the load and check the motor and mechanical condition. 2. select an AC drive of higher power class.
E00A	Overvoltage during deceleration	1: The input voltage is too high. 2: An external force drives the motor during acceleration. 3: The acceleration time is too short. 4: The braking unit and braking resistor are not installed.	1.adjust the voltage to normal range. 2.cancel the external force or install a braking resistor. 3.increase the acceleration time. 4.install the braking unit and braking resistor.
E00d	External equipment fault	1.external fault signal is input via S. 2.external fault signal is input via virtual I/O.	1.reset the operation 2.reset the operation
E00E	Module overheat	1.the ambient temperature is too high. 2. the air filter is blocked. 3.the fan is damaged. 4. the thermally sensitive resistor of the module is damaged. 5.the inverter module is damaged.	1.lower the ambient temperature. 2.clean the air filter. 3.replace the damaged fan. 4.replace the damaged thermally sensitive resistor. 5.replace the inverter module.
E00F	EEPROM readwrite fault	The EEPROM chip is damaged.	Replace the main control board.
E012	Power input phase loss	1.the three-phase power input is abnormal. 2.the drive board is faulty. 3.the lightening board is faulty. 4.the main control board is faulty.	1.eliminate external faults. 2.seek technical support 3.seek technical support 4.seek technical support
E013	Power output phase loss	1.the cable connecting the AC drive and the motor is faulty. 2.the AC drive's three-phase outputs are unbalanced when the motor is running. 3.the drive board is faulty. 4.the module is faulty.	1.eliminate external faults. 2.check whether the motor three-phase winding is normal. 3.seek technical support 4.seek technical support

Display	Fault Name	Possible Causes	Solutions
E015	Current detection fault	1.the HALL device is faulty. 2.the drive board is faulty.	1.replace the faulty HALL device. 2.replace the faulty drive board.
E016	Motor self-learning fault	1.the motor parameters are not set according to the nameplate. 2.the motor self-learning times out.	1.set the motor parameters according to the nameplate properly. 2.check the cable connecting the AC drive and the motor.
E017	Contactor fault	1.the drive board and power supply are faulty. 2.the contactor is faulty.	1.replace the faulty drive board or power supply board. 2.replace the faulty contactor.
E018	Communication fault	1.the host computer is in abnormal state. 2.the communication cable is faulty. 3: F00.02 is set improperly. 4.the communication parameters in group F13 are set improperly.	1.check the cabling of host computer. 2.check the communication cabling. 3.set F00.02 correctly. 4.set the communication parameters properly.
E020	Accumulative running time reached	The accumulative running time reaches the setting value.	Clear the record through the parameter initialization function.
E023	Short circuit to ground	The motor is short circuited to ground.	Replace the cable or motor
E026	Encoder fault	1.the encoder type is incorrect. 2.the cable connection of the encoder is incorrect. 3.the encoder is damaged. 4.the PG card is faulty.	1.set the encoder type correctly based on the actual situation. 2.eliminate external faults. 3.replace the damaged encoder. 4.replace the faulty PG card.
E029	Accumulative power-on time reached	The accumulative power-on time reaches the setting value.	Clear the record through the parameter initialization function.
E02E	PID feedback lost during running	The PID feedback is lower than the setting of F10.26.	Check the PID feedback signal or set F10.26 to a proper value.
E030	Load becoming 0	The AC drive running current is lower than F09.13.	Check that the load is disconnected or the setting of F09.13 and F09.14 is correct.

Display	Fault Name	Possible Causes	Solutions
E032	Pulse-by-pulse current limit fault	1.the load is too heavy or locked rotor occurs on the motor. 2.the AC drive model is too small power class.	1.reduce the load and check the motor and mechanical condition. 2.select an AC drive of higher power class.
E033	AC drive hardware fault	1.overvoltage exists. 2.overcurrent exists.	1.handle based on overvoltage. 2.handle based on overcurrent.
E034	Too large speed deviation	1.the encoder parameters are set incorrectly. 2.the motor self-learning is not performed. 3.F09.17 and F09.60 are set incorrectly.	1.set the encoder parameters properly. 2.perform the motor self-learning. 3.set F09.17 and F09.60 correctly based on the actual situation.
E035	Motor over-speed	1.the encoder parameters are set incorrectly. 2.the motor self-learning is not performed. 3.F09.17 and F09.60 are set incorrectly.	1.set the encoder parameters properly. 2.perform the motor self-learning. 3.set F09.17 and F09.60 correctly based on the actual situation.
E036	Motor overheat	1.the cabling of the temperature sensor becomes loose. 2.the motor temperature is too high.	1.check the temperature sensor cabling and eliminate the cabling fault. 2.lower the carrier frequency or adopt other heat radiation measures.
E037	Initial position fault	The motor parameters are not set based on the actual situation.	Check that the motor parameters are set correctly and whether the setting of rated current is too small.
E038	Motor switch over fault during running	Change the selection of the motor via terminal during running of the AC drive.	Perform motor switch over after the AC drive stops.

## 7.2 Common Faults and Solutions

You may come across the following faults during the use of the AC drive. Refer to the following table for simple fault analysis.

Table 7-1 Troubleshooting to common faults of the AC drive

SN	Fault	Possible Causes	Solutions
1	There is no display at power-on.	1.there is no power supply to the AC drive or the power input to the AC drive is too low. 2.the power supply of the switch on the drive board of the AC drive is faulty. 3.the rectifier bridge is damaged. 4.the control board or the operation panel is faulty. 5.the cable connecting the control board and the drive board and the operation panel breaks.	1. check the power supply. 2. check the bus voltage. 3. re-connect the 34-core cables. 4. seek technical support
2	“VP600” is displayed at power-on.	1.the cable between the drive board and the control board is in poor contact. 2.related components on the control board are damaged. 3.the motor or the motor cable is short circuited to the ground. 4.the HALL device is faulty. 5.the power input to the AC drive is too low.	1. re-connect the 34-core cables. 2. seek technical support
3	“E023” is displayed at power-on.	1.the motor or the motor output cable is short-circuited to the ground. 2.the AC drive is damaged.	1.measure the insulation of the motor and the output cable with a megger. 2.seek technical support
4	The AC drive display is normal upon poweron. But “VP600” is displayed after running and stops immediately.	1.the cooling fan is damaged or locked-rotor occurs. 2.the external control terminal cable is short circuited.	1.replace the damaged fan. 2.eliminate external fault.
5	E00E (module overheat) fault is reported frequently.	1.the setting of carrier frequency is too high. 2.the cooling fan is damaged, or the air filter is blocked. 3.components inside the AC drive are damaged (thermal coupler or others).	1.reduce the carrier frequency (F00.17). 2.replace the fan and clean the air filter. 3.seek technical support
6	The motor does not rotate after the AC drive runs.	1.check the motor and the motor cables. 2.the AC drive parameters are set improperly (motor parameters). 3.the cable between the drive board and the control board is in poor contact. 4.the drive board is faulty.	1.ensure the cable between the AC drive and the motor is normal. 2.replace the motor or clear mechanical faults. 3.check and re-set motor parameters.

SN	Fault	Possible Causes	Solutions
7	The S terminals are disabled.	1.the parameters are set incorrectly. 2.the external signal is incorrect. 3.the jumper bar across DCM and +24 V becomes loose. 4.the control board is faulty.	1.check and reset the parameters in group F05. 2.re-connect the external signal cables. 3.re-confirm the jumper bar across DCM and +24 V. 4.seek technical support
8	The motor speed is always low in close loop vector control mode.	1.the encoder is faulty. 2.the encoder cable is connected incorrectly or in poor contact. 3.the PG card is faulty. 4.the drive board is faulty.	1.replace the encoder and ensure the cabling is proper. 2.replace the PG card. 3.seek technical support
9	The AC drive reports overcurrent and overvoltage frequently.	1.the motor parameters are set improperly. 2.the acceleration/deceleration time is improper. 3.the load fluctuates.	1.re-set motor parameters or re-perform the motor self-learning. 2.set proper acceleration/deceleration time. 3.seek technical support
10	E017 is reported upon power-on or running.	The soft startup contactor is not picked up.	1.check whether the contactor cable is loose. 2.check whether the contactor is faulty. 3.heck whether 24 V power supply of the contactor is faulty. 4.seek technical support
11	88888 is displayed upon power-on.	Related component on the control board is damaged.	Replace the control board.

## Chapter 8   Warranty Agreement

Warranty of our products is transacted as the following rules and regulations:

1. The warranty period of the product is 24 months (refer to the barcode on the equipment). During the warranty period, if the product fails or is damaged under normal use by following the instructions the supplier will be responsible for the repair.
2. Within the warranty period, maintenance will be charged for the damages caused by the following reasons:
  - Improper use or repair/modification without prior permission
  - Fire, flood, abnormal voltage, other disasters and secondary disaster
  - Hardware damage caused by dropping or transportation after procurement
  - Improper operation
  - A problem with external equipment (for example, external device)
3. For Service and commissioning please contact POPE Australia +61 8 8295 5566 or within Australia free call 1300 553 552

## Appendix A Serial Communications

VP600 series AC drive, provides an RS485 communication interface, and adopts the ModBus communication protocol of international standard to make master-slave communication. Users can realize centralized control by PC/PLC, upper computer controlling and so on( set the controlling command, operation frequency, correlation function code parameters change, inverter working state and fault information monitoring, etc.) , so as to adapt to specific application requirements.

### 1. Protocol content

The Modbus serial communication protocol defines the frame content and using form of asynchronous transmission in serial communication, including: host polling and broadcast frame, slave response frame format; frame content of host organization includes: slave address (or the broadcast address), performing commands, data and error checking, etc.; slave response is also using the same structure, content including: action confirmation, data returning and error checking, etc. if error happens when slave is receiving frame, or cannot achieve the requirements of the host, it will organize a fault frame as a response feedback to the host.

### 2. Application way

VP600 series AC drive access the controlling network of "single master multiple slave" with RS232/RS485 bus.

### 3. Bus structure

#### (1) The interface way

RS485 hardware interface

#### (2) Transmission mode

Asynchronous serial and half-duplex transmission mode. At the same time only one between the host and the slave can send data and the other receives data. In the process of serial asynchronous communication, data is sending in the form of message, and frame by frame.

#### (3) Topological structure

Single master multiple slave system. Slave address set range from 1 ~ 247, 0 as the broadcast address, and each slave address in the network has uniqueness. This is the foundation of guaranteeing Modbus serial communication.

### 4. Protocol specification

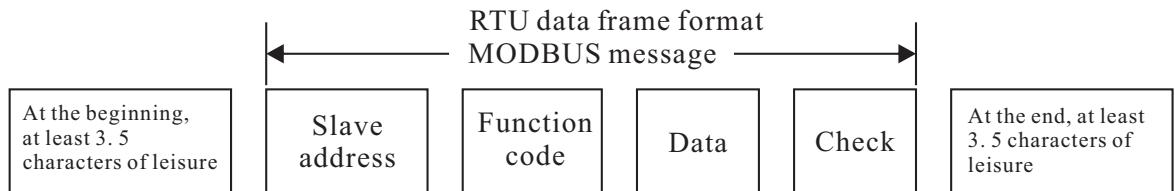
The communication protocol of the VP600 series AC drive is a master-slave Modbus communication protocol with asynchronous serial and in the network only one device (host) can establish protocol (called "query/command"). Other device (slave) can only respond to the "query/command" of the host with the provided data, or make corresponding action according to the "query/command" of the host. Host here refers to the personal computer (PC), industrial control equipment or programmable logic controller (PLC), etc., and slave refers to VP600 series inverter or other controlling equipment of the same communication protocol. Host can not only separately communicate with a certain slave, but also can release broadcast information to all slaves. For the separately "query/command" of the host, slave should return a information (called response), and for broadcast information of the host, the slave does not have to feedback information to the host.

### 5. Communication frame structure

The Modbus protocol communication data format of VP600 series AC drive as following:

In RTU mode, new information always becomes silent for at least 3.5 bytes of transmission time as a start. In the network that calculates transmission rate by baud rate, transmission time of 3.5 bytes can be easily grasped. And then the transmitted data fields are, in order: slave address, operation command code, data and CRC check words, transmitted bytes of each domain are hexadecimal 0...9, A...F. network device always monitors the activities of the communication bus, even in the silent intervals. When receiving the first field (address information), each network device will conform the byte. With the last byte transmission completion, a similar 3.5 bytes of transmission time interval is used to show the end of the frame. After this, the transmission of a new frame will start.

Information of a frame must be transmitted in a continuous flow of data. If the interval is more than 1.5 bytes before the end of the whole frame transmission, the receiving device will remove the incomplete information, and mistakenly consider the following byte to be part of a new frame address. In the same way, if the interval between the start of a new frame and previous frame is less than 3.5 bytes, receiving device will consider it to be a continuation of the previous frame. Because of the frame disorder, the final CRC check value is not correct, which will lead to a communication fault.



The standard structure of RTU frame:

START	T1-T2-T3-T4 (3.5 bytes of transmission time)
SLAVE ADDR	Communication address: 1~247
CMD	03H : read slave parameters : 06H : write slave parameters
DATA (N-1)	
DATA (N-2)	
.....	Data: function code parameter address, number of function code parameter ,value of function code parameter
DATA0	
CRC CHK high- order	
CRC CHK low- order	Check value: CRC
END	T1-T2-T3-T4 (3.5 bytes of transmission time)

Command code (CMD): 03H , read N words ( at most continuously read 12 words) . For example, the inverter of which slave address is 01, memory starting address is F02, when continuously reading two words, and then the host command information as below:

ADR	01H
CMD	03H
Starting address high- order	F0H
Starting address low- order	02H
Number of data high- order	00H
Number of data low- order	02H
CRC CHK low- order	need to calculate CRC,CHK
CRC CHK high- order	

Slave response information

When F13.05 set to 0:

ADR	01H
CMD	03H
Number of bytes high-order	00H
Number of bytes low-order	04H
Data address F002H high- order	00H
Data address F002H low- order	00H
Data address F003H high- order	00H
Data address F003H low- order	01H
CRC CHK low- order	need to calculate CRC,CHK
CRC CHK high- order	

When F13.05 set to 1:

ADR	01H
CMD	03H
Number of bytes	04H
Data address F002H high- order	00H
Data address F002H low- order	00H
Data address F003H high- order	00H
Data address F003H low- order	01H
CRC CHK low-order	need to calculate CRC,CHK
CRC CHK high-order	

Command code: 06H, write a word

For example, write 5000( 1388H) in F00AH address of inverter that the slave address is 02H.

## Host command information

ADR	02H
CMD	06H
Data address high-order	F0H
Data address low-order	0AH
Data content high- order	13H
Data content low- order	88H
CRC CHK low- order	need to calculate CRC,CHK
CRC CHK high- order	

## Slave response information

ADR	02H
CMD	06H
Data address high-order	F0H
Data address low-order	0AH
Data content high- order	13H
Data content low- order	88H
CRC CHK low- order	need to calculate CRC,CHK
CRC CHK high- order	

CRC checking methods---CRC( Cyclical Redundancy Check) :

Use the RTU frame format, and frame contains frame error detection domain based on CRC calculation. CRC domain detects the content of the entire frame. CRC domain is two bytes, containing 16 bit binary value. It joins the frame after calculated by the transmission equipment, and the receiving device recalculates CRC of the received frame, and compared with the received value of CRC domain, if the two CRC value is not equal, then there is an error in transmission.

CRC is deposited in the OxFFFF first, and then process more than six consecutive bytes of the frame with the value of current register. Only 8 bit data of each character is valid for CRC, and the start bit and stop bit and parity bit are all invalid.

In the process of CRC, each 8- bit character is separately XOR with register content, and as a result, moves to the lowest effective direction, and the highest effective bit fills with 0. LSB is extracted to detect, if the LSB is 1, register is separately XOR with preset value, if the LSB is 0, then give up. The whole process will repeat 8 times. After the completion of the final bit ( eighth bit) , next 8- bit bytes will separately XOR with the current value of register. The value in the register finally is the CRC value after all bytes in the frame perform.

This calculation method of CRC adopts the CRC check rule of international standards. When users edit CRC algorithm, they can refer to relevant standard of the CRC algorithm, and write CRC calculation program that really meets the requirements.

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

```

unsigned int crc_chk_value (unsigned char *data_value, unsigned char length)
{
    unsigned int crc_value=0xFFFF;
    int i;
    while (length--)
    {
        crc_value ^= *data_value++;
        for (i=0; i<8; i++)
        {
            if(crc_value&0x0001)
            {
                crc_value= (crc_value>>1) ^ 0xa001;
            }
            else
            {
                crc_value=crc_value>>1;
            }
        }
    }
    return (crc_value) ;
}

```

The definition of communication data address:

This part is the address definition of communication data, and used to control the operation of the inverter, obtain inverter state information and related function parameters settings, etc.

#### 6. Function code parameter address rules

High and low byte range respectively: high byte F0~FE(F group),A0~A2(F15~F17 group); low byte 00~FF. For example, if visit F04.02, so the function code address is 0xF40C.

Note: F14 group: manufactures setting parameters, neither can read this group of parameter, nor change this group of parameters; F17 group: can read this group of parameter, but can not change parameter. When inverter is in operation, some parameters cannot be changed; some parameters cannot be changed no matter what state the inverter is; when changing the function code parameters, you also should note the parameter setting range, units, and related instructions.

Function code group	Communication visit address	Function code address of communication change RAM
F00~F14	0xF000~0xFEFF	0x0000~0x0EFF
F15~F17	0xA000~0xA2FF	0x4000~0x42FF

Because the EEPROM is frequently stored, it will reduce the service life of EEPROM. As for users, some function code does not need to be stored under the mode of communication, and only need to change the value of RAM to satisfy the usage requirements. This function can be achieved only by changing the high-order of the corresponding code address from F to 0.

High and low byte range respectively: high byte 00 0F(F group); low byte 00 FF.

For example:

Function code F04.12 is not stored in the EEPROM, and set the address to 040C.

Function code F15.51 is not stored in the EEPROM, and set the address to 4033.

This address can only be used for chip RAM, and cannot be used as a function of reading, if doing so, then invalid address. For all parameter, it can realize this function by command code 07H.

Control command input to AC drive: (only write)

Command address	Command function
1000H	0001H : forward running
	0002H: reverse running
	0003H: forward jog
	0004H: reverse jog
	0005H : free stop
	0006H : decelerate to stop
	0007H: fault resetting

Digital output to terminal control: (only write)

Command address	Command function
1001H	BIT0:MO1 output control
	BIT1:retain
	BIT2:RA output control
	BIT3:TA output control
	BIT4:HDO output control
	BIT5:retain
	BIT6:retain
	BIT7:retain
	BIT8:retain
	BIT9:retain

Analog output AO1 control: (only write)

Command address	Command function
1002H	0~7FFF means 0%~100%

Analog outputAO2 control: (only write)

Command address	Command function
1003H	0~7FFF means 0%~100%

Pulse output control: (only write)

Command address	Command function
1004H	0~7FFF means 0%~100%

Read AC drive status: (only write)

Status address	Status function
2000H	0001:forward running
	0002 : reverse running
	0003 : stop

Stop/run parameter address:

Address	Data meaning
3000H	*communication setting range -10000~10000) (decimalism)
3001H	frequency running
3002H	bus voltage
3003H	output voltage
3004H	output current
3005H	output power
3006H	output torque
3007H	run speed
3008H	terminal input symbol
3009H	terminal output symbol
300AH	AI1 voltage
300BH	AI2 voltage
300CH	AI3 voltage
300DH	count value input
300EH	length valuse input
300FH	load speed
3010H	PID setting

Address	Data meaning
3011H	PID feedback value
3012H	PLC steps
3013H	input pulse frequency unit is 0.01kHz
3014H	feedback speed, unit is 0.1Hz
3015H	residue running time
3016H	AI1 voltage before correcting
3017H	AI2 voltage before correcting
3018H	AI3 voltage before correcting
3019H	line speed
301AH	current power on time
301BH	current run time
301CH	input pulse frequency unit is 1Hz
301DH	communication setting time
301EH	actual feedback speed
301FH	A frequency display
3020H	B frequency display

Note: communication setting value is relative percentage - 100. 00% 100. 00%), and can make communication write operations. When setting as frequency source, relative is the largest frequency(F00.03); When setting as torque source, relative is F03.10,F15.48 (motor1,motor2.)

Parameter lock password calibration: (if back to 8888H, is means password calibration passed)

Address	Data meaning
1F00H	*****

Parameter initializing address is 1F01H:

Parameter initializing address	Command function
1F01H	0001H : factory reset, not include motor parameter
	0002H : clear fault file

AC Drive fault description:

AC Drive fault address	AC Drive fault information
8000H	0000H: no fault 0001H: acceleration overcurrent (E004) 0002H: deceleration overcurrent (E005) 0003H: constant speed overcurrent (E006) 0004H: acceleration overvoltage (E002) 0005H: deceleration overvoltage (E00A) 0006H: constant speed overvoltage (E003) 0007H: undervoltage falut (E001) 0008H: motor overload (E007) 0009H: AC drive overload (E008) 000AH: input phase loss (E012) 000BH: output phase loss (E013) 000CH: module overheat (E00E) 000DH: buffer resistance overload (E014) 000EH: contactor fault (E017) 000FH: external fault (E00d) 0010H: communication fault (E018) 0011H: current detection fault (E015) 0012H: motor self-learning fault (E016) 0013H: accumulative running time reached (E020) 0014H: EEPROM readwrite fault (E00F) 0015H: Short circuit to ground (E023) 0016H: PID feedback lost during running (E02E) 0017H: encoder fault (E026) 0018H: AC drive hardware fault (E033) 0019H: accumulative power-on time reached (E029) 001AH: load becoming 0 (E030) 001BH: rapid current limit timeout (E032) 001CH: too large speed deviation (E034) 001DH: motor switch over fault during running (E038) 001EH: motor over-speed (E035)

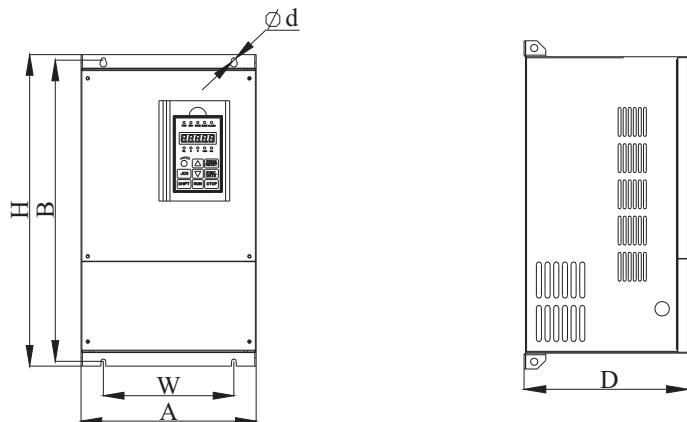
AC Drive fault address	AC Drive fault information
8000H	001FH:motor overheat E036 0020H:initial position fault E037

Communication fault description: (fault code)

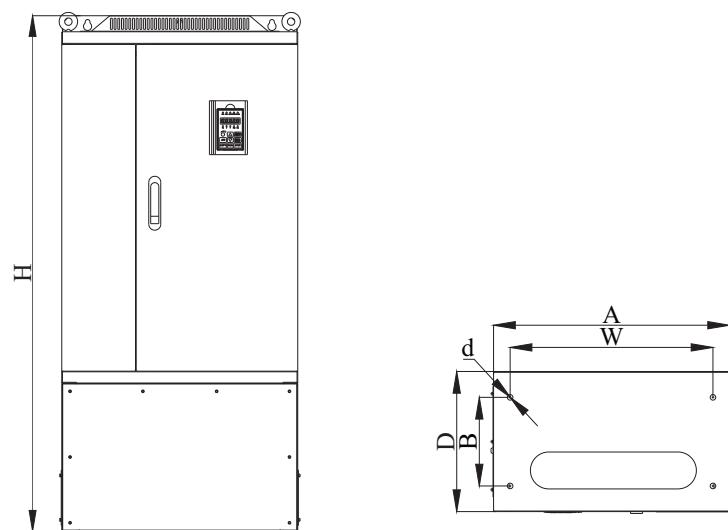
Communication fault address	Communication fault information
8001H	0000H: no fault 0001H: wrong password 0002H: wrong command code 0003H: wrong CRC check 0004H: invalid address 0005H: invalid parameter 0006H: invalid parameter change 0007H: system is locked 0008H: inverter busy ( EEPROM in storage)

## Appendix B External Dimension

### 1. External dimension: wall-mounted housing



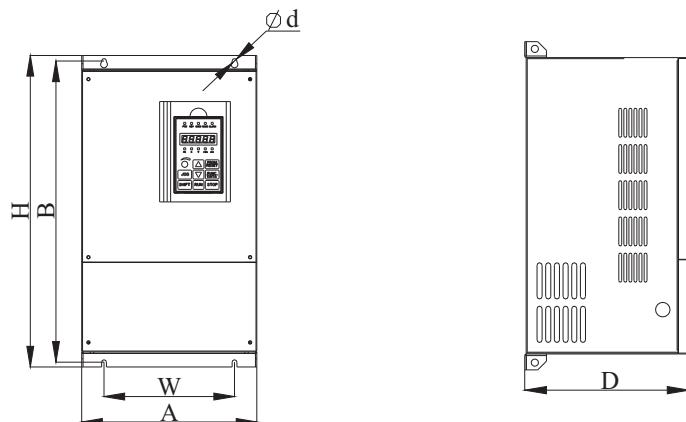
### 2. External dimension: wall-mounted/ floor combination housing



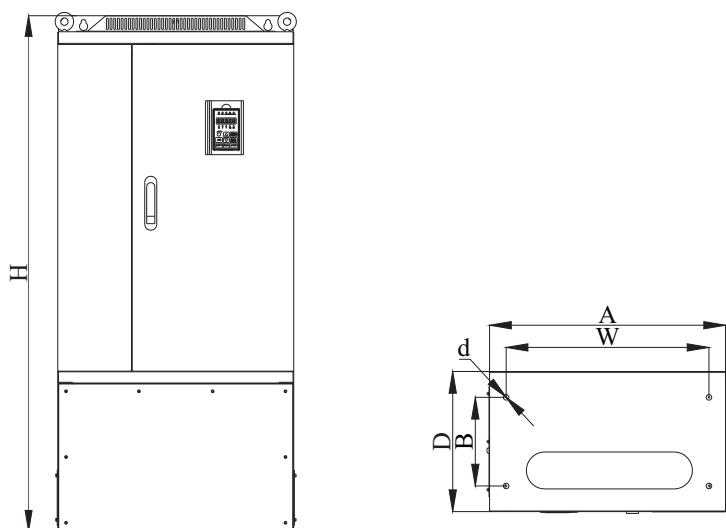
Base No.	Model	Power (kw)	Dimensions (mm)						Housing
			A-width	H-height	D-depth	W	B	d	
B10	VP600-0R5G-2	0.55kW	116	175	153	103	165	5	Wall-mounted plastic housing
	VP600-0R7G-2	0.75kW							
	VP600-1R5G-2	1.5kW							
B01	VP600-2R2G-2	2.2kW	134	251	173	121	238	5	Wall-mounted plastic housing
	VP600-3R7G-2	3.7kW							
B02	VP600-5R5G-2	5.5kW	161	274	198	148	261	6	
	VP600-7R5G-2	7.5kW							

Base No.	Model	Power (kW)	Dimensions (mm)						Housing	
			A-width	H-height	D-depth	W	B	d		
B10	VP600-0R7G/1R5P-4	0.75kW	116	175	153	103	165	5	Wall-mounted plastic housing	
	VP600-1R5G/2R2P-4	1.5kW								
	VP600-2R2G/3R7P-4	2.2kW								
B01	VP600-3R7G/5R5P-4	3.7kW	134	251	173	121	238	5	Wall-mounted steel casing housing	
B02	VP600-5R5G/7R5P-4	5.5kW	161	274	198	148	261	6		
	VP600-7R5G/011P-4	7.5kW								
B03	VP600-011G/015P-4	11kW	210	343	215	195	327	6		
	VP600-015G/018P-4	15kW								
B11	VP600-018G/022P-4	18.5kW	220	393	222	160	377	6	Wall-mounted steel casing housing	
	VP600-022G/030P-4	22kW								
B04	VP600-030G/037P-4	30kW	255	453	237	190	440	7		
	VP600-037G/045P-4	37kW								
B05	VP600-045G/055P-4	45kW	280	582	295	200	563	9	Wall-mounted steel casing housing	
	VP600-055G/075P-4	55kW								
B06	VP600-075G/093P-4	75kW	300	685	323	200	667	11		
	VP600-093G/110P-4	93kW								
B07	VP600-110G/132P-4	110kW	420	840	334	150*150	815	11	Floor type steel casing housing	
	VP600-132G/160P-4	132kW								
	VP600-160G/200P-4	160kW								
B09	VP600-200G/220P-4	200kW	640	1035	390	250*250	1003	11	Floor type steel casing housing	
	VP600-220G/250P-4	220kW								
	VP600-250G/280P-4	250kW								
	VP600-280G/315P-4	280kW								
	VP600-315G/350P-4	315kW								
B07-G	VP600-110G/132P-4-01	110kW	420	1108	334	320	230	12	Floor type steel casing housing	
	VP600-132G/160P-4-01	132kW								
	VP600-160G/200P-4-01	160kW								
B09-G	VP600-200G/220P-4-01	200kW	640	1400	390	5500	240	15		
	VP600-220G/250P-4-01	220kW								
	VP600-250G/280P-4-01	250kW								
	VP600-280G/315P-4-01	280kW								
	VP600-315G/350P-4-01	315kW								

## 3. IP54 External dimension 1:wall-mounted housing



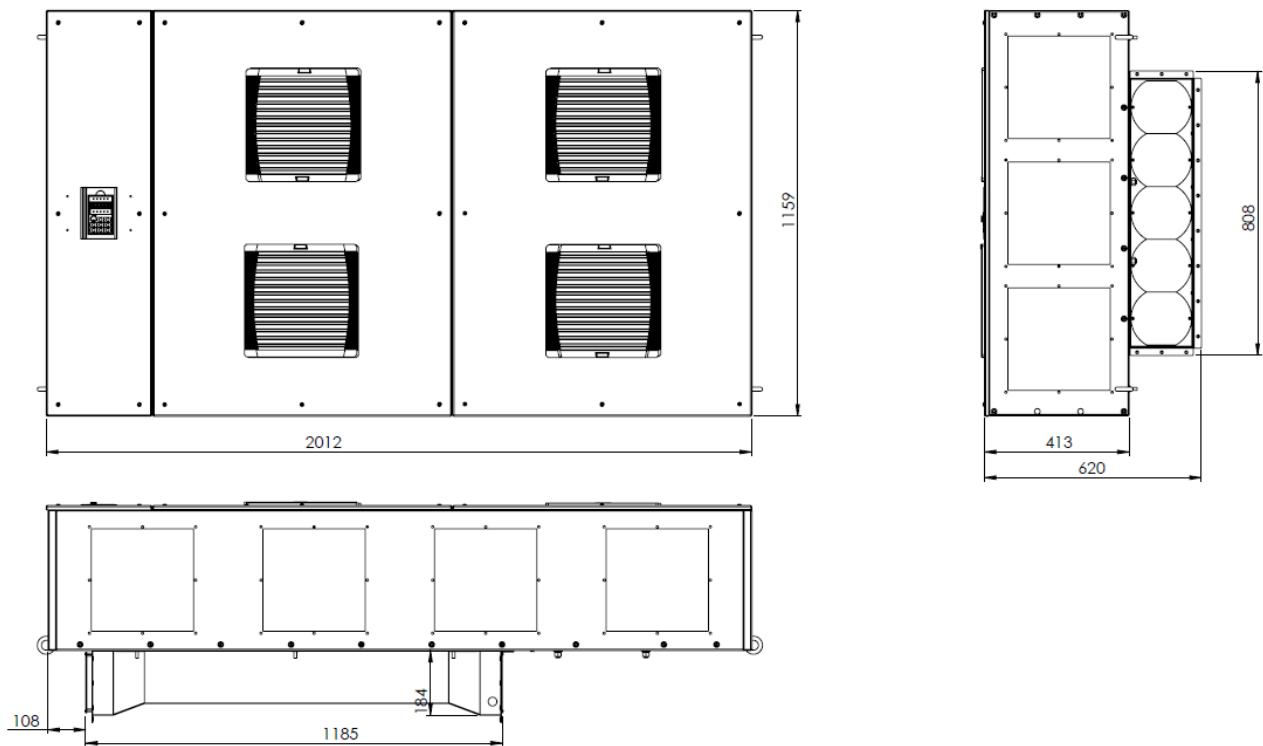
## 4. IP54 External dimension: wall-mounted/ floor combination housing



1 Phase IP54								
Base No.	Power (kW)	Dimensions (mm)						Housing
		W (width)	H (height)	D (depth)	A	B	d	
1512	0.5-2.2	160	278	161	65	262	8	Wall -mounted steel casing housing
0855	3.7-7.5	204	385	179	140	369	8	

3 Phase IP54								
Base No.	Power (kW)	Dimensions (mm)						Housing
		W (width)	H (height)	D (depth)	A	B	d	
1512	2.2-5.5	160	278	161	65	262	8	Wall-mounted steel casing housing
0855	7.5-15	204	385	179	140	369	8	
0108	18.5-30	267	452	239	190	434	8	
0111	37-55	300	578	285	190	557	11	
0125	75-93	300	685	323	200	667	11	
0861	110-132	420	840	334	150X150	815	11	
0871	160-200	640	1035	390	250X250	1003	11	
0860-G	110-132	420	1108	334	320	230	12	Floor type steel casing housing
0870-G	160-200	640	1400	390	550	240	15	

5. IP20 / IP44 External Dimensions: High Power Wall Mounted 400-500kW  
IP00 available upon request. Dimensions on page 175



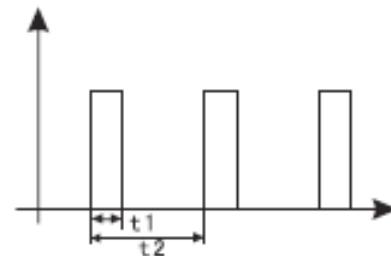
## Appendix C Accessories Selection

1:Brake unit and brake resistor selection guide

Voltage	AC drive Power	brake unit		brake resistance		brake torque (10%UD)
		model	quantity (piece)	power(W) /resistance value( $\Omega$ )	quantity (piece)	
220V	0.55kW	Built-in		80	120	1
	0.75kW			80	120	1
	1.5kW			150	100	1
	2.2kW			300	68	1
	3.7kW			300	68	1
	5.5kW			400	30	1
	7.5kW			400	30	1
	0.75kW			150	300	1
	1.5kW			200	300	1
	2.2kW			200	200	1
	3.7kW			400	150	1
	5.5kW			400	100	1
	7.5kW			750	75	1
380V	11kW			1000	60	1
	15kW			1500	40	1
	18.5kW			2500	30	1
	22kW			3000	30	1
	30kW	DBU-4030	1	5000	25	1
	37kW	DBU-4045	1	7500	20	1
	45kW		1	10000	13.6	1
	55kW	DBU-4030	2	5000*2	25	1
	75kW	DBU-4045	2	7500*2	15	1
	93kW		2	10000*2	13.6	1
	110kW	DBU-4160	1	20000	8	1
	132kW		1	25000	6	1
	160kW		1	30000	6	1
	200kW		1	35000	4.5	1
	220kW	DBU-4280	1	40000	4.5	1
	250kW		1	45000	4	1
	280kW		1	50000	3.5	1
	315kW		1	55000	3	1
	350kW		1	60000	2.5	1
	400kW		1	60000	2.5	1
	500kW		1	80000	2	1

**Notes :**

- 1: Please select the power and the resistance value recommended by POPE.
- 2: The power and the resistance value that is recommended in the table above can be calculated by 100% braking torque and 10% frequency of utilization. The power and the resistance value can be suitably reduced as long as it meets the load demand and the system is reliable: The power and the resistance value of the braking resistor should be suitably changed if the braking torque and frequency of utilization need to be increased, or users can contact POPE.
- 3: When installing a braking resistor, please consider the safety and heat resistance of the surrounding environment.
- 4: The frequency of use of Braking  $UD = t_1 / t_2 * 100\%$   
 t<sub>1</sub>: the braking time in a working period  
 t<sub>2</sub>: a working period  
 If the braking efficiency is double, the power of the corresponding braking unit and braking resistor also need to be double.



5. The values of resistors that are over 2500W are the total amount of resistance and power of an array of resistors. The power of the resistor is from parallel connection based on 2500W. For example, to get a 25000W 6Ω resistor, ten 2500W 60Ω resistors are needed to be connected in parallel.

The calculation of braking resistor: Statistics show that

$$IB = IMN/2 \rightarrow TB \approx TMN \text{ or } IB = 2UB/IMN$$

**Notes:** IB—braking current, A; IMN—the motor rated current, A;

TB—braking torque, N·m; TMN—rated load torque of motor, N·m.

As a general rule, the range of choice of braking torque is :

$$TMN < TB < 2TMN \quad IMN < IB < 2IMN$$

According to specific situation, users can decide the braking current according to the formula (3- 12) and (3- 13).

After that, it is easy to calculate the braking resistance :

$$RB = UB/IB \quad RB_{min} = UB/IMN$$

**Notes:** UB is the braking threshold voltage; RB is braking resistor value. UB is 1.1 times as that of the rated voltage of bus. RB<sub>min</sub> is the minimum braking resistance the common braking threshold voltage:

AC220V : DC380V AC380V : DC680V AC660V : DC1140V

When get IB and RB, the power of resistance will be known.

$\lambda$  : Actual resistance value/ calculated value ED% : Braking efficiency e. g:

Suppose that there is a 7.5KW motor, rated current is 18A and rated input voltage is 380V

and :  $RB = 680V/9A = 75\Omega$

$$RB_{min} = 680V/18A = 38\Omega$$

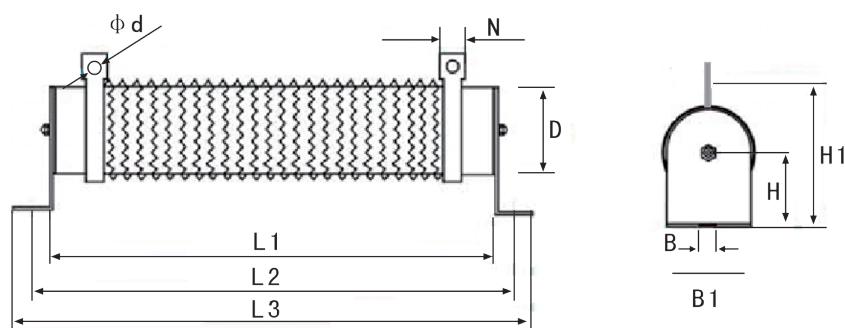
Empirically, the value is 75Ω

The power of braking resistor =  $1*680^2/75*0.1 = 616W$

The power can be suitably increased in actual use.

## 2. Mounting dimension of brake resistors

rated power (w)	dimension (mm)									
	L1 ( $\pm 2$ )	L2 ( $\pm 5$ )	L3 ( $\pm 3$ )	D ( $\pm 2$ )	B	B1	H	H1 ( $\pm 3$ )	N	$\phi d$
80	152	174	196	28	6.5	28	28	61	10	4.5
150	195	217	239	40	8	40	41	81	12	5.5
200	195	217	239	40	8	40	41	81	12	5.5
300	282	304	326	40	8	40	41	81	12	5.5
400	282	304	326	40	8	40	41	81	12	5.5
750	316	338	360	50	8	50	45	101	16	6
1000	300	325	350	60	8.5	60	60	119	16	6
1500	415	440	465	60	8.5	60	60	119	16	6
2000	510	535	560	60	8.5	60	60	119	16	6
2500	600	625	650	60	8.5	60	60	119	16	6



## 3. Display panel



Hole diameter of the panel installation box (height\*width) : 142\*98mm  
size of outline box : 147\*103

## Appendix D Using Introduction of I/O extension card

### 1. Introduction

BD-IO02 is I/O extension card of VP600 (applied to all models). BD-IO03 extends 4 multi-function digital input (it can be extends HDI high speed pulse input), 1 HDO output terminal (it can be extends HDI high speed pulse output or open collector output)

### 2. Installation and description

#### 1) Installation:

- ①: make sure the AC drive is power off completely.
- ②: aim I/O extension card to interface and install.
- ③: fix by screw

#### 2) Description:

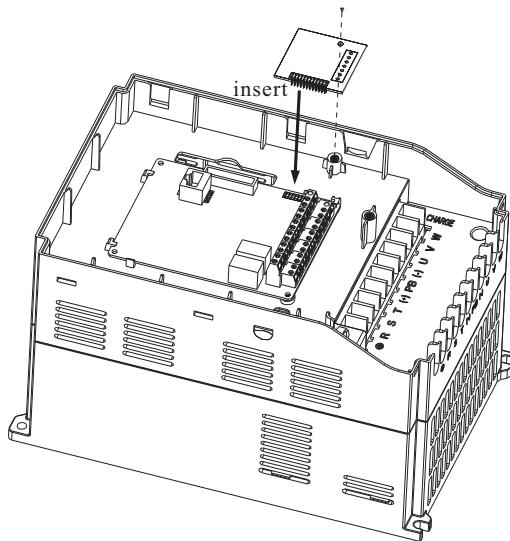


Figure 1 Install of I/O extension card

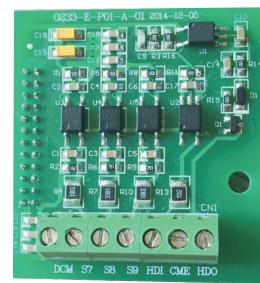


Figure 2 Extension card

DCM	S7	S8	S9	HDID	CME	HDO
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Figure 3 Wiring terminal of extension card

#### ② Description of I/O extension card control circuit terminal :

Terminal identification	Terminal function description	
S7-DCM	Multifunctional input terminal 7	Function setting: F05.06~F05.09
S8-DCM	Multifunctional input terminal 8	
S9-DCM	Multifunctional input terminal 9	
HDI-DCM	High speed pulse input terminal Max.input frequency 100kHz	
HDO-CME	Multifunctional output terminal (it can be high-speed pulse output terminal or open collector output )	Function setting: F06.00 Function setting: F06.01/F06.12、 F06.07/F06.21、 F06.22

## Appendix E Using Introduction of PG card

### 1. Introduction

BD-PG03 is PG card of VP600 (applied to all models) as optional accessories when close-loop vector control.

### 2. Installation and description

#### 1) Installation:

- ①: make sure the AC drive is power off completely.
- ②: aim PG extension card to interface and install.
- ③: fix by screw

#### 2) Description:

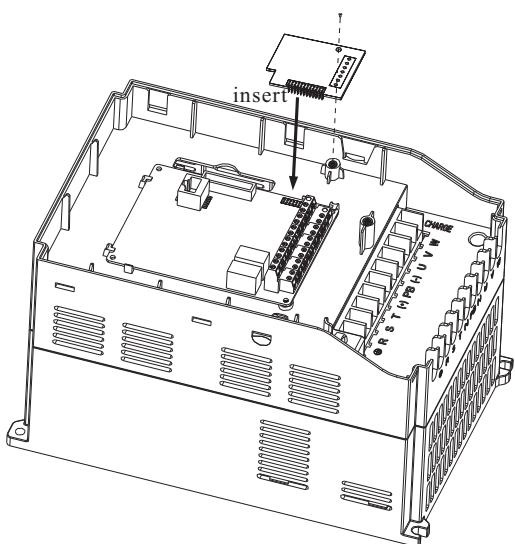


Figure 1 Install of PG extension card



Figure 2 PG card

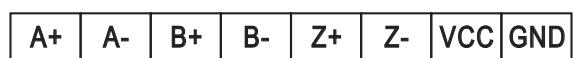


Figure 3 Wiring terminal of PG card

#### ② Description of PG card terminal :

Terminal identification	Terminal function description		Function setting: F02.27~F02.31	
A+	encoder output A signal positive			
A-	encoder output A signal negative			
B+	encoder output B signal positive			
B-	encoder output B signal negative			
Z+	encoder output Z signal positive			
Z-	encoder output Z signal negative			
VCC	encoder input power supply			
GND	power supply pool			

3、PG card jumper function:

- JP1: A phase differential/single-end signal switch over
- JP2: B phase differential/single-end signal switch over
- JP3: Z phase differential/single-end signal switch over
- JP4: encoder input power supply+5V/12V switch over

## Postscript I: IP00 400-500kW Dimensions

